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## ВЕСТНИК

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК  
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### **CYBERCRIME IN THE CONDITIONS OF THE DIGITAL ECONOMY AND THE NEW TENDENCIES IN THE FORENSIC ENQUIRY DEVELOPMENT**

**Abstract.** The rationale of the article is contingent on the possible security threats afflicting the digital economy in the context of the cybercrime spreading. The authors emphasize the important role of the law enforcement agencies in the prevention and suppression of computer crimes, determine their priority tasks and propose the possible solutions to them. The research content touches upon the topical issues of the computer forensic analysis in the conditions of the digital economy development in the Russian Federation. The study focuses on the experts' tasks, problems of implementation and demand for various types of the computer forensics, taking into account the tendencies of the criminal attacks on information and telecommunication systems and the equipment. The article justifies the importance of conducting the comprehensive computer forensics in order to obtain the forensically relevant information when investigating crimes committed using the Internet. From the standpoint of the economy digitalization development analysis, the authors offer the options for the forensics practice improvement and organization of the training for the experts in the forensic units. From the standpoint of the economy digitalization development analysis, the authors suggest the solutions for the computer forensics practice improvement and organization of the training for the experts in the forensic units.

**Keywords:** digital economy, information security threats, cybercrime, computer forensics, forensic examination, professional training.

**Introduction.** The concept of the “digital economy” became up-to-date in Russia quite recently and is connected with the legislative initiatives of the President and the Government of the Russian Federation. The very idea of implementation of the transition to the digital economic relations deserves support and is the scientific and technical progress. Issues of development and implementation of digital technologies in the framework of international integration of the countries of the Eurasian Economic Union are updated in the work of N.V. Kushzhanova and Dashgin Mahammadli [9]. Problems as always lie in the task and solution implementation, as well as creation of the foundation for reliable and secure functioning of the electronic information. The security issues are usually discussed from the standpoint of possible risks and threats, and the ways of their prevention and elimination are developed. An important role in countering the threats to the “digital economy” development shall be played by the law enforcement agencies. Therefore, the main tasks are the prevention, disclosure and investigation of the cybercrime. Their successful solution is impossible without obtaining the forensically significant information.

V. V. Putin, the President of the Russian Federation, in his Address to the Federal Assembly dd December 1, 2016, outlined the necessity to launch a large-scale system program for the development of the digital economy – the Russian economy of a new technological generation. The information society development strategy in the Russian Federation as of 2017–2030 has consolidated such a definition of the digital economy: this is an “economic activity in which the key production factor is the digital data, large volume processing and usage of the analysis allow to increase significantly the efficiency of various types of production, technologies, equipment, storage, sale, delivery of goods and services compared to traditional business forms” (scl. p) c .4) [23].

In order to implement the new progressive direction of the country's economic development, the Government of the Russian Federation approved and accepted for execution of the Russian Federation Digital Economy Program [17]. The implementation of this Program involves the development of the following basic digital technologies: big data; neurotechnology and artificial intelligence; distributed registry systems; quantum technologies; new production technologies; industrial Internet; robotics components and sensorics; wireless technology; virtual and augmented reality technology. The development of the new digital technologies is an inevitable process of modernity, in which a personal life, economy and production are integrated in a single information space that originated with the advent of the World Wide Web. [4].

**Methods.** This study is based on a system-activity approach, which is considered by the authors as an organic unity of tasks arising from the investigative situation, tasks of crime investigation and expert tasks of forensic examinations aimed at studying the properties and state of the objects of expert research. Historical and monographic research methods used in the study of the transformation of the problems solved by forensic examinations, in terms of the complexity of the methods of committing crimes in the field of high technology.

**Statement of the problem.** Though being attractive, the new technologies provide the high functioning efficiency only if they are highly protected from the external and internal information threats. In this regard, it is obvious that the development of the “digital economy” as many other information progress achievements will undoubtedly be accompanied by the realization of information security threats and the cybercrime development [8, 11, 26].

The use of digital technologies in a single information space provides not only the opportunities for the incredible business development, integration of information flows, exchange of knowledge and technologies, but also becomes a platform for illegal acts, as well as a means of crime commitment.

Types of crimes committed with the use of the computer and telecommunication technologies are enshrined in Chapter 28 of the Criminal Code of the Russian Federation: unauthorized access to the computer information (article 272 of the Criminal Code), creation, use and distribution of malicious computer programs (article 273 of the Criminal Code of the Russian Federation), violation of the operation rules for the data storage media, processing or transmitting computer information and information and telecommunication networks (article 274 of the Criminal Code of the Russian Federation), unlawful impact on the critical information infrastructure of the Russian Federation (Article 274.1 of the Criminal Code, was introduced starting from the 1<sup>st</sup> of January, 2018).

According to official statistics, in 2018, 132733 crimes committed using computer and telecommunication technologies were detected, which is 12.7 percent more compared to the same period of the previous year. 87323 crimes were not solved, which is 13.4 percent more compared to 2017. This statistics indicate the insufficiently developed by law enforcement agencies practice of solving such crimes.

In the meantime, it is obvious that cybercrime extends beyond the listed crimes. Computer information and telecommunication technologies often become the tools and means of the crime commitment, and the object of the crime covers the social relations such as property relations (art. 159.3, 159.6 of the Criminal Code), relations in the sphere of economic activity (art. 171.2 of the Criminal Code, art. 174, 174.1 of the Criminal Code, etc.), relations in the field of public health and public morality (articles 228-228.4, 234-234.1 of the Criminal Code), etc. Considering various types of crimes committed with the use of high technologies, we proceed from the generally accepted concept of their understanding not in the criminal law aspect, but in the forensic, which allows us to understand the methods of committing and concealing a crime and, accordingly, to develop methods for the detection and investigation of such crimes. [18, 109-110], including using the capabilities of forensic examinations.

In this connection, it can be concluded that the digital economy relying on advances in the computer technology and information telecommunications and expanding its borders in all the areas of economic, financial, industrial, commercial economic activity and in the public administration sphere, shall constantly be exposed to various criminal attacks, demanding the development of the new and improvement of the existing mechanisms for the information security of the global digital systems and technologies. The law enforcement agencies will have to confront threats, solve and investigate the crimes in the new economic environment. At the same time, measures for such crime prevention and control become of great importance. [10].

The emerging circumstances require the solution of a number of tasks facing the law enforcement agencies:

1. Training of the specialists with the special technical expertise in the field of functioning of the computer equipment, information and network technologies.
2. Analysis of the effective cybercrime investigation practice materials, and on this basis the development of the new and improvement of the existing methods for the high-tech crime solving and investigating.
3. Improvement of the organizational and tactical measures to obtain forensically relevant information both when checking statements (reports) about the prepared or committed crime with the use of the computer information and telecommunication technologies, and in the process of such crime investigation.
4. Conducting of the research and forensic science practice implementation of the new conducting forensic examination methods that meet the needs of investigative practices in solving the problems of the criminal case investigation concerning the use of the modern digital technologies.

The first and the second tasks are currently being solved within the framework of the specialist training in the educational organizations of the Ministry of Internal Affairs of Russia, the Federal Security Service of Russia and other law enforcement agencies and conduction of the scientific and applied research commissioned by the law enforcement agencies. The third task requires, first of all, the improvement of the operational search activity methods and techniques; in practice, it is implemented in the course of the operational search activity conduction (computer information obtaining, withdrawal of the information from the technical communication channels, etc.). The fourth task is quite complicated, its solution is multifaceted: first, it is the technical modernization of the laboratory equipment and the technical complexes included in the existing forensic laboratory equipment; secondly, this is the solution to the task for the creation of the research and analytical departments (services), whose main function is the analysis of the existing expert practice of the new expert task solution and the development of the modern expert research techniques for various kinds (types) of forensic examinations; thirdly, this is a solution to the financing issue concerning the technical modernization of the expert laboratory equipment, as well as the expert personnel professional retraining.

**Results.** We shall consider in more detail the upcoming development directions of the individual kinds (types) of forensic enquiry performed in the forensic units of various law enforcement agencies.

Primary attention shall be paid to the computer forensics (CF) which plays a leading role in the search and study of forensically significant information within the investigation of crimes committed with the use of computer information and telecommunication technologies. [2]. First of all, this particular forensic enquiry requires the continuous improvement of the experts' professional training level in forensic units and the contemporary development of its material and technical base.

As it has been already specified above, the digital economy relying on advances in computer technologies and info-telecommunications will be subject to various criminal attacks, requiring the development of the new and improvement of the existing information security mechanisms for global digital systems and technologies. Computer forensics is assigned to the leading role not only in the search of forensically relevant information but also in the cybercrime prevention [7].

At present the following adopted classification of CF is based on the research providing the computer environment component [19]:

- hardware computer forensics;
- software computer forensics;
- information computer (data) forensics;
- computer network forensics.



Hardware computer forensics examines the technical (hardware) tools of the computer system. The subject of this forensics type are the facts and circumstances substantiated on the basis of the research of the computer hardware operation and functioning consistencies related to the crime commitment.

The computer forensics is designed for the forensic software study implementation. Its subject is the consistencies of the development (creation) and application (use) of the computer system software. The purpose of this enquiry is to study the functional purpose, characteristics, requirements, algorithm, current state of the software presented for the study.

Information computer forensics is the key type of CF as it allows to form holistically the evidence base by the final resolution of the majority of issues related to the computer information. The purpose of this type of enquiry is the search, detection, analysis and evaluation of the forensically significant information prepared by the user or generated (created) by the software in order to organize the information processes in a computer system.

Computer network forensics is based primarily on the functional purpose of the computer tools implementing some network information technology. The necessity to distinguish it in a separate type is associated with the development of Internet technologies and the requirement to use the specific expertise in order to combine the obtained objects and the information about them for the effective solution of the assigned expert tasks.

Let us consider in detail what CF types will be in demand within the global digitalization of economic relations.

The basis of the modern digital relations is the credit and banking organizations. The development of digital technologies in the credit and banking sector will undoubtedly be based on the large-scale expansion of the remote banking services (RBS). Generally, a bank card holder installs the bank mobile application to his smartphone or uses the Internet service. The client-banking applications of the legal entities are developing in parallel with mobile applications. The problem of RBS system cyber-attacks aimed primarily at mobile applications of users and ATMs, remains relevant for several years [1]. The implementation of such attacks is based on the distribution of malicious software exposing both software and hardware of the computer systems. In most cases the distribution channel of such malware is the Internet communications. Consequently, to investigate such crimes it is necessary to conduct a whole complex of CF ranging from the hardware computer to computer network forensics. Since the process of conducting of various CF types involves multisystem platforms that are diverse in their hardware, system and application software, it is necessary to use the modern computer tools and technologies that must be skillfully used. The list of the typical tasks requiring solutions in this case [24]:

- determination of the type (type, brand), properties of the hardware, as well as its technical and functional characteristics;
- identification and study of the functional properties, as well as software settings;
- determination of the program initial state (for example, within the initial installation) and identifying the possible changes;
- determination of the goals and conditions for changing the software properties and state (deliberate changing of some functions, configuration to the specific hardware environment, etc.), investigation into the implementation way of software changes (for example, the effect of a malicious program, the errors in the software environment, unauthorized access);
- determination of the actual state of information, finding out whether there are any deviations from the typical state of the CF objects (for example, whether there are any malicious inclusions, violation of the information integrity, etc.);
- determination of the mechanism and circumstances of the event (case), substantiation of separate stages (phases, fragments) of the event according to the available data carrier information or its copies (for example, preparation of several copies of a business letter and sending it by the fax software to different addresses);
- investigation into the causes of changes in the properties of a computer network (for example, organization of the access control levels; substantiation the fact of network operation mode violation; facts (traces) of using external (“alien”) software use, etc.).

In the case of crime investigation concerning RBS systems that have been attacked or destroyed by viruses, there can be two sides - the server part of the bank's information system and the client module at the user side. Consequently, the software and hardware of the user devices and the data center of the bank shall be subject to the computer forensics. At the same time, difficulties may occur on the server side, under the pretext of ensuring the confidentiality of the processed information. In this regard, a legislative resolution of this problem is required.

It is important to note that cybercrimes are often transnational in nature. In some cases, the servers for information processing and storage, as well as postal services, instant messengers and social networks belong to the foreign companies and are deployed in other states. The ability to withdraw and study the electronic information placed in other states is the key to successful criminal exposure. At present, there is no clear mechanism for prompt obtaining of the information being interesting to the law enforcement agencies outside of the home state. In accordance with the criminal procedure legislation of the Russian Federation, the specified needs of the law enforcement agencies are met by directing of the legal assistance requests to other states. The deadlines for the execution of such requests are often longer than one year and are unacceptable to ensure the prompt investigation of a cybercrime. Thus, it is necessary to develop intergovernmentally a clear algorithm of international assistance in solving of the analyzed category crimes. The assistance terms and mechanisms, the specific responsibilities of the parties should be specified in this algorithm.

The following forensic information can be obtained from the subscriber devices in case of the fraud in RBS systems [5]:

- the traces of malicious software such as Trojan horse viruses or their signatures themselves;
- logs of the operating system and application software;
- crypto containers, password files;
- configuration files and scripts.

The economy digitalization develops the sphere of Internet application services for its support and operation, which means that the user is tasked with the skillful use of authentication tools (credentials, tokens, passwords, crypto containers, etc.). Many objects of economic relations are virtualized and, respectively, exist only in electronic form. The user identity leakage is a current and future time issue. And in this case, CF is crucial to obtain the material evidence. The issues and tasks facing the expert are approximately the same as the ones within the investigation of crimes with the use of RBS. The study of facts and circumstances in this area is a multi-step process as the computer-network forensics may require the hardware computer, the software computer, and, of course, the information computer forensics

Due to the large-scale use of the cryptographic security tools, it shall be necessary to apply the special knowledge in the related fields of mathematics and the computer system security. There may be difficulties due to the remoteness of the object of the forensic enquiry and the impossibility to obtain it for research. Intrinsically, it is difficult to assume the withdrawal of a large data center server or "mirroring" of the entire array of the information located on it.

This kind of computer forensics require various expertise to be more focused on Internet technologies and their development tools. Objects and facts in this case can serve as an evidence base only if they are connected in a chain of transactions accomplished with or without the user's actions on the network data processing devices.

The development of the digital economy in Russia is impossible without the global trends in the growth of the blockchain technology popularity [16]. And this is not only a cryptocurrency, in fact, it is a mechanism of a decentralized, secure and fault-tolerant registry. The scope of implementation is extensive - these are the financial transactions, securities registers, electronic commerce, logistics, etc [15]. The blockchain has proven its effectiveness and reliability in the experience of operations with the cryptocurrencies. The vulnerability of the blockchain technology lies only in the need to confirm transaction operations with private keys. Due to the complexity of the key, its storage is allowed both electronically and in paper form. The evidence from practice shows that the owners themselves are culpable of stealing keys or the vulnerabilities are discovered in the exchange security [6]. Thus, the software computer and information computer forensics can be used in the process of the blockchain technology crime investigation to determine the possible malicious software use, as well as to analyze the application event and the operating system logs.

However, the blockchain technology admits the unauthorized use of the remote computers' resources for cryptocurrency mining. As a rule, the organization of such botnets is based on the exploitation of any operating system vulnerabilities and the usage of the remote computer power for the benefit of unknown persons. In this type of the computer crime it is necessary to exclude the malware presence in the computer. In this case the software computer and the computer network forensics are demanded. The problematic issues of research of objects located in remote computer systems are updated in their research by D.A. Tarasov [25].

The cryptocurrency exchange hacking cases are frequent in the world practice [13]. The main vulnerability lies in the errors of configuration, administration and the site development security systems. The software computer and the information computer forensics of the server equipment is important in the investigation of such incidents. It is necessary to examine the event and security logs, as well as the configuration files.

The growing trend of the digital economy should be the growing popularity of the Internet of things [12]. Due to the large number of the "smart" equipment manufacturers, there is an increasing risk that developers do not pay enough attention to the security issues of the management services, the application software and the hardware configuration [3]. Thus, in order to search for crime traces, the investigation should include both the hardware and the software of the device along with the network configuration. All this shall require the appointment of a full range of the computer forensics. The role of forensic computer-technical expertise in solving complex expert problems is considered in [27].

The processes of the digital technology widespread use are already being actively implemented in the business, the economic and financial management sphere, the accounting automation has already been spread greatly simplifying the processing of accounting information large amounts and reporting. The new procedure for using cash registers is being introduced into practice, which provides the online transfer of the information about each calculation made in an organization to the server of the RF Tax Service. As already specified above, the development of digital technologies within the implementation of the credit and banking operations is based on a large-scale expansion of the remote banking services.

Electronic document management, modern technologies for creating a primary or other document, the use of automated accounting information processing systems - all these are the realities of the modern world, on the one hand, optimize lots of financial and business processes and are aimed at strengthening of the state control over the financial flow implementation. But, on the other hand, unfortunately, the digitalization of the economy gives rise to the new criminal schemes for money embezzlement, as well as the schemes for criminal proceeds introduction into the legal economic circulation.

The forensic economical examination is of great importance in obtaining the evidentiary information in the course of the investigation of such criminal cases. Specific objects of research in such expertise are the material storage media containing information on accounting and economic transactions relating to the subject of a specific examination. Such information can be provided for examination both on paper and on non-rewritable CD-R (DVD-R, BD-R) discs. In conditions when the compulsory paper media duplication of the accounting information is not required by the law [14], and the accounting data bases of an economic entity may be remotely accessible, it becomes necessary to obtain and withdraw such electronic information with the participation of a specialist (Articles 182, 183 of the Criminal Procedure Code). The need for the participation of a specialist in the field of forensic computer-technical expertise in the production of forensic economic examinations is updated in his works by A.I. Semikalenova and M.G. Nersesyan [20, 21]. The information withdrawn in electronic form is subsequently sent for examination. In such situations the practice of the last 5-7 years follows the path of the complex computer and economic forensics, when it is first necessary to decipher information in the electronic form and to convert it into the ordinary accounting and economic information and then it is to be analyzed by an expert economist.

Taking into account the ever-increasing volumes of the accounting information submitted in the digital form for the economic forensics, the development of the analytical software algorithms for the typical expert task solution will be required in the coming years. This will require, firstly, the analysis of the already existing positive practice of the typical EF expert task solution and, on this basis the development of software algorithms that make it easier for the expert to perform computations and calculations. Accordingly, the workplace of each forensic economist should be equipped with the

appropriate software and hardware to optimize the time of the enquiry. Secondly, it will be necessary to organize the retraining and the advanced training of the forensic economists in this direction.

**Conclusion.** Summarizing the issue of the development trends for the individual forensic examination kinds (types) in the context of the active digital technologies implementation in the economy, the public administration sphere in the Russian Federation and the resulting threats to information security and the cybercrime spread, the general conclusions shall be drawn.

First, the dominant role in the search and study of evidentiary information in the investigation of the computer and telecommunication technology criminal cases shall belong to the computer forensics. The solution of individual investigation tasks for such crimes shall require the development of the comprehensive forensic enquiry conducted in conjunction with the computer forensics. For example, the investigation of criminal cases related to the criminal proceeds legalization using the blockchain technology, through the implementation of the credit and banking operations, shall require the development of the new directions in the expert problem solution of the comprehensive computer and economic forensics.

Secondly, the relevant direction is the improvement of educational programs for the future investigators aimed at introducing of a special discipline - let's call it, for example, "Basics of the forensic computer knowledge", giving an in-depth study of the functioning of the computer equipment, information and network technologies and possible directions of the criminal use of such technologies and their detection mechanism. In the same direction, in the coming years, the professional retraining and advanced training of the current employees of the forensic law enforcement units shall be required.

The search for new directions in the development of forensic enquiry in the conditions of the digital technology progress and thus, the possible criminalization of economic operations, is becoming a relevant area of the scientific research today.

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#### **ЦИФРЛЫҚ ЭКОНОМИКАДАҒЫ КИБЕРҚЫЛМЫС ЖӘНЕ СОТТЫҚ САРАПТАМА ДАМУЫНДАҒЫ ЖАҢА ТЕНДЕНЦИЯЛАР**

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#### **КИБЕРПРЕСТУПНОСТЬ В УСЛОВИЯХ ЦИФРОВОЙ ЭКОНОМИКИ И НОВЫЕ ТЕНДЕНЦИИ В РАЗВИТИИ СУДЕБНЫХ ЭКСПЕРТИЗ**

**Аннотация.** Актуальность статьи обусловлена возможными угрозами безопасности, стоящими перед цифровой экономикой в условиях распространения киберпреступности. Отмечается важная роль правоохранительных органов в профилактике и пресечении компьютерных преступлений, определяются стоящие перед ними приоритетные задачи и предлагаются варианты их решения. Основное содержание работы затрагивает актуальные вопросы проведения судебных компьютерно-технических экспертиз в условиях развития цифровой экономики в Российской Федерации. Обсуждаются стоящие перед экспертами задачи, проблемы реализации и востребованность различных видов компьютерно-технических экспертиз с учетом тенденций преступных посягательств на инфотелекоммуникационные системы и оборудование. Обосновывается важность проведения комплексной компьютерно-технической экспертизы с целью получения криминалистически значимой информации при расследовании преступлений, совершаемых с использованием сети Интернет. С позиций анализа развития цифровизации экономики предлагаются варианты совершенствования практики проведения компьютерно-технических экспертиз и организации подготовки специалистов экспертно-криминалистических подразделений.

**Ключевые слова:** цифровая экономика, угрозы информационной безопасности, киберпреступность, судебная компьютерно-техническая экспертиза, профессиональная подготовка.

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**REFERENCES**

- [1] Current Cyber Threats – 2017: Trends and Expectations (2017) // In Positive Technologies, available at: <https://www.ptsecurity.com/upload/corporate/ru-ru/analytics/Cybersecurity-threatscape-2017-rus.pdf> (in Rus.).
- [2] Andrew Jones, Stilianos Vidalis (2019). Rethinking Digital Forensics // Annals of Emerging Technologies in Computing. 2019. 3(2). P. 41-53. DOI: 10.33166/AETiC.2019.02.005 (in Eng.).
- [3] Anti-virus report for 2017: let's forget about the malicious software (2017). Available at: <https://habr.com/company/panda/blog/347430> (in Rus.).
- [4] Bukht R., Heeks R. (2018). Defining, Conceptualising and Measuring the Digital Economy // International Organisations Research Journal. Vol. 13, N 2. P. 143-172. DOI: 10.17323/1996-7845-2018-02-07 (in Rus.).
- [5] Imam Riadi, Sunardi, Muhamad Ermansyah Rauli (2018). Identifikasi Bukti Digital WhatsApp pada Sistem Operasi Proprietary Menggunakan Live Forensics // Jurnal Teknik Elektro. 2018. 10(1): 18-22. DOI: <https://journal.unnes.ac.id/nju/index.php/jte/article/view/14070/7872> (in Eng.).
- [6] How bitcoins can be stolen: five most widespread ways (2017). Available at: <https://coinspot.io/technology/bezopasnost/kak-kradut-bitcoiny-pyat-rasprostranyonnyh-sposobov> (in Rus.).
- [7] Khatuntsev N.A. (2017). Standardization of Terms and Definitions in Computer Forensic Science // Theory and Practice of Forensic Science. 2017. 12(4): 34-36. DOI: <https://doi.org/10.30764/1819-2785-2017-12-4-34-36> (in Rus.).
- [8] Kopczewski M., Napieralska A. (2018) Cyber space – risks to children and young people – research results // Scientific Journal of the Military University of Land Forces. Vol. 50, N 4(190). P. 45-58. DOI: <http://dx.doi.org/10.5604/01.3001.0013.0720> (in Eng.).
- [9] Kushzhanov N.V., Dashqin Mahammadli (2019). Cifrovaya povestka EAES...// Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494. 2019. Vol. 2. N 378. 55-61. <https://doi.org/10.32014/2018.2518-1467.40> (in Eng.).
- [10] Magdalena El Ghamari (2018). Cyberspace Protection – the Challenge of Our Time? // Bezpieczeństwo i Technika Pożarnicza. 2018. 49(1): 24-33 DOI: 10.12845/bitp.49.1.2018.2 (in Eng.).
- [11] Makhalin V.N., Makhalina O.M. (2018). Management of calls and threats in digital economy of Russia // Upravlenie. 2018. 6(2). 57-60. DOI: <https://doi.org/10.26425/2309-3633-2018-2-57-60> (in Rus.).
- [12] Md Arafatur Rahman, A. Taufiq Asyhari. (2019). The Emergence of Internet of Things (IoT): Connecting Anything, Anywhere // Computers. 2019. 8(2):40. DOI: 10.3390/computers8020040 (in Eng.).
- [13] The most explosive hacking attacks on cryptocurrency exchanges in 2017 (2017) // In Rossiiskii biznes on-line [Russian Business online], available at: <http://www.innov.ru/news/it/nazvany-samye-gromkie-kha>. (in Rus.).
- [14] About the Accounting: the Federal Law № 402-FZ of December 4, 2011, articles 9, 10 (2011). (in Rus.).
- [15] Pavlova Kristina I. (2019) The Advantages and Risks of Using Cryptocurrency in the Modern Digital Economy // Biznes Inform. 2018. 7(486). 229-233. DOI: [http://www.business-inform.net/export\\_pdf/business-inform-2018-7\\_0-pages-229\\_233.pdf](http://www.business-inform.net/export_pdf/business-inform-2018-7_0-pages-229_233.pdf) (in Rus.).
- [16] Prateek Goorha (2019). The Contractual Cryptoeconomy: An Arrow of Time for Economics // The Journal of The British Blockchain Association. 2019. 2(1):1-9. DOI: 10.31585/jbba-2-2-(1)2019 (in Eng.).
- [17] "The Digital Economy of the Russian Federation." Program: approved by the RF Government Decree of July 28, 2017 (2017). N 1632-r. (in Rus.).
- [18] Rossinskaya E.R. (2016) K voprosu o chastnoj teorii informacionno-komp'yuternogo obespecheniya kriminalisticheskoy deyatel'nosti // Izvestiya Tul'skogo gosudarstvennogo universiteta. Ekonomicheskie i yuridicheskie nauki. Izdatel'stvo: Tul'skij gosudarstvennyj universitet (Tula) ISSN: 2071-6184. 2016. N 3-2. P. 109-117 (in Rus.).
- [19] Rossinskaia E.R. (2011). Forensic Enquiry in the Civil, Arbitral, Administrative and the Criminal Proceeding: Research and Practice Workbook. Moscow: Norma (in Rus.).
- [20] Semikalenova A.I., Nersesyan M.G. (2013) Osobennosti uchastiya specialista v oblasti sudebnoj komp'yuternotekhnicheskoy ekspertizy v proizvodstve sudebno-ekonomicheskoy ekspertizy // Teoriya i praktika sudebnoj ekspertizy v sovremennykh usloviyah: materialy 4-j Mezhdunarodnoj nauchno-prakticheskoy konferencii. ISBN: 978-5-392-10099-6. M.: Prospekt, 2013. P. 251-253 (in Rus.).
- [21] Semikalenova A.I., Nersesyan M.G. (2011) Problemy proizvodstva sudebnykh finansovo-ekonomicheskikh ekspertiz, ob"ektom kotorykh vystupayut produkty avtomatizacii buhgalterskogo i finansovogo ucheta // Teoriya i praktika sudebnoj ekspertizy. Izd-vo: Rossijskij Federal'nyj centr sudebnoj ekspertizy pri Ministerstve yusticii Rossijskoj Federacii (Moskva). ISSN: 1819-2785 eISSN: 2587-7275. 2011. P. 128-132 (in Rus.).

- [22] The Criminal Situation in Russia as of January – December. (2018). Available at: <https://мвд.рф/reports/item/16053092/> (in Rus.).
- [23] The Strategy of the Information-oriented Society Development in the Russian Federation as of 2017-2030: approved by the Decree of the Russian Federation President of May 9, 2017. N 203 (in Rus.).
- [24] Sudebnye ekspertizy v grazhdanskom sudoproizvodstve: organizaciya i praktika: nauchno-prakticheskoe posobie (2014) // Glava 8. Sudebnaya komp'yuterno-tekhnicheskaya ekspertiza / Pod. red. prof. E. R. Rossinskoj. M.: Izdatel'stvo YUrajt; ID Yurajt. ISBN 978-5-9916-4579-9 (Izdatel'stvo Yurajt). ISBN 978-5-9692-1569-6 (ID Yurajt). 2014: 364-384 (in Rus.).
- [25] Tarasov D.A. (2019) Situacionnaya ekspertiza obstoitel'stv formirovaniya sledovoj kartiny v komp'yuternyh sistemah // Ugolovnoe sudoproizvodstvo: problemy teorii i praktiki. Izdatel'stvo: OOO "Izdatel'stvo "YUniti-Dana" (Moskva). ISSN: 2346-8335. 2019. 1: 141-143 (in Rus.).
- [26] Udalov D.V. (2018). Threats and Challenges of the Digital Economy // Economic security and quality. 2018. 1 (30). P. 12-17 (in Rus.).
- [27] Usov A.I., Edzhubov L.G., Karpuhina E.S., Hatuncev N.A. (2011) Rol' komp'yuterno-tekhnicheskoy ekspertizy pri reshenii kompleksnyh zadach // Ekspert-kriminalist Izdatel'stvo: Izdatel'skaya gruppa "Yurist" (Moskva). ISSN: 2072-442X. 2011. 4: 31-35 (in Rus.).
- [28] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494.4(380). P. 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [29] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S., Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. (2019). Foresight and the role of innovation in the development of education // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494.4(380). 93-101. <https://doi.org/10.32014/2019.2518-1467.96>
- [30] Mamyrbayev O.Z., Othman M., Akhmediyarova A.T., Kydyrbekova A.S., Mekebayev N.O. Voice verification using I-vectors and neural networks with limited training data // Bulletin of the National academy of sciences of the Republic of Kazakhstan. 2019. N 3(379). P. 36-43. <https://doi.org/10.32014/2019.2518-1467.66>
- [31] Lavrinenko S.V., Arpentieva M.R., Kassymova G.K. (2019). The negative impact of the internet on the educational process. International youth scientific conference "Heat and mass transfer in the thermal control system of technical and technological energy equipment" (HMTTSC 2019). <https://doi.org/10.1063/1.5120671>
- [32] Atayeva M., Putro N.H.P.S., Kassymova G., Kosbay S. (2019) Impact of reading on students' writing ability // Materials of International Practical Internet Conference "Challenges of Science". ISBN 978-601-323-144-0. Issue II, 2019. P. 5-13. <https://doi.org/10.31643/2019.001>
- [33] Kassymova K.G., Tyumaseva Z.I., Valeeva G.V., Lavrinenko S.V., Arpentieva M.R., Kenzhaliyev B.K., Kosherbayeva A.N., Kosov A.V., Duvalina O.N., Dossayeva S.K. Integrative model of student and teacher stress coping: the correction of relations in educational, professional and personal interaction // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494. 2019. Vol. 3, N 379. P. 169-179. <https://doi.org/10.32014/2019.2518-1467.83>
- [34] Arpentieva M.R., Kassymova G.K., Lavrinenko S.V., Tyumaseva Z.I., Valeeva G.V., Kenzhaliyev O.B., Triyono M.B., Duvalina O.N., Kosov A.V., Dossayeva S.K. Environmental education in the system of global and additional education // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494. 2019. Vol. 3, N 379. P. 158-168. <https://doi.org/10.32014/2019.2518-1467.82>
- [35] Azatbek T., Panzabekova A., Bekenova L., Yegizbyeve Zh. The share of drug trafficking in Kazakhstan's GDP: methods for evaluation // Economic Annals-XXI (2017). 166(7-8). P. 31-36(Scopus). DOI: <https://doi.org/10.21003/ea.V166-06>
- [36] Khalitova M.M., Praliev G.S., Panzabekova A.Z., Andreeva Z.M., Dzhubaliyeva Z.A. Financial instruments of state regulation industrial and innovative development of Kazakhstan economy // Life Sci J. 2014. 11(10s):369-378. (ISSN:1097-8135). <http://www.lifesciencesite.com.70>

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## INVESTIGATION OF THE EFFECT OF *XANTHIUM STRUMARIUM* L. EXTRACT ON THE LEVEL OF THYROID-STIMULATING HORMONES AND MASS COEFFICIENT OF RAT THYROID GLAND

**Abstract.** Iodine deficiency disorders (IDD) are pathological states caused by the reduction of iodine intake. These diseases include iodine-deficient hypothyroidism, diffuse nontoxic goiter, nodular goiter, functional autonomy of thyroid. Goiter is one of the most common thyroid disorders. Iodine deficiency is the most common cause of these diseases. It is evident that the most adverse effects arise with early stage of human development that moves through the stages of embryofoetal development infancy, childhood, adolescence, and adulthood. The main etiologic factor of this pathology is a lack of iodine in biosphere; it is almost unchanged. Therefore the prevention and control of iodine deficiency disorders among the population in iodine deficient regions is nagging health and social problem.

It is known that seafood (seaweed, shellfish, mollusks, and fish) is the primary natural source of iodine. Other food products contain insignificant amount of this micro-element. Brown algae that is rich in iodine stimulates the thyroid gland and regulates its metabolism. In addition to seaweeds and seafood there are plants that are source of iodine and used for pharmacological correction and prevention of IDD. These plants contain substances that have an effect not on the thyrocytes but on the cells of immune system present in gland and responsible for the processes of tissue regulation. *Xanthium strumarium* L. is relevant to plants that have a great impact on the pathogenesis of the respective diseases. That's why this plant was chosen as a study object.

Extract of *Xanthium strumarium* L. has been obtained. The amount of total iodine (0.21%) has been performed by titrimetric method with sodium thiosulfate (0.01M) according to the requirements of the monograph "Laminaria<sup>N</sup>" of the State Pharmacopoeia of Ukraine.

The influence of *Xanthium strumarium* L. extract on the level of thyroid-stimulating hormones in serum and mass coefficient has been investigated on the model of perchlorate-induced hypothyroidism. It has been established that *Xanthium strumarium* L. extract was inferior to efficacy compared to reference drug "Iodomarin<sup>®</sup> 100". Taking into consideration mechanism of action of sodium perchlorate, it can be assumed that inorganic iodine contained in the tablets of "Iodomarin<sup>®</sup> 100" had higher ability to penetrate into the tissues of thyroid gland compared to other mostly organic forms of iodine in *Xanthium strumarium* L. extract. This inorganic form of iodine results in lowering of local iodine deficiency and reduces signs of pathology.

**Key words:** iodine deficiency disorders, *Xanthium strumarium* L., extract, thyroid-stimulating action.

Iodine deficiency disorders (IDD) are a major challenge to the health of populations all over the world. According to estimates of WHO and UNICEF more than billion of people were at risk of IDD, 300 millions were affected by goiter. That's why primary health care and control of IDD was included into the international programs together with such diseases as AIDS, infantile paralysis and tuberculosis [1, 2].

Prevention and control of iodine deficiency disorders among the population in iodine deficient regions are one of the biggest worldwide public health problems. IDD elimination is a top-priority task for many countries worldwide including Ukraine [3].

Iodine is essential for the production of thyroid hormones, for normal growth, and for brain development. Iodine is naturally present in seawater and in the soil, and the iodine content of the soil

determines its content in vegetables, milk, and eggs. Fish, seafood, and algae are good sources of iodine. Brown algae that is rich in iodine stimulates the thyroid gland and regulates its metabolism [4, 5].

In addition to seaweeds and seafood there are plants that are source of iodine and used for pharmacological correction and prevention of IDD. These plants contain substances that have an effect not on the thyrocytes but on the cells of immune system present in gland and responsible for the processes of tissular regulation. These plants are used individually or in combination. *Xanthium strumarium* L. belongs to the plants that effect the aetiopathogenesis. Therapeutic benefit of this plant is evident as at the toxic goiter and at the Riedel disease [6].

*Xanthium strumarium* L. (Family: *Compositae*) is a cocklebur or burweed commonly found as a weed in roadsides, rice fields, hedges throughout the tropical parts of India, South America, Europe, Caucasus, some regions of Asia and Russia. This plant is the most abundant and widely spread out in Australia, Africa, and Oceania and also in South America [7].

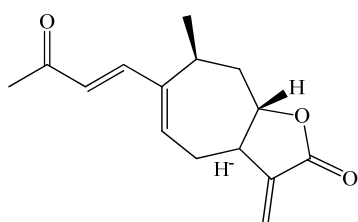
The plant is successfully used in treating thyroid disorders; it has evident antiseptic, antithermic, anti-inflammatory, fungicidal and diaphoretic properties. People's experience points to the fact that *Xanthium strumarium* L. is really therapeutically effective agent. But this plant is not used in Ukrainian academic medicine.

The aerial parts of the plant contain a mixture of unidentified alkaloids, which are said to be toxic. Besides alkaloids, the aerial parts of the plant contain sesquiterpene lactones, viz. xanthinin; its stereoisomer, xanthumin, xanthatin (deacetyl xanthinin); a toxic principle, a sulphated glycoside: xanthostrumarin, atractyloside, carboxyatractyloside; phytosterols, xanthanol, isoxanthanol, xanthinosin, 4-oxo-bedfordia acid, hydroquinone; xanthanolides; caffeoylquinic acids;  $\alpha$  and  $\gamma$ -tocopherol; thiazinedione, 4-oxo-1(5),2,11,(13)-xanthatriene-12,8-olide, known as "deacetyl xanthumin" an antifungal compound; linoleic acid. The main toxic compound isolated from the plant has been identified as carboxyatractyloside, a kaurene glycoside previously called xanthostrumarium. In addition to carboxyatractyloside CAT, potentially toxic ingredients include several sesquiterpene lactones (e.g. guaianolides, germacranolides, and elemanolides). Aerial parts contain three xanthanolide and xanthanetype sesquiterpenoids, 11 $\alpha$ ,13-dihydroxanthatin, 4 $\beta$ ,5 $\beta$ epoxyxanthatin-1 $\alpha$ ,4 $\alpha$ -endoperoxide, 1 $\beta$ ,4 $\beta$ ,4 $\alpha$ ,5 $\alpha$ -diepoxy xanth-11(13)-en-12-oic acid, a dimeric xanthanolide, sesquiterpene lactones, 8-epixanthatin, 2-epixanthumin and 8-epixanthatin-5 $\beta$ -epoxide. The phenols isolated are caffeic acid, potassium 3-O-caffeoylquinic acid, 1-O-caffeoylquinic acid, chlorogenic acid, 4-O-caffeoylquinic acid, 1,4-di-O-caffeoylquinic acid, 1,5-di-O-caffeoylquinic acid, 3,5-di-O-caffeoylquinic acid, 4,5-di-O-caffeoylquinic acid, 1,3,5-tri-O-caffeoylquinic acid, 3,4,5-tri-O-caffeoylquinic acid, and cynarin. The toxic principles of the seeds are hydroquinone, choline and a third more toxic unidentified compound. Besides these, the seeds also contain considerable amount of iodine. The fruits are rich in vitamin C [8, 9]. Thiazinediones isolated from the fruits are 7-hydroxy methyl-8,8-dimethyl-4,8-dihydrobenzo[1,4]thiazine-3,5-dione-11-O- $\beta$ -d-glucopyranoside, 2-hydroxy-7-hydroxymethyl-8,8-dimethyl-4,8-dihydrobenzo[1,4]thiazine-3,5-dione-11-O- $\beta$ -d-glucopyranoside, 7-hydroxymethyl-8,8-dimethyl-4,8-dihydrobenzo[1,4]thiazine-3,5-dione, 7-hydroxy-methyl-8,8-dimethyl-4,8-dihydrobenzo[1,4]thiazine-3,5-dione-(2-Ocaffeoyl)- $\beta$ -d-glucopyranoside, ferulic acid, formononetin and ononin. The powdered shell of fruit can be used for making activated carbon. The shells contain 15.9% pentosans and can be used as a raw material for the synthesis of furfural. The young fruit contains glucose, fructose, sucrose, organic acids, phosphatides, potassium nitrate,  $\beta$ -sitosterol,  $\gamma$ -sitosterol,  $\beta$ -d-glucoside of  $\beta$ -sitosterol called strumaroside. The total free amino acid content is 1.65%. It includes amino-n-butyric acid, arginine, aspartic acid, cystine, glutamic acid, methionine, proline, tryptophan in micromoles per milligram dry weight [10, 11]. The structural formulas of the most important biologically active substances of *Xanthium strumarium* L. are given in the figure.

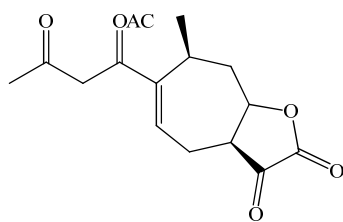
Additionally, *Xanthium strumarium* L. contains a significant quantity of iodine-containing compounds that regulate functional activity of thyroid gland [11, 12].

**Materials and methods.** Extract of *Xanthium strumarium* L. was obtained in accordance with general scheme. Air-dried herbal raw material, reduced in size of particles passing through the 3-4 mm sieve openings, was added to the extractor. Hot water extraction was performed at raw material to extracting solvent ratio of 1:10 till complete recovery of biologically active substances taking into account adsorption coefficient of extracting solvent.

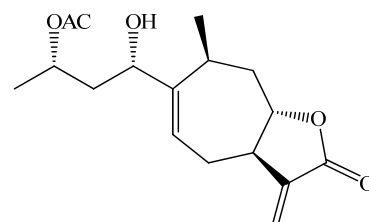




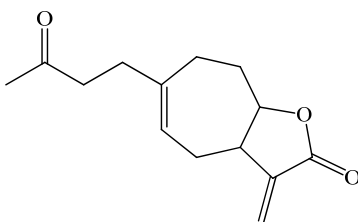
(-)-xanthatin



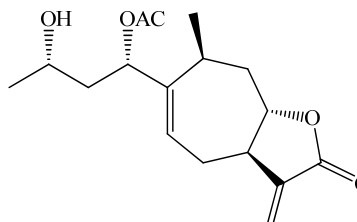
xanthinin



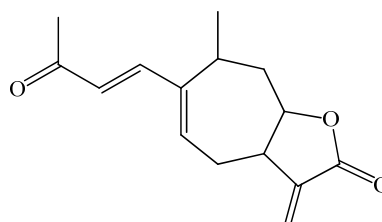
xanthanol



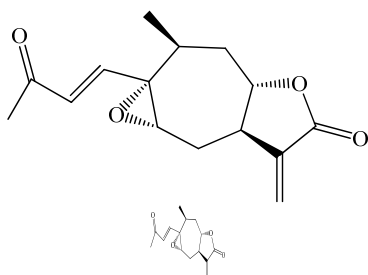
xanthinosin



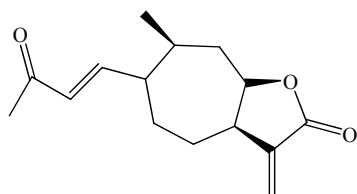
isoxanthanol



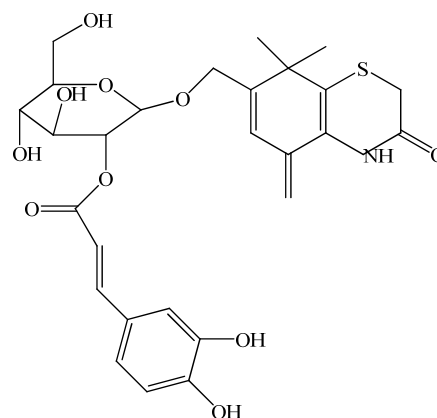
deacetyl xanthumin



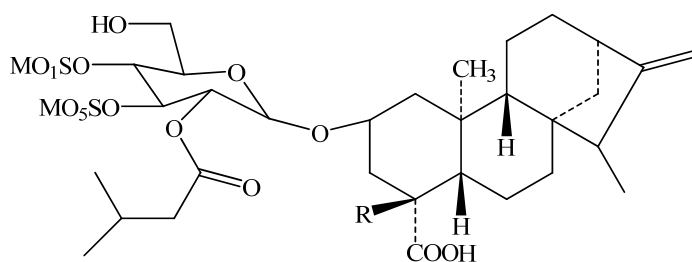
5-epixanthatin-5β-epoxide



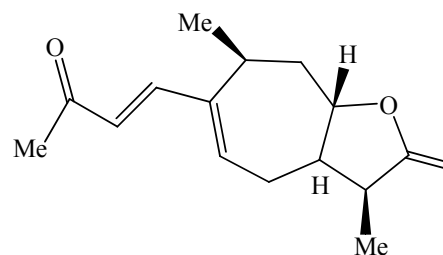
8-epixanthatin



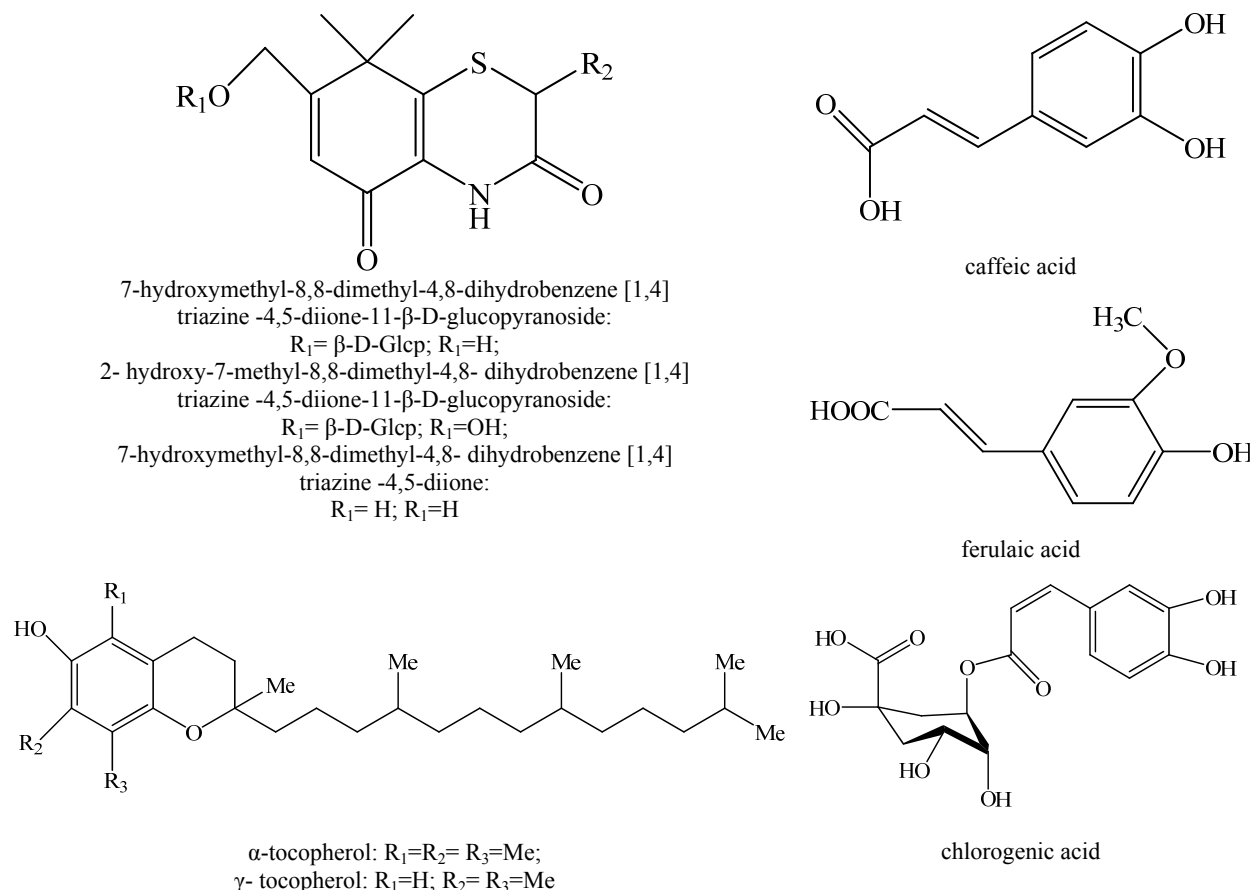
7-hydroxy-8,8-dimethyl-4,8-dihydroxybenzene [1,4] triazine-3,5-diion-(2-O-caffeol)-β-D-glucopyranoside



Anthraglycoside  
M=H, R=H  
carboxy anthraglycoside  
M=H, R=COOH



11α-13-dihydroxy xanthatin



Structural formulas of the most important biologically active substances of *Xanthium strumarium* L.

Extraction was carried out twice at 70-80 °C for 1.5-2 hours. Obtained extracts were pooled, allowed to stand and filtered.

Assay of iodine content in the extract of *Xanthium strumarium* L. has been determined according to the procedure specified in the monograph "Laminaria<sup>N</sup>" of the State Pharmacopoeia of Ukraine (SPHU). This procedure involves alkaline mineralization of the raw material followed by titrimetric determination of total iodine (titrant is a 0.01 M sodium thiosulphate, indicator is a starch) [13]. This procedure was adapted to the monograph "Kelp" of the European Pharmacopoeia [14].

Investigation of thyrotropic activity of the *Xanthium strumarium* L. extract was conducted at the Central Research Laboratory (CRL) of National University of Pharmacy under the supervision of PharmDr., Prof. Yakovleva L.V. and specialist of 3 category Babenko D.I.

Study of the effect of *Xanthium strumarium* L. extract on the thyroid hormone levels and mass coefficient has been done on the mongrel female rats (body weight is 200±20 g). Rats were grown in the vivarium of CRL and were kept in the room for analysis for 7 days to adapt to environment. Throughout the study, animals were kept in natural light conditions and an ambient temperature 20±2°C. The animals had free access to food and water [15]. The animals were treated in accordance with the rules of European Convention for the Protection of Vertebrate Animals used for Experimental and Other Scientific Purposes [16]. The animals were randomly divided to 4 groups (n=6/each) consisting:

1 group – intact control (IC) – healthy animals, 2 group – control of pathology (CP) – animal modeling of hyperthyroidism, 3 group – animals were intragastrically received *Xanthium strumarium* L. aqueous extract in daily manner for 20 days at the development of hypothyroidism, 4 group – animals were intragastrically received *Xanthium strumarium* L. aqueous extract in daily manner for 30 days at the development of hypothyroidism. Dose of the extract was calculated in accordance with the content of organic and inorganic forms of iodine on dried extract base and it was 1.14 g/kg equivalent to iodine content 23.92 µg/kg (it was recalculated for rats with recommended dose of iodine (400 µg/kg) for

hypothyroidism treatment) [17]. Nonclassical model of sodium perchlorate-induced hypothyroidism was chosen for the determination of thyrotropic activity of the extract. Reasonability of selected model is explained by the fact that sodium perchlorate is a competitive inhibitor of the sodium–iodide symporter (NIS) at the entrance of iodide into the thyroid and causes local iodine-deficient condition. That's why we are of the opinion that this model is suitable for study of iodine-containing medicinal products [18, 19]. Modeling of hypothyroidism was performed by the injection of 1% sodium perchlorate solution in rats for 20 days.

“Iodomarin® 100” was taken as reference drug. The investigation of the effect of the reference drug was carried out in 3 weeks after the start of first experiment with *Xanthium strumarium* L. aqueous extract. Study design and doses of “Iodomarin® 100” were the same as for study with *Xanthium strumarium* L. extract. Since animal management (temperature and light conditions, feed) was not changed and animals were grown in the same vivarium, it makes most sense to compare data of both experiments.

Animals were narcotized by chloroform, eliminated thyroids, and collected blood for serum preparation. Eliminated thyroids were weighted and mass coefficient (MC) was calculated using the following formula:

$$MC = \frac{M_{org(g)}}{M_{animal\ body\ weigh(g)}} \cdot 100.$$

Once this is done, thyroids were selected for histological examination. Levels of triiodothyronine (T<sub>3</sub>) and thyroxine (T<sub>4</sub>) were determined using the Thyroid-IFA reagent kits (Manufactured by Alkor Bio, Russia). Statistical data processing was performed using the STATISTICA 6.0 software package. The statistical significance of differences in quantitative parameters with a distribution that differs from the normal one was evaluated using Kruskal-Wallis test and the Mann-Whitney method.

**Results and discussion.** Obtained *Xanthium strumarium* L. aqueous extract was a brown transparent extract with a characteristic apple smell and bitter taste. It was complied with the requirements of SPhU. Determined total iodine content was 0.021 %.

The results of pharmacological study showed that T<sub>3</sub> and T<sub>4</sub> hormone levels in serum have been significantly decreased after the injection of 1% sodium perchlorate solution. That was in agreement with data obtained by other authors and gave evidence of goiter development [19]. Taking into account the significant increase in the values of the MC by 3 times in the group of control pathology compared to intact group, it can be concluded that hypothyroid condition complicated with goitrous hyperplasia develops in the experimental animals. Administration of *Xanthium strumarium* L. extract for 20 or 30 days did not increase significantly T<sub>3</sub> or T<sub>4</sub> concentration in rat blood serum despite of increased level of T<sub>3</sub>. Increased values of T<sub>3</sub> concentration were not statistically significant. Significant increase in T<sub>3</sub> and T<sub>4</sub> concentration in rat blood serum was observed during the treatment with “Iodomarin® 100” for 20 days. Additionally, further normalization of thyroid-stimulating hormone levels in the serum was seen at prolonged treatment (30 days) (tables 1 and 2).

Table 1 – Concentration of free triiodothyronine (T<sub>3</sub>)  
in the serum of rats after administration of *Xanthium strumarium* L. extract

T <sub>3</sub> level (nmol/l)			
IC	CP	20-th day of administration	30-th day of administration
1.72±0.10	0.67±0.10*	0.85±0.14*	0.91±0.09*
T <sub>4</sub> level (nmol/l)			
IC	CP	20-th day of administration	30-th day of administration
43.83±9.82	14.1±3.6*	14.08±4.4*	13.3±4.5*
<p>Note. 1. * – statistically significant difference compared to group of intact control; ** – statistically significant difference compared to group of control pathology, p≤0.05.</p> <p>2. All data were presented as Mean±SE.</p>			

Table 2 – Concentration of free thyroxine (T<sub>4</sub>)  
in the serum of rats after administration of *Xanthium strumarium* L. extract

T <sub>3</sub> level (nmol/l)			
IC	CP	20-th day of administration	30-th day of administration
1.27±0.21	0.59±0.04*	0.82±0.06*/**	1.20±0.20**
T <sub>4</sub> level (nmol/l)			
IC	CP	20-th day of administration	30-th day of administration
53.0±3.34	9.72±1.34*	14.2±2.05*/**	29.8±8.86**
<p>Note. 1. * – statistically significant difference compared to group of intact control; ** – statistically significant difference compared to group of control pathology, p≤0.05. 2. All data were presented as Mean±SE.</p>			

Table 3 – Values of thyroid mass coefficient in rats after administration of “Iodomarin®100”

The value of MC				
Test drug	IC	CP	20-th day of administration	30-th day of administration
<i>Xanthium strumarium</i> L. extract	5.2	22.23*	19.7*	22.67*
Iodomarin	5.3	21.42*	21.64*	12.73*/**
<p>Note. 1. * – statistically significant difference compared to group of intact control; ** – statistically significant difference compared to group of control pathology, p≤0.05. 2. Data is given as M±S.E.</p>				

In regard to change in MC of thyroid gland *Xanthium strumarium* L. extract did not show therapeutic efficacy at both treatment periods while “Iodomarin®100” significantly decreased values of MC by 2 times for 30 days of treatment (table 3).

**Conclusion.** Extract of *Xanthium strumarium* L. was obtained. Determination of total iodine was performed by the titrimetric method in accordance with the procedure set out in the monograph “Laminaria<sup>N</sup>” of the SphU, it was 0.021 %, respectively.

Effect of the *Xanthium strumarium* L. extract on the thyroid-stimulating hormone levels and mass coefficient was investigated on the model of perchlorate-induced hypothyroidism. It has been established that *Xanthium strumarium* L. extract exhibited inferior efficiency for normalization of thyroid-stimulating hormone levels and decrease mass coefficient of thyroid glands compared to “Iodomarin®100”. Taking into account mechanism of action of perchlorate, it may be assumed that inorganic iodine contained in the tablets of “Iodomarin®100” penetrated better into the tissues of thyroid gland by contrast to other mostly organic forms of iodine in the *Xanthium strumarium* L. extract thus reducing signs of pathology and improving local iodine-deficient condition.

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САРЫСОЯУ СЫҒЫНДЫСЫНЫҢ  
ТИРЕОТРОПТЫ ГОРМОНДАР ДЕҢГЕЙІНЕ ӘСЕРІН ЗЕРТТЕУ ЖӘНЕ  
ЕГЕУҚҰЙРЫҚТАРДЫҢ ҚАЛҚАНША БЕЗІНІҢ МАССАЛЫҚ КОЭФФИЦИЕНТІ

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## ИССЛЕДОВАНИЕ ВЛИЯНИЯ ЭКСТРАКТА ДУРНИШНИКА НА УРОВЕНЬ ТИРЕОТРОПНЫХ ГОРМОНОВ И МАССОВЫЙ КОЭФФИЦИЕНТ ЩИТОВИДНОЙ ЖЕЛЕЗЫ У КРЫС

**Аннотация.** Йододефицитные заболевания представляют собой патологические состояния, обусловленные сниженным потреблением йода. Эта группа заболеваний включает йододефицитный гипотиреоз, диффузный нетоксический зоб, узловой и многоузловой эутиреоидный зоб, функциональную автономию щитовидной железы. Наиболее часто наблюдается увеличение в размерах щитовидной железы – зоба. Эти заболевания обусловлены снижением функциональной активности щитовидной железы в ответ на дефицит йода. Очевидно, что наиболее неблагоприятные последствия возникают на ранних этапах формирования организма, начиная с внутриутробного периода и заканчивая возрастом полового созревания. Основным этиологическим фактором данной патологии – дефицит йода в биосфере – практически неизменный, поэтому профилактика йододефицитных заболеваний и контроль за йодным обеспечением населения в регионах с йододефицитом является актуальной медико-социальной проблемой.

Известно, что природными источниками йода для организма являются морские водоросли, моллюски и морская рыба. Другие пищевые продукты содержат, как правило, небольшое количество этого микроэлемента. Богатые йодом бурые водоросли стимулируют щитовидную железу и регулируют метаболизм. Кроме морских водорослей и морепродуктов, для фармакологической коррекции и профилактики возникновения йододефицитных заболеваний существуют и другие растения, которые являются источниками йода и содержат вещества, действуют не на тироциты, а на клетки иммунной системы, имеющиеся в железе и ответственные за процессы тканевой регуляции. К таким растениям, которые влияют на звенья этиопатогенеза заболеваний относится дурнишник обыкновенный, который и стал объектом нашего исследования.

Получен дурнишника травы экстракт и определено количественное содержание общего йода титриметрическим методом (титрант – 0,01 М раствор натрия тиосульфата, индикатор – крахмал) по методике, приведенной в ГФУ монография «Ламинария<sup>N</sup>», которое составляло 0,021 %.

Исследовано влияние дурнишника экстракта на показатели содержания гормонов щитовидной железы в сыворотке и массовый коэффициент на модели перхлорат-индуцированного гипотиреоза у крыс. Установлено, что дурнишника экстракт уступал по своей эффективности препарату сравнения «Йодомарин ®100» в способности нормализовать уровень тиреотропного гормона и уменьшать массовый коэффициент щитовидной железы. Учитывая механизм действия перхлората натрия, можно предположить, что неорганический йодид, который содержится в таблетках «Йодомарин ®100» имел большую способность к проникновению в ткани щитовидной железы по сравнению с другими, в основном органическими формами йода, содержащиеся в дурнишнике экстракте, тем самым снижая локальное йододефицитное состояние и уменьшая признаки патологии.

**Ключевые слова:** йододефицитные заболевания, *Xanthium strumarium* L., экстракт, тиреотропное действие.

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## REFERENCES

- [1] Nascimento A.C., Guedes D.R., Santos C.S., et al. Thyroperoxidase gene mutation in congenital goitrous hypothyroidism with total and partial iodide organification deficiency // *Thyroid*. 2003. Vol. 13, N 12. P. 1145-1151.
- [2] Delange F. World Status of Monitoring Iodine Deficiency Disorders Control Programs // *Thyroid*. 2002. Vol. 12, N 10. P. 915-924.
- [3] Petrenko O.D., Pisarenko Ju.M. Dosvid profilaktiki jododeficitnih zahvorjuvan' v endemichnomu rajoni Ukraïni // *Problemi harchuvannja*. 2009. N 3-4. P. 25-28.
- [4] Zubov L.A., Savel'eva T.A. Celebnyj dar morja. Arhangel'sk: AOVK, 1997. 18 p.
- [5] Azarashvili A.I. Biologicheski aktivnye veshhestva i drugie prirodnye soedinenija morskikh vodoroslej. Tbilisi: Izd-vo In-ta farmakohimii, 1980. 334 p.
- [6] Bioactivity guided fractionation for antiinflammatory and analgesic properties and constituents of *Xanthium strumarium* L. / T. Han, H. Li, Q. Zhang et al. // *Phytomedicine*. 2007. Vol. 10. P. 1016.
- [7] Oudhia P. Phyto-sociological studies of rainy season wasteland weeds with special reference to *Parthenium hysterophorus* L. in Raipur (India) district // *Asian J Microbiol Biotech Environ Sci*. 2001. 3: 89-92.
- [8] A new thiazinedione from *xanthium strumarium* / L. Qin, T. Han, H. Li et al. // *Fitoterapia*. 2006. Vol. 77. P. 245-6.
- [9] Ahmed A., Mahmoud A., El-Gamal A. A xanthanolide diol and a dimeric xanthanolide from *xanthium* species // *Planta Med*. 1999. Vol. 65. P. 470-472.
- [10] Bisht N.P., Singh R. Chemical constituents of the stem and roots of *xanthium strumarium* L. // *J Indian Chem Soc*. 1999. Vol. 56. P. 108-109.
- [11] Bisht N.P., Singh R. Chemical Investigation of the leaves of *Xanthium Strumarium* L. // *Journal of Indian Chemistry Society*. 1997. N 4. P. 797-798.
- [12] Vladymyrova I., Georgiyants V., Savelieva E. Pharmacotherapeutic action analysis of mineral substances of medicinal plants, which are used in thyroid gland diseases // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. Vol. 1, N 377 (2019). P. 6-13. <https://doi.org/10.32014/2019.2518-1467.1> ISSN 2518-1467 (Online), ISSN 1991-3494 (Print).
- [13] Derzhavna Farmakopeja Ukraïni: v 3 t. / Derzhavne pidpriemstvo «Ukraïns'kij naukovij farmakopejnij centr jakosti likars'kih zasobiv». 2-e vid. Harkiv: Derzhavne pidpriemstvo «Ukraïns'kij naukovij farmakopejnij centr jakosti likars'kih zasobiv», 2014. Vol. 3. 732 p.
- [14] European Pharmacopoeia 7<sup>th</sup> ed. Strasbourg: European Department for the Quality of Medicines, 2011. 5092 p.
- [15] Zapadnjuk M.P., Zapadnjuk V.I., Zaharija E.A. Laboratornye zhivotnye. Ispol'zovanie v jeksperimente. K.: Vyssh. shk., 1983. 382 p.
- [16] Commission of the European Communities: Council Directive of 18 December 1986 on the Laws, regulating the Application of Principles of Good Laboratory Practice and the Verification of Their Applications for Tests on Chemical Substances (87/18/EEC) // *The Rules Governing Medicinal Products in the European Community*. 1991. Vol. 1. P. 145-146.
- [17] Doklinichni doslidzhennja likars'kih zasobiv / Red. O. V. Stefanov. K.: MOZ Ukraïni, Derzhavnij farmakologichnij centr, 2001. 528 p.
- [18] Mutaku J.F., Poma J.F., Many M.C., Denef J.F., van Den Hove M.F. Cell necrosis and apoptosis are differentially regulated during goiter development and iodine-induced involution // *Journal of Endocrinology*. 2002. N 172. P. 375-386.
- [19] Wolff J. Perchlorate and the thyroid gland // *Pharmacol Reviews*. 1998. Vol. 50, N 1. P. 89-105.
- [20] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedyorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494.4(380). P. 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [21] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S., Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. (2019). Foresight and the role of innovation in the development of education // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494.4(380). 93-101. <https://doi.org/10.32014/2019.2518-1467.96>
- [22] Mamyrbayev O.Z., Othman M., Akhmediyarova A.T., Kydyrbekova A.S., Mekebayev N.O. Voice verification using I-vectors and neural networks with limited training data // *Bulletin of the National academy of sciences of the Republic of Kazakhstan*. 2019. N 3(379). P. 36-43. <https://doi.org/10.32014/2019.2518-1467.66>
- [23] Lavrinenko S.V., Arpentieva M.R., Kassymova G.K. (2019). The negative impact of the internet on the educational process. International youth scientific conference "Heat and mass transfer in the thermal control system of technical and technological energy equipment" (HMTTSC 2019). <https://doi.org/10.1063/1.5120671>
- [24] Atayeva M., Putro N.H.P.S., Kassymova G., Kosbay S. (2019) Impact of reading on students' writing ability // *Materials of International Practical Internet Conference "Challenges of Science"*. ISBN 978-601-323-144-0. Issue II, 2019. P. 5-13. <https://doi.org/10.31643/2019.001>
- [25] Kassymova K.G., Tyumaseva Z.I., Valeeva G.V., Lavrinenko S.V., Arpentieva M.R., Kenzhaliyev B.K., Kosherbayeva A.N., Kosov A.V., Duvalina O.N., Dossayeva S.K. Integrative model of student and teacher stress coping: the correction of relations in educational, professional and personal interaction // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494. 2019. Vol. 3, N 379. P. 169-179. <https://doi.org/10.32014/2019.2518-1467.83>
- [26] Arpentieva M.R., Kassymova G.K., Lavrinenko S.V., Tyumaseva Z.I., Valeeva G.V., Kenzhaliyev O.B., Triyono M.B., Duvalina O.N., Kosov A.V., Dossayeva S.K. Environmental education in the system of global and additional education // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494. 2019. Vol. 3, N 379. P. 158-168. <https://doi.org/10.32014/2019.2518-1467.82>

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## THE RELATION OF PRODUCTIVE LONGEVITY OF LITHUANIAN HEAVY DRAFT MARES WITH THE UDDER CAPACITY

**Abstract.** The intensity of mare's milk secretion is closely related to the accumulation and removal of it through the mammary glands. Studies of the udder capacity of the Lithuanian heavy draft mares were carried out at the breeding koumiss complex of ZAO Semenovskiy breeding plant. In mares of the Lithuanian breed, the udder capacity was the highest among the draft horse breeds: the average udder capacity was  $3.01 \pm 0.04$  kg, and the maximum udder capacity was 4.75 kg of milk.

The udder capacity of mares of the Lithuanian heavy draft breed varied during the day, the lactation and the ontogenesis of mares, it was determined more by genetic factors - the coefficient of heritability of this trait was 0.60. The maximum duration of economic use of the Lithuanian draft mares was 23 years, during which the maximum lifelong milk yield reached 88138 kg, and the milk yield for the highest lactation was 8576 kg of milk.

It was found that the udder capacity is positively correlated with the milk yield of mares. The correlation coefficient between the udder capacity and the lifetime milk yield of mare of the Lithuanian heavy draft breed was positive and significant  $r = +0.67$ . Studies have been conducted to determine the possibility of using this indicator for the selection of animals with long-term economic use and a high lifetime milk yield. It was found that it is possible during the first lactation to select mares by the udder capacity, distinguishing by the period of economic use and high lifetime milk yield.

**Keywords:** dairy horse breeding, udder capacity, milk yield per lactation, correlation, period of economic use, lifetime milk yield.

**Introduction.** The most important feature of mares lactation is the continuous lactogenesis with periodic emptying of the udder during milking or sucking by foal. The intensity of mare's milk secretion is closely related to the accumulation and removal of it through the mammary glands since the udder capacity of mares is about ten times smaller than that of cows [1]. The dairy productivity of mares is directly related to the udder capacity and its milk-forming ability [2]. Mares with a larger udder have higher dairy productivity and, therefore, should be used for a longer period as productive animals [3].

**Aim and objectives of the research.** The aim of this study was to investigate the udder capacity of mares and the possibility to extend the period of economic use of mares of the Lithuanian heavy draft breed by selecting animals, including the morphological traits of the udder.

To achieve this aim, there were objectives of investigating the udder capacity of the Lithuanian heavy draft mares comparing with other heavy breeds, and the relation of the udder capacity with the duration of economic use and the lifetime dairy production of animals.

**Materials and methods of research.** The research was carried out on the breeding koumiss complex of ZAO Semenovskiy Breeding Plant of the Mari El Republic. The samples include data on 122 mares of the Lithuanian heavy draft breed, which were rejected from the broodstock of the complex from 2000 to

2013. Accounting for milk yields from dairy mares was carried out by the method of control milking, conducted twice a month, the daily milk yield was determined by Saigin formula [2]. The period of economic use (PEU) of mares was determined from the moment of the first foaling to rejection from the broodstock or forced slaughter of the animal. The age of the studied mares in lactation ranged from 1 to 21 lactation. The maximum udder capacity (MUC) and the physiological udder capacity (PUC) of mares were determined according to F.L. Garkavy [4] in the modification of E. Chirgin [5]. To determine the physiological udder capacity, the mares were milked out after skipping one milking, that is, the gap between the milkings was specially extended from two to four hours so that the udder was completely filled with milk [5]. The determination was carried out on the second or third month of lactation when the udder capacity of the mares was maximum.

**Research results.** The udder capacity, or the ability of animals to accumulate large amounts of milk in between milkings, is important for dairy productivity of mares. The fact is that the capacitive system of the mare's udder is relatively small compared to that of cows, but a milk production per day is about 20–40 kg, comparable to amount of milk in cow's udder [2, 5]. An objective criterion for assessing the development of glandular tissue and udder capacity are daily and one-time milk yields of mares. In cattle breeding, along with the concept of “maximum udder capacity”, which means “absolute maximum”, Azimov G.I. introduced the concept of “physiological udder capacity” (PUC), which meant the maximum udder capacity at a given time interval or, in a manner of speaking, the “relative maximum” of the udder capacity [6]. We determined the physiological udder capacity for mares of three heavy draft breeds that were milked at ZAO Semenovskiy breeding plant (table 1).

Table 1 – Average udder capacity for mares of some heavy draft breeds

Horse breed	n, animals	Average udder capacity, kg	Limit: min-max	$\sigma$ , kg	$C_v$ , %
Russian heavy draft	150	2.54±0.04	1.35-4.00	0.45	17.72
Lithuanian heavy draft	169	3.01±0.04	1.90-4.75	0.45	14.95
Soviet heavy draft	101	2.87±0.16	1.90-4.50	0.75	26.13

In our studies, the average udder capacity of the Lithuanian mare was 3.01±0.04 kg of milk, which is 18.5% higher than the figures of the Russian heavy draft breed and by 4.88% higher than the same indicator in Soviet heavy draft mares [7]. The variability of the udder capacity in Lithuanian draft mares was lower than that of Russian and Soviet heavy draft mares and was equal to 14.95%, indicating a greater stabilization of this trait in Lithuanian mares. The maximum udder capacity (MUC) taken into account in Lithuanian draft mares reached 4.75 kg of milk, which is an absolute record among mares of all breeds used for milk production. In terms of the maximum udder capacity, the Lithuanian mares exceeded Russian mares (4.00 kg) and Soviet ones (4.50 kg), despite the fact that the latter had significantly larger udder and nipple measurements [8]. The correlation coefficient between the physiological udder capacity and the maximum udder capacity was significant and amounted to +0.70 for the Lithuanian mare.

In our studies, the capacity of the udder of mares varied during the day, the lactation and the ontogenesis of animals [9]. During the day, the largest udder capacity of a mare of the Lithuanian breed was observed in between 5 and 8 am of local time.

After foaling during three weeks, the udder capacity of the mares enlarged rapidly due to hypertrophy of the milk alveoli and the disappearance of puffiness and reached a maximum during this lactation. Then, over the course of five to six months of lactation, the udder capacity changed little, and towards the end of lactation, it began to decrease quickly, about 1.5-2.0 months before the takeoff due to the restructuring of the mammary glands.

In the process of ontogenesis, the physiological udder capacity of a mare of the Lithuanian breed increased by the fifth lactation. The udder capacity of Lithuanian mares from the first to the second lactation increased intensively - by 17% at once. Then it increased with each lactation by 6-8% on average, up to the fifth lactation. From the fifth to the 10-12 lactations, the udder capacity remained approximately at the same level, and then gradually began to decline. The udder capacity of mares decreased by about 15–20% by the 16–18 lactations.



The high correlation calculated by us ( $+0.79 \pm 0.03$ ) of the physiological udder capacity of mares with the calculated daily milk yield indicates that the udder capacity largely determines the amount of milk produced by animals. Between the physiological udder capacity and the average one-time milk yield of mares, the correlation coefficient was  $+0.80 \pm 0.02$ . These data confirmed the close relation between milk yield and udder capacity. Mares' milk yields reflect the capacity of their udder and the amount of glandular tissue in the udder.

The relation between the maximum udder capacity of the mares, the calculated daily milk yield and the calculated milk yield per lactation was determined using big data of factual material (table 2).

Table 2 – Relation between the maximum udder capacity of the Lithuanian heavy draft mares and their calculated milk yield per day and per lactation

Indicators	Udder capacity of mares, kg						
	1.50-1.99	2.00-2.49	2.50-2.99	3.00-3.49	3.50-3.99	4.00-4.49	4.50-5.00
Calculated milk yield per day, kg	15-19	20-24	25-29	30-34	35-39	40-44	45-50
Calculated milk yield per lactation, kg	2800-3500	3700-4400	4500-5400	5500-6400	6500-7300	7400-8200	8300-9200

In our opinion, knowing the maximum udder capacity of mares, using the data in this table, it is possible to predict what amount of yield per lactation a particular animal or group of mares can have according to their average udder capacity. We believe that the functional udder capacity is a relative value since it depends on environmental conditions and the physiological state of the animal.

The maximum udder capacity is predicated mainly upon the genotype of the animal. In mares of the Lithuanian breed, the heritability coefficient of the maximum udder capacity averaged 0.60, while in individual families of the Lithuanian heavy draft breed it varied from 0.70 to 0.95. The frequency of occurrence of this feature in the Lithuanian mare of the heavy breed was also high equaled 0.88. Therefore, we believe that the maximum udder capacity of mares can be a remarkable breeding indicator in dairy horse breeding. A simplicity of determining the udder capacity makes this indicator a universal selection tool in the industry. [10].

Horses like late-ripening and infertile animals have a rather high individual value. Therefore, economically valuable animals in terms of breeding and production should be used as long as possible. It can be assumed that mares with a more capacious udder have a higher milk yield, and, consequently, a higher level of metabolism and higher viability. These animals, therefore, should have a higher lifetime yield.

To verify this hypothesis, we selected 122 mares of the Lithuanian heavy draft breed, rejected from the broodstock from 2000 to 2013. The following indicators were determined in these animals: the period of economic use (PEU), number of lactations, lifetime milk yield, average milk yield per lactation and milk yield for the highest lactation (table 3). The number of lactations in mares turned out to be less than the average years of PEU, about 20%, which in this case is understandable since the mare is removed from the milking in case of illness or death of the foal. In highly productive mares of the Lithuanian heavy draft breed, on average, about 5% of foals die every year, according to our data, and from 12 to 18% of offspring are susceptible to various diseases. In the average sample, the average milk yield per lactation

Table 3 – Period of economic use, lifetime milk yield and other indicators of mares of the Lithuanian heavy draft breed

Indicators	n, animals	M $\pm$ m	Limit min-max	$\sigma$	C <sub>v</sub> , %
PEU, years	122	6.50 $\pm$ 0.37	1-23	4.83	74.25
Lactations, n	122	5.38 $\pm$ 0.32	1-21	4.10	76.14
Lifetime milk yield, kg	122	21200.08 $\pm$ 1390.70	940-88138	18025.59	85.03
Average milk yield per lactation, kg	122	3727.72 $\pm$ 76.18	940.00-5839.67	987.42	26.49
Milk yield for the highest lactation, kg	122	4611.71 $\pm$ 106.28	940-8576	1377.54	29.87

was 3,727.72 kg and the milk yield for the highest lactation was 4,611.71 kg, while the best milk yield for the highest lactation was 8576 kg of milk. To achieve this result, there was an extreme rejection of low-productive mares, after the first lactation 18.67% of mares were rejected, after the second lactation - 15.05% of mares and after the third lactation - 10.24% of all mares. But dairy productivity does not directly affect the period of economic use of mares [11]. On the contrary, it is usually more productive animals that leave the herd for various reasons. Therefore, the variability of such traits as the period of economic use of mares, the number of lactations and the lifetime milk yield of mares were very high 74.25-85.03%.

To determine how the udder capacity of mares affected the period of economic use (PEU) and their lifetime productivity, all animals were divided into six groups depending on the value of their udder capacity: in the first group with a capacity below 2.0 kg, in the second group - from 2.0 to 2.49 kg, in the third group - from 2.50 to 2.99 kg, in the fourth group - from 3.00 to 3.49 kg, in the fifth group - from 3.50 to 3.99 kg, in the sixth group with the udder capacity of more than 4.00 kg of milk. The results of the investigation are presented in table 4.

Table 4 – Relation between the udder capacity of the Lithuanian draft mares, their lifelong milk yield and period of economic use

Groups	n, animals.	PEU, years	Lactations, n	Lifetime milk yield, kg	Average highest yield, kg	Average milk yield per lactation, kg
1	7	2.57	1.86	5162.57	2370.00	2775.58
2	44	6.16	5.02	18087.60	4335.09	3603.11
3	27	7.48	6.07	23497.11	5102.33	3871.02
4	30	10.63	8.70	37042.53	5672.03	4257.76
5	9	11.67	10.22	46271.89	5728.67	4527.58
6	5	13.80	11.80	49115.40	5858.80	4162.32

The table shows a clear trend that with enlarging the udder capacity, the period of economic use of mares increased from 2.57 years to 13.8 and the lifetime milk yield increased from 5162.57 to 49115.40 kg of milk. A particularly noticeable increase in both investigated traits was observed in mares with the udder capacity of more than 2.50 kg. The correlation coefficient between the udder capacity and the lifetime milk yield for the Lithuanian heavy draft mares was +0.67. The highest yield also rose as the udder capacity of the mares of the Lithuanian breed increased. The average milk yield per lactation in mares with the udder capacity of more than 4.00 kg even decreased by 8.78% compared with the previous group of animals. In the last group of mares, lifetime milk yield increased due to growth in the number of lactations.

The Lithuanian heavy draft mares with the udder capacity from 2.50 kg to 4.75 kg were distinguished by a longer period of economic use, the highest lifetime milk yield and higher average milk yield per lactation. A clear relation has been established between the udder capacity, the period of economic use and the lifetime milk yield of mares [12]. Consequently, it is already possible during the first lactation to select mares according to the udder capacity, which are distinguished by long-term economic use and high lifetime milk yield.

### Conclusions.

1. In mares of the Lithuanian heavy draft breed, the udder capacity was the highest among the draft horse breeds: the average udder capacity was  $3.01 \pm 0.04$  kg, and the maximum udder capacity was 4.75 kg of milk.

2. In mare of the Lithuanian breed, a close positive relation was found between the udder capacity and daily milk yield ( $r=+0.79 \pm 0.03$ ), between the udder capacity and one-time milk yield ( $r=+0.80 \pm 0.02$ ), therefore, milk yield of mares was mainly determined by the udder capacity.

3. The udder capacity of the Lithuanian mares varied during the day, the lactation and the ontogenesis and it was determined more by genetic factors - the heritability coefficient of this trait was 0.60.

4. The maximum duration of economic use of the mares of the Lithuanian heavy draft breed was 23 years, during which time the maximum lifetime milk yield reached 88138 kg, and the milk yield for the highest lactation was 8576 kg.

5. A clear relation was established between the udder capacity on the one hand and the period of economic use and the lifetime milk yield of mares on the other hand. The correlation coefficient between the udder capacity and the lifetime milk yield for a mare of the Lithuanian breed was positive and significant  $r=+0.67$ .

6. The Lithuanian heavy draft mares with larger udder capacity have high dairy productivity and longer economic use. Consequently, during the first lactation, it is possible to select such mares according to the udder capacity, which will differ by a long period of economic use and high lifetime milk yield.

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### ЛИТВА АУЫР ЖҮК ТАРТАТЫН ЖЫЛҚЫ ТҰҚЫМЫНЫҢ ЕМШЕГІ СЫЙЫМДЫЛЫҒЫНЫҢ ӨНІМДІЛІК ҰЗАҚТЫҒЫМЕН БАЙЛАНЫСЫ

**Аннотация.** Жылқы сүтінің секрециясының қарқындылығы сүт бездерінде жиналуымен және оны шығарумен тығыз байланысты. Литвалық ауыржүк тартатын тұқымды жылқылардың желін сыйымдылығын зерттеу бойынша зерттеулер З.А. Семеновскийдің асыл тұқымды қымызды кешенінде өткізілді. Литвалық ауыр жүк тартатын жылқыларының желін сыйымдылығы басқа ауыр жүк тартатын жылқылар арасында ең жоғары: орташа сыйымдылық  $3,01 \pm 0,04$  кг, ал жоғарғы көрсеткіш 4,75 кг. Литва тұқымының желін сыйымдылығы тәулік ішінде өзгерді, лактация және онтогенез генетикалық факторлармен анықталды - осы ерекшеліктің мұрагерлік коэффициенті 0,60 болды. Шаруашылықта ең ұзақ қолданысы 23 жыл, сол аралықта өмірлік сауын 88138 кг құрды, ал ең жоғарғы лактация 8576 кг құрады. Желін сыйымдылығы жылқының сауынымен тікелей байланыста екенін байқадық. Корреляция коэффициент желін сыйымдылығы мен өмірлік сауынмен байланысы оң көрсеткіш көрсетті  $r = +0,67$ . Бұл көрсеткішті ұзақ уақыт шаруашылық пайдалануда және өмірлік сүт өнімділігі бар жануарларды таңдау үшін пайдалану мүмкіндігін анықтау үшін зерттеулер жүргізілді. Алғашқы лактация кезінде ұзақ уақыт бойы шаруашылықта пайдалану және сүттің жоғары өмірлік деңгейімен ерекшеленетін жылқыларды таңдау мүмкіндігі бар екені анықталды.

**Түйін сөздер:** жылқы сүт шаруашылығы, емшек сыйым вымени, лактация кезінді сауын, корреляция, шаруашылық қолданас ұзақтығы, өмірлік сауын.

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### ВЗАИМОСВЯЗЬ ПРОДУКТИВНОГО ДОЛГОЛЕТИЯ КОБЫЛ ЛИТОВСКОЙ ТЯЖЕЛОВОЗНОЙ ПОРОДЫ С ЕМКОСТЬЮ ИХ ВЫМЕНИ

**Аннотация.** Интенсивность секреции кобыльего молока тесно связана с накоплением и выведением его из молочных желез. На племенном кумысном комплексе ЗАО ПЗ «Семеновский» были проведены исследования по изучению емкости вымени кобыл литовской тяжеловозной породы. У кобыл литовской тяжеловозной породы емкость вымени была самой высокой среди тяжеловозных пород лошадей: средняя емкость вымени составляла  $3,01 \pm 0,04$  кг, а максимальная емкость вымени равнялась 4,75 кг молока. Емкость вымени кобыл литовской тяжеловозной породы изменялась в течение суток, лактации и онтогенеза кобыл и детерминировалась в большей степени генетическими факторами – коэффициент наследуемости этого признака

составлял 0,60. Максимальная продолжительность хозяйственного использования кобыл литовской тяжеловозной породы составляла 23 года, за это время максимальный пожизненный удой достигал 88138 кг, а удой за наивысшую лактацию составлял 8576 кг молока. Выяснили, что емкость вымени положительно коррелирует с удоом кобыл. Коэффициент корреляции между емкостью вымени и пожизненным удоом у кобыл литовской тяжеловозной породы был положительным и значительным  $r = +0,67$ . Были проведены исследования по определению возможности использования этого показателя для отбора животных с длительным периодом хозяйственного использования и высоким пожизненным удоом. Было установлено, что можно уже во время первой лактации отбирать по емкости вымени кобыл, отличающихся продолжительным периодом хозяйственного использования и высоким пожизненным удоом.

**Ключевые слова:** молочное коневодство, емкость вымени, удой за лактацию, корреляция, продолжительность хозяйственного использования, пожизненный удой.

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#### **REFERENCES**

- [1] Yambulatov M.A. (2018). The influence of the age of mothers on milk yield and morphological traits of the udder of their daughters // Student science and the XXI century. Vol. 15, N 1(16). Part 1. P. 146-148 (in Russ.).
- [2] Saigin I.A. (1962). Zootechnical foundations of dairy horse breeding (experimental studies on dairy horse breeding of the Bashkir ASSR): Author's abstract dis. ... D. Sc. agricult. Leningrad. 32 p. (in Russ.).
- [3] Chirgin E.D., Onegov A.V. (2015). Udder capacity of the Lithuanian draft mares // Scientific notes of the Kazan State Academy of Veterinary Medicine. Vol. 224 (4). P. 253-255 (in Russ.).
- [4] Garkavy F.L. (1974). Breeding of cows and machine milking. Moscow. Ear. 160 p. (in Russ.).
- [5] Chirgin E.D. (2015). Changing the udder capacity of Lithuanian draft mares with age // VII Intern. scientific-practical conf. Domestic science in the era of change: the postulates of the past and the theory of the new time. Part 4, N 2 (7). Yekaterinburg. P. 130-132 (in Russ.).
- [6] Azimov G.I. How is milk formed? (1965). Moscow: Kolos. 128 p. (in Russ.).
- [7] Chirgin E.D. (2015). Selection of mares by morphological traits of the udder // IX International scientific-practical conf. Scientific prospects of the XXI century. Achievements and prospects of the new century. Part 4, N 2(9). Novosibirsk. P. 109-111 (in Russ.).
- [8] Yavorsky V.S., Chirgin E.D., Novoselova K.S. (2001). Dairy horse breeding - a reserve for increasing the efficiency of the industry // Horse breeding and equestrian sport. N 2. P. 9 (in Russ.).
- [9] Chirgin E.D. (2013). Forms and measurements of mare's udder // Horse breeding and equestrian sport. N 3. P. 19-23.
- [10] Yavorsky V.S. (2001). Dairy horse breeding. Yoshkar-Ola: Mari State University. 128 p.
- [11] Akimbekov A.R., Iskhan K.Zh., Aldanazarov S.S., Aubakirov Kh.A., Karynbayev A.K., Rzabayev T.S., Geringuli Mukhtai, Asylbekov S.B., Baimukanov A.D. Meat productivity of young stock of the Kazakh horse of Jabe type in the conditions of the Almaty region // Bulletin of National academy of sciences of the Republic of Kazakhstan. Vol. 1, N378 (2019). P. 146-160. ISSN 2518-1467 (Online), ISSN 1991-3494 (Print). <https://doi.org/10.32014/2019.2518-1467.51>
- [12] Iskhan K.Zh., Akimbekov A.R., Baimukanov A.D., Aubakirov Kh.A., Karynbayev A.K., Rzabayev T.S., Geringuli Mukhtai, Dzhunusova R.Z., Apeev K.B. (2019). Dairy productivity of the kazakh horse mares and their cross breeds with roadsters // Bulletin of national academy of sciences of the Republic of Kazakhstan. Vol. 3, N 379 (2019). P. 22-35. ISSN 2518-1467 (Online), ISSN 1991-3494 (Print). <https://doi.org/10.32014/2019.2518-1467.65>

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## **PRODUCTIVITY AND BIOLOGICAL FEATURES OF PIGS OF DOMESTIC AND CANADIAN BREEDING**

**Abstract.** In the conditions of large pig breeding complexes in the raw material base of Smolmyaso OJSC and Pavlovskaya Sloboda Meat Processing Plant OJSC, in the period of 2010-2015, research and production experience was conducted to study the productivity and biological features of domestic and western breeding pigs. Experimental young stock from 2 months age till reaching the live weight of 100 kg was kept in the control growing. The conditions of keeping, feeding and slaughter of young pigs were identical. When young pigs reached 95-105 kg in live weight, they were evaluated by their own productivity and slaughter indices.

In the process of research, it was found that among the domestic and Canadian young stock, the highest precocity and growth rate was characterized by three-breed hybrid young stock, obtained by crossing hybrid sows with Duroc boars. The results of the control slaughter showed that among the domestic and Canadian young stock, the best slaughter indices were characterized by the three-breed hybrid young.

It was established that the three-breed cross young pigs of the Canadian breeding reached the pre-slaughter live weight 22 days earlier compared to the domestic one, the average daily weight gain was 134.1 g higher, the slaughter yield was 2.3% higher. Thus, the three-breed commercial young stock of Canadian breeding reliably surpasses the pigs of domestic breeding.

The calculation of the economic efficiency of growing young pigs shows that the additional income from the sale of 1 head of Canadian breeding is 1.5 thousand rubles (23 US dollars) compared with the domestic breeding.

Based on the research results, it was recommended that pig farms engaged in breeding and growing domestic pigs, should strengthen breeding to improve the fattening and meat qualities of pigs. To obtain commercial young pigs with high fattening and meat qualities, it is recommended to use Canadian pigs more extensively.

**Keywords:** young pigs, domestic breeding, Canadian breeding, growth rate, average daily gains, slaughter weight, slaughter yield.

**Introduction.** Currently, animal husbandry is one of the most important sectors of the agro-industrial complex of the Russian Federation and plays a significant role in the country's food supply. Pig breeding, as the most intensive and efficient livestock industry, makes a substantial contribution to providing the population of the country with meat and meat products. At the moment, the pig breeding is developing dynamically, which means that the production of pork sustainably develops. As before, the growth rate of pork production goes ahead of the increase in livestock population, which indicates the intensification of the industry due to the implementation of progressive methods of pig breeding, the involvement of highly productive breeds in the production and widespread use of hybridization and crossing, and the improvement of fattening technology and pig breeding [1-3].

According to the National Union of pig breeders, for the last 5 years from 2014 to 2018, pork production increased from 2816 thous. t to 3733 thous. t. or by 24.6%. The main growth in pork production was received due to the increase in the production of agricultural enterprises. During this period, the import of pork dropped from 427 thous. t to 80 thous. t or 5.3 times [4]. The pork production figures show that the pig breeding successfully executes the program of import substitution.

A significant portion of pork is produced in the large industrial complexes with the use of intensive technologies of growing and fattening animals. However, as indicated by Yu.V. Tatulov and co-authors [5, 6], instability of dimensional and weight standards of pigs, no stress resistance lead to a decrease in quality and appearance of meat defects, complicating its industrial processing. In this regard, there is an ongoing search for breeds, lines and types of pigs that are able to show high productive quality in large pig-breeding complexes [7-10].

Currently, the domestic pig farms to form tribal flocks often use imported pigs from abroad and, in particular, from Canada. These pigs are characterized by high productive qualities [12-17].

But so far the lifetime productivity and biological features of Canadian breeding pigs in large farms are poorly studied.

Therefore, the conduct of a comparative assessment of productivity and biological features of domestic and Canadian pigs in the conditions of large pig farms is very urgent.

**The aim of the research** is a determination of biological and productive features in pigs of domestic and the Canadian breeding grown in the conditions of the pig farms.

To achieve this aim, the following objectives were traced:

- to assess the own productivity of young pigs of domestic breeding;
- to assess the own productivity of young pigs of the Canadian breeding;
- to determine the slaughter parameters of the tested young stock;
- to calculate the economic efficiency of pork production when using domestic and Canadian pigs.

**Arrangement and methods of the research.** The control growing of experimental young pigs and slaughter were carried out in the raw material zone of Smolmya so OJSC and Pavlovskaya Sloboda Meat Processing Plant OJSC of the Moscow Region during 2010-2015.

To conduct a research and production experiment, two experimental groups were formed with 3 subgroups of the most common pig breeds and breed combinations. The first group consists of yelts from parents of domestic breeding, in the second - from Canada breeding. The sequence of the experiment is shown in scheme.

In all experiments, identical methods of housing and feeding, as well as transportation and pre-slaughter preparation and slaughter of animals were applied. Pigs were fed according to the norms and diets of feeding at the animal farms [18].

Formation of the experimental groups	
Domestic breeding: 1.1. Large white x Large white 1.2. Large white x Landrace 1.3. (Large white x Landrace) x Duroc	Canadian breeding: 2.1. Yorkshire 2.2. Yorkshire x Landrace 2.3. (Yorkshire x Landrace) x Duroc
Test indicators	
At control growing	At slaughter
Pre-slaughter live weight, kg Age of reaching 100 kg mass, days Average daily weight gain, g	Carcass weight, kg Mass of internal fat, kg Deadweight, kg Slaughter yield, %
Calculation of economic efficiency.	

Scheme of the experiment performance

Lifetime productivity of experimental young stock was assessed according to standard methods for control growing according to indicators covering the animals' productivity - age of attaining live weight in days and average daily gain in grams [19].

Slaughter indicators were determined in accordance with the "Methodological recommendations by the V.I. Lenin Academy of Agricultural Sciences on the assessment of meat productivity, meat quality and subcutaneous fat of pigs" [19].

Evaluation of the economic efficiency of growing experimental young pigs was determined by mapping live weight during realization and the costs of growing young pigs in monetary terms. The level of profitability was calculated as the ratio of profit to prime cost, %.

Biometric processing of the obtained data was performed according to A.M. Gataulin's methodological guidelines on the design of measurement results using the Microsoft Excel, the accuracy of the difference was taken at the reliability threshold of  $B1 = 0.95$  (significance level  $P \leq 0.05$ ). At the level of difference  $P \geq 0.05$ , the difference is not statistically significant [20]. As a control group, young pigs of 1.1 and 2.1 subgroups were used.

**Research results and discussion.** Lifetime assessment of young pigs in their own productivity allows to evaluate animals according to phenotype. The results of table 1 show that among domestic breeding pigs, pre-slaughter mass ranged from 99.3 kg (subgroup 1.1) to 102.3 kg (subgroup 1.3), which indicates slight deflections in this indicator.

In the three-breed cross young stock of domestic breeding from 1.3 subgroup, the age of reaching 100 kg of live weight was 178 days, which is less compared to gilts from 1.1 and 1.2 subgroups by 8 ( $P \leq 0.05$ ) and 4 days respectively. The highest gains in live weight were obtained from gilts of 1.3 subgroup - 694.0 g, which is higher than in 1.1 and 1.2 subgroups by 52.0 g or 7.5% ( $P \leq 0.01$ ) and 21.9 g - 3.2%, respectively.

Consequently, among young stock of domestic breeding, the highest early ripeness and growth rate were for the three-crossbred stock, received by crossing crossbred sows with duroc boars.

Analysis of the data in Table 1 demonstrates that among young Canadian breeding pigs, the smallest age to reach 100 kg of weight was obtained from gilts of 2.3 group — 156 days, which is less compared to the young pigs from 2.1 and 2.2 subgroups by 6 ( $P \leq 0.05$ ) and 2 days respectively. The highest average daily gains of live weight among young Canadian breeding were obtained from gilts of 2.3 subgroup - 828.1 g, which is higher than in yelts from 2.1 and 2.2 subgroups by 54.1 g or 6.5% ( $P \leq 0.001$ ) and by 43.6 g - 5.3% ( $P \leq 0.01$ ) respectively.

On the basis of the research results, it can be concluded that of young pigs of Canadian breeding, the highest early ripeness and growth rate were for three-crossbred young pigs from 2.3 subgroup.

Comparing with young domestic breeding pigs from 1.1, 1.2 and 1.3 subgroups, pigs of Canadian breeding from 2.1, 2.2 and 2.3 subgroups reached live weight 24 and 22 days earlier at ( $P \leq 0.001$ )

Table 1 – Lifetime productivity of experimental young pigs ( $X \pm m_x$ ;  $n=20$ )

Group	Combination	Pre-slaughter live weight, kg	Age of reaching 100 kg mass, days	Average daily weight gain, g
1. Domestic breeding				
1.1	Largewhite	99.3±1.1	186±3	642.0±12.0
1.2	Largewhitex Landrace	101.2±0.9	182±2	672.1±13.4
1.3	Large whitex Landracex Duroc	102.3±1.0	178±2*	694.0±14.2**
2. Canadian breeding				
2.1	Yorkshirex Yorkshire	99.0±1.0	162±2.0	774.0±5.9
2.2	Yorkshirex Landrace	99.5±1.0	158±2.0	784.6±10.6**
2.3	Yorkshirex Landracex Duroc	102.0±1.1	156±2.0*	828.1±13.9***
Note. * $P \leq 0.05$ ; ** $P \leq 0.01$ ; *** $P \leq 0.001$ . Hereinafter, a dominance of young experimental subgroups over the control groups (1.1 and 2.1 subgroups) is indicated.				

respectively. In young stock of Canadian breeding from subgroups 2.1, 2.2 and 2.3 compared to subgroups 1.1, 1.2 and 1.3 of domestic breeding, the average daily weight gain was higher by 132.0 g or 15.9%, 112.5 g - 14.3% and 134.1 g - 16.2% respectively with ( $P \leq 0.001$ ).

Therefore, young Canadian breeding pigs significantly exceeded young stock of domestic breeding in average daily live weight gain.

The main indicator characterizing the meat productivity of pigs is the slaughter yield. The results of table 2 show that among young pigs of domestic breeding, the highest carcass mass was obtained from gilt of 1.3 subgroup - 69.6 kg, which is higher than in animals from 1.1 and 1.2 subgroups by 5.5 kg or 7.9% ( $P \leq 0.01$ ) and by 2.5 kg - 3.6%. The biggest mass of internal fat was obtained from young pigs of 1.1 subgroup - 3.2 kg, and the smallest - from gilt of 1.3 subgroup - 3.0 kg.

A higher slaughter yield was received from young pigs of 1.3 subgroup - 71.0%, which is higher compared to 1.1 and 1.2 subgroups by 3.2% ( $P \leq 0.05$ ) and 1.6%, respectively.

The slaughter results show that among the young domestic breeding pigs, the best slaughter indicators were shown by three-crossbred young stock.

Among young pigs of Canadian breeding, the highest carcass weight was obtained from 2.3 subgroup - 73.2 kg, which is higher compared to 2.1 and 2.2 subgroups by 4.6% ( $P \leq 0.05$ ) and 2.9% respectively. The highest mass of internal fat was obtained from pigs of 2.1 subgroup - 1.8 kg, and the lowest - from young stock of 2.1 subgroup - 1.6 kg. The highest results in slaughter yield were obtained from young pigs of 2.3 subgroup - 73.3%, which is higher compared to 2.1 and 2.2 subgroups of animals by 2.3% ( $P \leq 0.05$ ) and 1.2% respectively. So, the best slaughter rates among young pigs of Canadian breeding were obtained from three-breed crossbred young pigs of 2.3 subgroup.

Slaughter yield of young stock of Canadian breeding from 2.1, 2.2 and 2.3 subgroups compared to the young Canadian breeding of 1.1, 1.2 and 1.3 subgroups was higher by 3.2% ( $P \leq 0.05$ ), 2.7% and 2.3% respectively.

Table 2 – Slaughter indicators of young pigs ( $X \pm m_x$ ;  $n=10$ )

Group	Pre-slaughter live weight, kg	Carcass weight, kg	Mass of internal fat, kg	Deadweight, kg	Slaughter yield, %
1. Domestic breeding					
1.1	99.3 $\pm$ 1.1	64.1 $\pm$ 1.3	3.2 $\pm$ 0.1	67.3 $\pm$ 1.4	67.8 $\pm$ 1.2
1.2	101.2 $\pm$ 0.9	67.1 $\pm$ 1.0	3.1 $\pm$ 0.1	70.2 $\pm$ 1.5	69.4 $\pm$ 0.9
1.3	102.3 $\pm$ 1.0	69.6 $\pm$ 1.1**	3.0 $\pm$ 0.1	72.6 $\pm$ 1.2**	71.0 $\pm$ 0.7*
2. Canadian breeding					
2.1	99.0 $\pm$ 1.0	68.6 $\pm$ 1.8	1.8 $\pm$ 0.1	70.4 $\pm$ 1.9	71.0 $\pm$ 1.0
2.2	99.5 $\pm$ 1.0	70.3 $\pm$ 1.6	1.7 $\pm$ 0.1	72.0 $\pm$ 1.7	72.1 $\pm$ 0.9
2.3	102.0 $\pm$ 1.1	73.2 $\pm$ 1.1*	1.6 $\pm$ 0.1	74.8 $\pm$ 1.1*	73.3 $\pm$ 0.6*

Research results demonstrate that Canadian breeding is characterized by higher slaughter indicators. This certifies deeper and more effective breeding by fattening and meat qualities in pigs of Canadian breeding.

**Conclusion.** As a result of the research and production experiment, the biological features and productivity of domestic and Canadian breeding pigs were studied and it was established that:

- among domestic breeding young stock, the highest early ripeness and growth rate were for three-breed crossbred young pigs, obtained by crossing crossbred sows with Duroc boars;
- among Canadian breeding pigs, the highest precocity and growth rates were shown by three-breed crossbred stock obtained by mating of crossbred sows with Duroc boars;
- among the domestic breeding young pigs, the best slaughter indicators were shown by three-breed crossbred young stock;



- the best slaughter indicators among young pigs of Canadian breeding were for three-crossbred young stock;

- it was found that in comparison with the domestic breeding pigs, the three-breed crossbred young pigs reached the pre-slaughter live weight 22 days earlier; their average daily weight gains were higher by 134.1 g, and the slaughter yield was 2.3% higher. Thus, the three-breed commercial young stock of the Canadian breeding reliably surpasses the crossbred domestic breeding pigs.;

- a calculation of the economic efficiency of growing young pigs shows that the additional income from a realization of 1 pig of Canadian breeding, compared to domestic breeding, is 1.5 thousand rubles (\$ 23).

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#### КАНАДА ЖӘНЕ ОТАНДЫҚ СЕЛЕКЦИЯДАН ШЫҚҚАН ШОШҚАЛАРДЫҢ БИОЛОГИЯЛЫҚ ЖӘНЕ ӨНІМДІЛІК ЕРЕКШЕЛІКТЕРІ

**Аннотация.** 2010-2015 жылдар аралығында шошқа өсірудің ірі кешендері жағдайында, шикізат аймағы ААҚ «Смолмясо» және ААҚ «Павловская Слобода» ет комбинатында зерттеумен өндірістік тәжірибе отандық және батыс селекциясы арқылы өсірілген шошқалардың өнімділігі мен биологиялық ерекшеліктерін зерттеу үшін жүргізілді. Тәжірибелік 2 айлық жас 100 кг тірі салмақ жинау үшін бақылау жағдайында өсірілді. Жас шошқалардың өсіру жағдайы үй, азықтандыру және сою шарттары бірдей болды. Жас шошқаның 95-105 кг тірі салмақ жинағаннан кейін олардың өнімділігі мен таза ет салмағының бағалауын өткіздік.

Зерттеу үрдісінде жас отандық және канадалық шошқалардың арасында ең жоғары өнімділік пен өсім қарқыны Дюрок тұқымының шошқасы мен будан шошқалармен будандастырылған үш тұқымдық жастармен сипатталды.

Бақылау сойысының нәтижелері жасотандық және канадалық шошқа арасында ең жақсы союыс көрсеткіш көрсеткен үштұқымдық будан жастары шошқалары.

Үштұқымдық будан жастары канадалық селекцияның отандық шошқадан ерекшелігі сойғанға дейін тірі салмағын 22 күнге ерте жинайды, орташа тірі салмақ жинау 134,1 г, сойыс шығысы 2,3% ға жоғары. Сондықтан, үш тұқымдық канадалық селекциядан шыққан тауарлық жас шошқалар отандық шошқалардан жоғары болып есептелді.

Жас өсірілген шошқалардың экономикалық тиімділігін есептеу Канаданың 1 басын сатудан түскен қосымша табыс отандық іріктеумен салыстырғанда 1,5 мың рубльді (23 АҚШ доллары) құрайды.

Зерттеу нәтижелері бойынша шошқа фермалары шошқа өсіру және шошқа етін өсірумен айналысады, шошқалардың бордақылау және ет сапасын арттыру үшін өсіруді күшейтеді. Бұрынғы бордақылау және ет сапасы жоғары сатылатын жас шошқаларды алу үшін канадалық шошқа шошқаларын кеңінен пайдалану ұсынылады.

**Түйін сөздер:** жас шошқа, отандық іріктеу, канадалық іріктеу, өсу қарқыны, күнделікті орташа өсу, сойыс салмағы, сойысшығысы.

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## ПРОДУКТИВНОСТЬ И БИОЛОГИЧЕСКИЕ ОСОБЕННОСТИ СВИНЕЙ ОТЕЧЕСТВЕННОЙ И КАНАДСКОЙ СЕЛЕКЦИИ

**Аннотация.** В условиях крупных свиноводческих комплексов в сырьевой зоне ОАО «Смолмясо» и ОАО «Мясокомбинат «Павловская Слобода» в течение 2010-2015 гг. был проведен научно-производственный опыт по изучению продуктивности и биологических особенностей свиней отечественной и западной селекции. Подопытный молодняк с 2-мес. возраста до достижения живой массы 100 кг содержался в условиях контрольного выращивания. Условия содержания, кормления и убоя молодняка свиней были идентичны. При достижении молодняком свиней живой массы в 95-105 кг провели оценку по собственной продуктивности и убойным показателям.

В процессе исследований было установлено, что среди молодняка отечественной и канадской селекции наиболее высокой скороспелостью и скоростью роста характеризовался трехпородный помесный молодняк, полученный при скрещивании помесных свиноматок с хряками породы дюрок. Результаты контрольного убоя показали, что среди молодняка отечественной и канадской селекции лучшими убойными показателями характеризовался трехпородный помесный молодняк.

Установлено, что трехпородный помесный молодняк канадской селекции по сравнению с отечественным достигал предубойной живой массы на 22 суток раньше, среднесуточные приросты живой массы были выше на 134,1 г, убойный выход был выше на 2,3%. Таким образом, трехпородный товарный молодняк канадской селекции по продуктивности достоверно превосходит свиней отечественной селекции.

Расчет экономической эффективности выращивания молодняка свиней показывает, что дополнительный доход от реализации 1 головы канадской селекции по сравнению с отечественной селекцией составляет 1,5 тыс. руб (23 доллара США).

На основе полученных результатов исследований было рекомендовано свинокомплексам, занимающимся разведением и выращиванием свиней отечественной селекции, усилить селекцию на повышение откормочных и мясных качеств свиней. Для получения товарного молодняка свиней с высокими откормочными и мясными качествами рекомендуется шире использовать свиней канадской селекции.

**Ключевые слова:** молодняк свиней, отечественная селекция, канадская селекция, скорость роста, среднесуточные приросты, убойная масса, убойный выход.

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## REFERENCES

- [1] Belousov N. (2016). Effective development of pig husbandry. Pig production. Moscow. N 2. P. 66-67 (in Russ.).
- [2] Griksas S.A. (2011). Ways and methods of improving the breeding and productive qualities of specialized lines and types of pigs and the effectiveness of use in hybridization. Monograph. Moscow: MSAU. 116 p. (in Russ.).
- [3] Suslina E.N. (2017). State and development of the breeding sector of the domestic pig husbandry. Pig production. Moscow. N 4. P. 4-6 (in Russ.).
- [4] Russia ranks 5th in the world in pork production [Electronic resource]. (2016). Electron. text data. – Access mode: <http://www.servis-expo.ru/news/rossiya-vyshla-na-5-mesto-v-mire-po-proizvodstvu-svininy>. Date of applying: 29.12.2016.
- [5] Tatulov Yu.V., Kolomiets N.N., Rozanov A.V., Griksas S.A. (2001). To the problem of creating industrially suitable genotypes of pigs // Meat industry. N 1. P. 40-42 (in Russ.).
- [6] Chernukha I.M., Tatulov Yu.V., Veselov P.P., Sus I.V., Griksas S.A., Kolomiets N.N. (2004). Recommendations for the use of industrially suitable pig genotypes in the meat industry. Moscow: MSHA publishing house, 2004. P. 8 (in Russ.).
- [7] Velichko V.A., Komlatsky V.I., Velichko L.F. (2017). The path to import substitution - the use of foreign breeding pigs. Scientific journal KubGAU. Kuban, 2017. N 130(06). P. 1-8 (in Russ.).
- [8] Pokhodnya G.S., Ivchenko A.N., Korobov D.V., Malakhova T.A. (2016). The effectiveness of cross-breeding of large white sows with boars of Duroc breed of import breeding // Tavrichesky scientific reviewer. Crimea. N 5(10). May. P. 172-178 (in Russ.).
- [9] Solovyh A., Ovchinnikov A., Khrenova O. (2005) The best maternal breed - Large white. Animal husbandry of Russia. Moscow. N 12. P. 22-23 (in Russ.).
- [10] Sokolov N.V., Zerkova N.G. (2018). Comparative productivity of pigs of large white and landrace breeds at linear breeding and crossing. Achievements of science and technology of agriculture. Moscow. Vol. 34, N 4. P. 54-58. DOI: 10.24411 // 0235-2451-2018-10413 (in Russ.).
- [11] Burtseva S.V., Pautova L.N. (2016). The influence of the Yorkshire blood on meat quality of pigs // Bulletin of the Altai State University. Altai. N 10(144). P. 102-106 (in Russ.).
- [12] Gubanova N.S. (2013). Biological and productive features of Canadian breeding pigs: Author's abstract ... dis. can. biol. sciences. Moscow. 20 p. (in Russ.).
- [13] Vodyannikov V.I., Shkalenko V.V., Ruzhenikov F.V., Zemlyakov R.N. (2010). Productivity and quality of Canadian pork in the Lower Volga region. Pig husbandry. Moscow. N 6. P. 14-15 (in Russ.).
- [14] Bekenev V.A., Frolova V.I., Botsan I.V., Frolova Yu.V., Kharseeva M.I., Zabolotnaya A.A., Gaptar S.I., Golovko A.N. (2012). The results of the use of imported meat breeds of pigs when crossed in Siberia. Achievements of science and technology of agriculture. Moscow. N 7. P. 67-69 (in Russ.).
- [15] Funikov G.A. (2001). The productivity and quality of the meat of large white breed pigs in purebred breeding and crossing with boars of large black, Landrace and Duroc breeds: Abstract ... dis. can. agricultural sciences. 17 p. (in Russ.).
- [16] Takahashi K. (1996). Structural weakening of skeletal muscle tissue during post-mortem aging of meat: the non-enzymatic mechanism of meat tenderization. Meat science. 43. P. 67-S80.
- [17] Fredeen X.T. (1969). Breed structure and population dynamics of the Canadian Yorkshire pig: Canadian Journal of Animal Science. 49(3): 291-304 (doi: 10.4141/cjas69-040).
- [18] Norms and diets of feeding farm animals. (2003). Reference manual. 3rd edition revised and enlarged / Ed. A.P. Kalashnikov, V.I. Fisinin, V.V. Shcheglova, N.I. Kleimenova. Moscow. 456 p. (in Russ.).
- [19] Methodological recommendations of the Academy of Agricultural Sciences on the assessment of meat productivity, meat quality and subcutaneous fat of pigs. (1978). Moscow: Agricultural Sciences. 43 p. (in Russ.).
- [20] Gataulin A.M. (1992). The system of applied statistical and mathematical methods for processing experimental data in agriculture (ISSN 5-7230-0001-2). 2 parts. Moscow. Ed. TSHA. 23.5 p.p.
- [21] Baimukanov D.A., Pristupa V.N., Kolosov Yu.A., Donnik I.M., Torosyan D.S., Kolosov A.Yu., Orlova O.N., Yuldashbayev Yu.A., Chylbak-ool S.O. (2019). Improvement of breeding and productive traits of Kalmyk cattle breed // Bulletin of National academy of sciences of the Republic of Kazakhstan. Vol. 1, N 378 (2019). P. 128-145. ISSN 2518-1467 (Online), ISSN 1991-3494 (Print). <https://doi.org/10.32014/2019.2518-1467.51>

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## **RESEARCH ON CORPORATE INTERNATIONAL SOCIAL RESPONSIBILITY REPORTING OF CHINESE INTERNATIONAL ENTERPRISES' IN KAZAKHSTAN**

**Abstract.** The paper investigates about corporate international social responsibility's (CISR) disclosure to examine the reporting content about overseas markets of Chinese international enterprises' (CIE) in Kazakhstan. The purpose is to explore the level of CISR developments and international social contributions of CIE.

In this study has been applied stakeholder theory to analyse and categorize CISR, we put ours emphasizes on environmental, human resource, community, productive, political and other activities. It is across-sectional study which has exploratory in nature and involved in a secondary data collection and used of content analysis technique to assess the statistical results.

International enterprises with higher levels of CISR activities are more likely to be internationalized and capable of establishing in the international business network. The results indicated that CISR's political activity of the CIEs' have not been issued in annual reports. Moreover, the other CISR activities are in a gradually improving on various degree. This study contributes to stakeholder theory and CISR research in the international business field, implications for implementing the level of CISR activities.

**Key words:** Chinese international enterprise, Kazakhstan; Corporate international social responsibility, content analysis.

**1. Introduction.** CSR reports have received considerable scholarly attention in recent years and most research has focused on the emergence of CSR reporting [1]. However, there is a lack of researches that has done CISR disclosure reporting in the international arena. In this paper, we argued that it is important to transfer our emphases from CSR to CISR for several reasons. Smith et al. indicate country of origin may be an important determinant of the level of CSR disclosure. Whereas many studies have focused on the variation in CSR disclosure across developed nations [2], only a few have addressed this issue in developing countries [3], and not much attention to date has been directed toward CISR disclosure in Kazakhstan. The spreading CSR conception impels to ensure the implementation of needs and goals to put CSR is in a global context essential to understand the specific regional and national contexts in which CIE in Kazakhstan. In this paper, we emphasized the international context of CSR. Before distinguishing between CSR and CISR, the meaning of CSR is not only different from sector to sector, but it also differs quite substantially from country to country [4]. CISR is an internationalized enterprise not only for making economical and financial profits or increase, but also has to focus on the international social problems, social activity with engaging stakeholders and shareholders. For instance, international enterprises will operate in a foreign country and having also different ethics, and institutional theory points the obligatory parts included obeying the rules of home countries' law, respect the ethics of local nationalities permanent views, in order to make bridge cooperation between with host country and home country.

We focus on the meaning of CISR of CIE's reports. We have chosen CISR disclosures to distinguish in the Chinese context research started to take a sample of medium and small-sized CIE in Kazakhstan, after a great effort on collecting international companies' annual reports, in our temporary results have shown that none of the CIE issued CISR annual reports, as known medium and small-sized enterprises generally have not disclosed annual reports due to the lack of their financial recourses. Mostly in research articles take samplings of annual disclosures from the large enterprises because they have efficient

recourse abilities and actively join international public communities, especially by implementing CISR activities. However, any approach to CISR should take part in the practical recognition that the corporations be profitable enough to provide shareholders a return that will encourage a continuation of investment [5]. This research paper is followed these two research questions: What CSR reporting category is being a major part of the information presented by CIE? What CISR reporting formats are chosen to provide by CIE? Annual reporting is a compulsory and obligatory document for most international enterprises. Content analysis is used to investigate CISR disclosure levels in the annual reports.

**2. Literature review and Hypotheses.** The international evidence indicates an increase in the number of firms providing external assurance of their CSR disclosures [6]. Many researchers pointed out that the text of CSR reporting should disclose information on the following projects: environmental performance, labor rights, health and safety practices, human rights, community economic development and social impacts, corporate governance, corporate planning and policies [7]. Different countries and enterprises issue CISR in different ways and use different types of categories of CISR. Extant studies argue that building a firm reputation through voluntary CSR reporting depends on the perceived reliability and credibility of CSR information [8]. International enterprises are faced with numerous legal, regulatory, cultural problems and business environments making the challenge of legal and ethical compliance more complex.

Prior research on CSR reporting has focused on the documents that organizations disclose to communicate their efforts and commitment to CSR. CSR disclosure on the web in developing countries [8]. CSR adoption likelihood of integrated reporting assurance of reporting [9], or level of reporting [10].

These institutional pressures explain organizations as business entities operating in coordination and with the support of other activities in their field, interacting with their stakeholders and striving for social acceptability and credibility, i.e. legitimacy, to survive in their context [11].

CISR activity is necessary for the purposes of adding to market share, incrementing stockholder wealth or for straightforward ethical principles. Areas of particular emphasis are community matters, health and safety, diversity and human resources and environment. Consistent with prior research, we have chosen several CISR reporting diversity categories;

Categories	Specific examples within each category
Environmental	Prevention of environmental risks, safety, pollution, conservation of natural resources, others
Business practice	Relations with business partners, responsibility practices aboard, gender equity, employment minorities, others.
Human resources	Compensation, manpower, hygiene and safety, others.
Community	Education, associations, arts, volunteer help, others.
Product development	Product safety, presentation of products, pollution related to use of the products, others.
Political	Political problems
Others	other categories.

Figure 1 – CISR reporting diversity categories

<sup>1</sup>Based on Cormier and Magnan 2003; Cormier et al. (2005); Ernst and Ernst 1978, and Gray et al., 1995. Murthy 2008: Holder-Webb et al. 2009.

H1: CIE in Kazakhstan annual CISR reporting is actively issuing year by year.

The Chinese economy is growing year by year, Chinese international brand is increasing so sharply, internationalization enterprises are very active to issue annual CSR report but the social problems, such as unfair income distribution, increasing employment pressure, severe resource waste, and environmental deterioration is getting obviously. This body of the literature provides evidence on how firm size, industry type, profitability, country, and media exposure influence the level of CSR reporting [12]. We predict that CIE in Kazakhstan are getting active on issuing CISR reports year by year.

H2: CIE in Kazakhstan when issue CISR reporting exists the characteristics of Chinese cultural elements.

Hu Jintao, China's president, advances the concept of a harmonious society should feature democracy, the rule of law, equity, justice, sincerity, amity, and vitality. An economics professor at Peking University argued this government-led agenda alludes to the Confucian ideal in which all people should co-exist harmoniously, love and help each other, encourage each other and make an effort to contribute to the building of a harmonious society. Mittelman (2006) claimed Confucian ethics could have a positive effect on business behavior in China's market economy. Cheung and Chan (2005) described "guanxi" as interpersonal relationships, loyalty, and ethical practices and suggested "guanxi" could help achieve harmony in social groups. Shafer et al. (2007) stated "guanxi" influences managers' perception of stakeholder power, legitimacy, and urgency managers that exposure to western ideas could influence the managers' ethical values [13].

**3. Methodology.** Although the importance of CISR is rather widely discussed in the scientific literature there is a lack of research on basic CISR disclosure situation, especially in developing countries. Thus, the main goal of this article is to investigate the level of social information disclosure in the annual reports of CIE in Kazakhstan after the execution of analysis of the factors of social responsibility disclosure distinguished in the scientific literature. CISR disclosure categories most commonly occurring in scientific literature, we present the assumptions for the research:

In this paper, we use an annual report for the investigation of the CISR disclosure level. 1) Referring to the scientific literature based on [14, 15]. The frequency of using annual reports are justified by their regularity, credibility, accessibility and useful information to stakeholders reporting. 2) The annual report is a compulsory document for most international enterprises. Content analysis is used to investigate the CISR disclosure level in the annual reports. Units of social disclosure in the content analysis may be various: words, phrases, characters, lines, sentences, pages. This empirical study uses two units for disclosure: a) The number of sentences for evaluating CISR since sentences provide complete, meaningful and reliable data about company's CISR disclosure level; b) The proportion of pages devoted to social accounting disclosure to determine the part in the whole document. Therefore, this study considers the CISR information disclosed in the annual reports. In addition, the annual reports of the top five CIE in Kazakhstan are public, available and easily accessible. They are Haier, Huawei, Alcatel, ICBC, CNPC (table 1). The annual reports were of 2013-2017 years, all collected CISR annual reports were in English with Chinese language translations. The analysis of the reported CISR activities in the annual reports proceeded as follows: (1) Copies all of the annual reports in pdf. files were downloaded and were given devised, (2) Those involved were asked to initially read all the annual reports to especially look the words "CSR" code general, to look for items involved in CISR disclosure, (3) Each CISR reports were distributed and reviewed, (4) After review classify the various CISR categories which the mentioned in the annual reports, (5) Getting results to discuss and disagreements.

Table 1 – Chinese the top five internationalization enterprises

Organization name	Website	Billions (RMB)	Documents	International branches
Haier	haier.com	1887	CSR Annual report	USA, Russia, Kazakhstan (100 countries)
Alcatel	zte.com.cn	3,21	CSR Annual report	Asia, North America (170 countries)
Huawei	huawei.com	395	CSR Annual report	Russia, Singapore (140 countries)
CNPC	cnpc.com.cn	4,034,10	CSR Annual report	Azerbaijan, Canada, Oman (38 countries)
ICBS	icbc.com.cn	2,220	CSR Annual report	Hong Kong, Spain, Portugal (42 countries)

**4. Data sampling.** We define an "information burst" as a single stand-alone document (proxy statement) or homogenous unit text (i.e. employee diversity page, product information sheet or product lines, etc.). It appears from this that the main valuation areas (environmental activity, human resources activity, community activity, product development, political and others).

**5. Analyses and Results.** What CISR reporting is being a major part of the category information presented by CIE in Kazakhstan?

Research Question 1 asks what CSR reporting category information will be an issue by CIE. All collected information 706 (table 2) shows the reporting rating by the disclosure category. The major part of

the information presented is on the environmental part and community activities. None of the CIE has presented the data on political activity in their annual reports. Includes all top five CIE for five years the entire sample by category 708. Percentage sum to 100% all disclosures include CISR information.

Table 2 – The frequencies of CISR disclosure, by category (n = 708)

Disclosure Categories	Frequency	Present of total information
Community	146	21%
Environment	181	26%
HRM	136	19%
Productivity	128	18%
Political	0	0%
Others	117	17%
Total	708	100%

What CISR reporting formats are of CIE in Kazakhstan choosing to provide?

Research question 2 asks what reporting formats CIE in Kazakhstan choose to convey CISR reporting. CISR reporting were collapsed into format categories: mandatory filings, website, governance documents, press releases, product fact sheets, CSR reports or brochures, and others. All collecting CISR reporting 708 information bursts are taken from websites. Used information taking 100 percentage used on the website format. CISR activity is a useful marketing tool it may provide a proxy for intangible benefits of marketing strategy. The website format of disclosure is popular among all CIE in Kazakhstan.

Hypothesis 1 asks to what CIE in Kazakhstan annual CISR reporting is getting active year by year.

There is shown the top five CIE in Kazakhstan within five years during 2013-2017 years development of issuing CISR reporting. They are Haier, Huawei, ICBS, Alcatel, CNPC international enterprises. All CIE disclosed categories are environmental, community, human resource, political and other information. Therefore, the result of the analysis is shown gradually growing, except political activity. Weem phasized the increasing political role international enterprises, for instance when enterprises provide goods and services (e.g. education and health care) in areas where governments are either unwilling or unable to protect the rights of their citizens. Statistical tests of these within the five years the development for international enterprises have mixed results. Overall result Huawei CIE in Kazakhstan has indicated gradually growing the development during five years. Another CIE in Kazakhstan has not indicated large differences within five years of issuing CISR reporting.

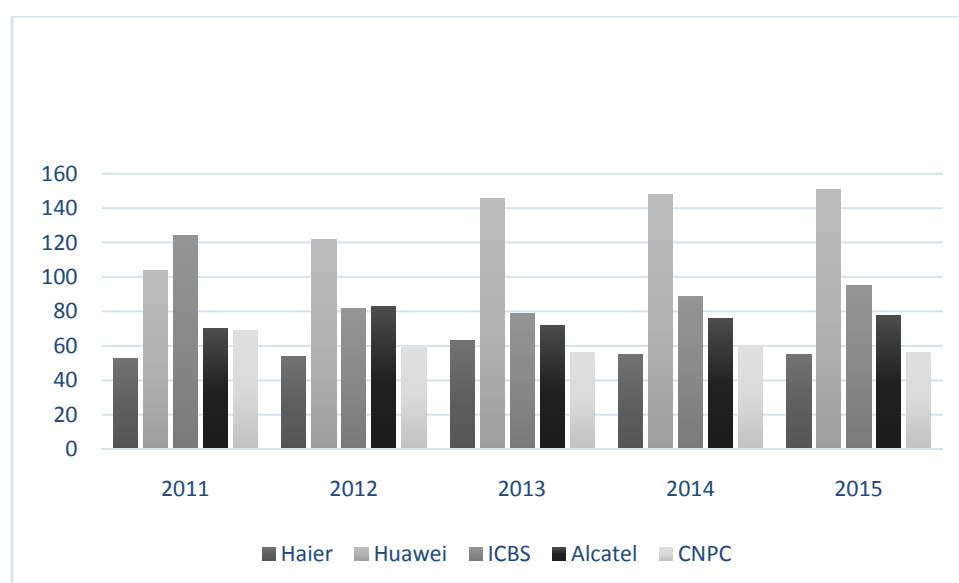


Figure 2 – Information included in CISR disclosure, by general type



Hypothesis 2 asks what extent to CIE in Kazakhstan issue CISR reporting will have details of Chinese characteristics.

The results showed that Chinese characteristics based texts and categories exist of CISR reporting documents, like the Confucian idea and “guanxi” and harmonious society. The disclosures by general Chinese characteristics based on all enterprises with all information calculated the percentage of issuing in annual reports. According to figure 3 provides a pie chart representing the relative frequency (percentages) of the whole general disclosure categories. Of these 708 disclosures are shown 56% CIE in Kazakhstan reported in their CSR annual reports, and Chinese characteristics 44% is not shown CIE in Kazakhstan reported in CSR annual reports. The observation’s innovative part based on a find according to the national characteristics involved with business management on reporting. It is possible that if the general perception is that CISR activity is business of society, it may provide a proxy for the benefits of the marketing strategy, image strategy and brand strategy and thus be considered to have value-relevance.

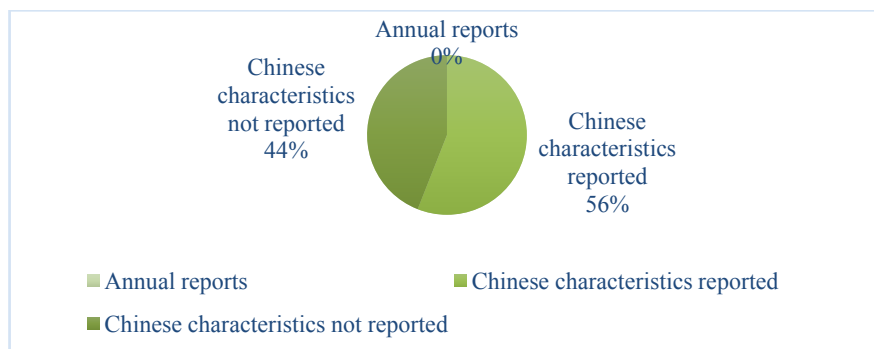


Figure 3 – Chinese characteristics content is included or not by general type of CISR disclosures, all information bursts (n=708)

**6. Conclusion.** Chinese international investment and subsidizing companies are spreading all over the world, it is including in developed and developing countries. Therefore, engaging in various social contribution activities need to issue their CISR annual reporting. The objectives of this study examine and describe CISR annual reporting practices among CIE in Kazakhstan. CISR reporting continues improving internationally spreading, and the levels of CISR reporting information, and influences on international enterprises in different social initiatives and social motivation.

In this paper, we have chosen the internalized top five CIE in Kazakhstan which operates in the overseas business and involved CISR annual reporting. The data collected from 2013 to 2017 years. As literature study shown that the CIE in Kazakhstan have a large pressure from the international market and some home countries various institutional requirements [16].

Firstly, the results indicate that CISR disclosure categories (environmental, human resource, community, productivity, political and others.) of annual reporting format especially is used to issue the website format form to disclosure CISR. However, other format types as such, mandatory fillings, press release not used to issue CISR reporting.

Secondly, the results indicate that CISR disclosure categories (environmental, human resource, community, productivity, political and others.) paid much attention and more focused disclose information CISR category CIE in Kazakhstan is the environmental category and the less attention had focused the political category disclosed. It says the lack of political activity and remains unclear when CIE in Kazakhstan operate the business in the international countries political issues and problems including legitimization [17].

In this research paper, provide some broad pictures of CISR disclosure categories among CIE in Kazakhstan and provide some normative and legitimacy and institutional arguments when involve disclosing the CISR annual reporting.

The study contributes to the existing literature in the area by extending deeper consideration to CIE in Kazakhstan, expanding the limited selection media and providing the amount determining CISR reporting as the tool of disclosure is more informative and more categories emphasis in management study.



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### **ҚАЗАҚСТАНДАҒЫ ҚЫТАЙЛЫҚ ХАЛЫҚАРАЛЫҚ КӘСІПОРЫНДАРДЫҢ КОРПОРАТИВТІК ХАЛЫҚАРАЛЫҚ ӘЛЕУМЕТТІК ЖАУАПКЕРШІЛІГІНДЕГІ АҚПАРАТТЫҚ ЗЕРТТЕУ**

**Аннотация.** Мақалада корпоративтік халықаралық әлеуметтік жауапкершіліктің (ҚХӘЖ) жариялануы Қазақстандағы қытайлық халықаралық кәсіпорындардың шетелдік нарықтар туралы баяндамаларын негізге ала отырып мазмұнын зерттеп анықтауға бағытталған. Мақалада көзделген мақсат – ҚХӘЖ әзірленуінің даму деңгейін және халықаралық қоғамға әлеуметтік үлесінің көрсеткішін зерттеу болып табылады.

Осы зерттеуде ҚХӘЖ талдау және санаттау мүдделі тараптардың қолданбалы теориясы қарастырылған, және халықаралық әдебиеттерден жинақталған ҚХӘЖ категорияларын қоршаған орта, адам ресурстары, қоғамдық байланыс, жасыл өнім өніру, саяси және басқа әлеуметтік іс шара.

Екінші деректер жинау, өңдеу және статистикалық нәтижелерді бағалау үшін мазмұнды талдау әдісін пайдаланатын көлденең қималы зерттеу жүргізілді. ҚХӘЖ қызметін жоғары деңгейінің көрсеткіші халықаралық кәсіпорындардың бизнесқалыптастыру желісінде халықаралық араластандыру қабілеттіне ықтимал болып табылады.

Зерттеу нәтижесі ҚХӘЖ саяси іс шаралар категориясы жыл сайынғы есептік баяндамада жарияланбайтыны, және халықаралық қоғамның саясат мәселері назардан тыс екені анықталды. Сонымен қатар, басқа да ҚХӘЖ іс-шаралары жүзеге асырылатын және даму дәрежеліқарқынды жақсаруда.

Осы зерттеуде мүдделі тараптар теориясымен және ҚХӘЖ халықаралық бизнес саласындағы зерттеулер, және қытайлық халықаралық кәсіпорындардың Қазақстанның әлеуметтік қоғамына үлес қосуы теориялық, практикалық негізін қарастырады.

**Түйін сөздер:** Қытайлық халықаралық кәсіпорын, Қазақстан, Корпоративтік халықаралық әлеуметтік жауапкершілік, мазмұндық талдау.

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### **ИНФОРМАЦИОННОЕ ИССЛЕДОВАНИЕ КОРПОРАТИВНОЙ МЕЖДУНАРОДНОЙ СОЦИАЛЬНОЙ ОТВЕТСТВЕННОСТИ КИТАЙСКИХ МЕЖДУНАРОДНЫХ КОМПАНИЙ В КАЗАХСТАНЕ**

**Аннотация.** В статье проводится исследование содержания докладов о зарубежных рынках китайских международных компаний в Казахстане при объявлении корпоративной международной социальной ответственности (КМСО). Цель – показать уровень развития подготовки КМСО и исследование показателей социальной доли международному сообществу.

Дан анализ КМСО, проведена классификация прикладной теории заинтересованных сторон, сбор международной литературы таких категорий КМСО, как среда обитания, человеческие ресурсы, общественная связь, производство зелёных продуктов, политические и другие социальные мероприятия.

Осуществлялось горизонтальное исследование сборов вторых данных, обработка и оценивание статистических результатов для использования метода содержательного анализа. Показателем высшего уровня деятельности КМСО является способность смешивания в международной сети формирования международных бизнес-компаний.

Рассматриваются теория заинтересованных сторон и исследования в международной сфере бизнеса КМСО, а также практическая и теоретическая помощь китайских международных компаний социальному обществу Казахстана.

**Ключевые слова:** Китайское международное предприятие в Казахстане; Корпоративная международная социальная ответственность, контент-анализ.

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**REFERENCES**

- [1] Bagnoli M., Watts S.G. Voluntary assurance of voluntary CSR disclosure // *Journal of Economics & Management Strategy*. 2016.
- [2] Belal A.R., Momin M. Corporate social reporting in emerging economies: a review and future direction. *Research in accounting in emerging economies*. 2009. P. 119-143.
- [3] Azizul M., Deegan C. Motivations for an organization within a developing country to report social responsibility information: evidence from Bangladesh // *Accounting, Auditing & Accountability Journal*. 2008. P. 850-874.
- [4] Freeman I., Hasnaoui A. The meaning of corporate social responsibility: The vision of four nations // *Journal of Business Ethics*. 2011. P. 419-443.
- [5] Li Q., Luo W., Wang Y., et al. Firm performance, corporate ownership, and corporate social responsibility disclosure in China. *Business Ethics. A European Review*, 2013. P. 159-173.
- [6] Dyusembaeva L.K., Babazhanova Zh.A., Bulakbay Zh.M., Nurbayeva G.Y. Strategy of interaction of the state and small business as a factor of innovation // *Bulletin of National academy of science*. 2019. P. 117-121. DOI <https://doi.org/10.32014/2019.2224-5294.17>
- [7] Rao K., Tilt C. Board composition and corporate social responsibility: The role of diversity, gender, strategy and decision making // *Journal of Business Ethics*. 2015. P. 1-21.
- [8] Intykbaeva Zh., Belgibayev A.A. Analysis of dynamics and structure of the enterprise capital // *Bulletin of National Academy of Science*. 2018. P. 53-56.
- [9] Matten D., Moon J. Implicit and explicit CSR: a conceptual framework for a comparative understanding of corporate social responsibility. *Academy of management Review*. 2008. P. 404-424.
- [10] Scott W.R. Institutional theory: Contributing to a theoretical research program. *Great minds in management. The process of theory development*, 2005. P. 460-485.
- [11] Gray R. Social, environmental and sustainability reporting and organizational value creation? Whose value? Whose creation? *Accounting, Auditing & Accountability Journal*. 2006. P. 793-819.
- [12] Esenbekova A.B., Robert Alan. To the question of new vectors of sustainable development of the economy of the Republic of Kazakhstan // *Bulletin of National Academy of Science*. 2018. P. 5-10.
- [13] Huang H., Zhou Z. Female Executives, Trust Environment and Corporate Social Responsibility Information Disclosure: Evidence from A-share Listed Companies with Voluntary CSR Report Disclosure // *Journal of Audit & Economics*. 2015.
- [14] Cumming D., Hou W., Lee E. Business Ethics and Finance in Greater China: Synthesis and Future Directions in Sustainability, CSR // *Journal of Business Ethics*. 2016. P. 601-626.
- [15] Wang H., Tong L., Takeuchi R. et al. Corporate Social Responsibility: An Overview and New Research Directions Thematic Issue on Corporate Social Responsibility // *Academy of Management Journal*. 2016. P. 534-544.
- [16] Kussainova A.A., Waldemar Kozlowski. To the question of social insurance in Japan and China // *Bulletin of National Academy of Science*. 2018. P. 152-157.
- [17] Martínez-Ferrero J., García-Sánchez I.M., Cuadrado-Ballesteros B. Effect of financial reporting quality on sustainability information disclosure // *Corporate Social Responsibility and Environmental Management*. 2015. P. 45-64.
- [18] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedyorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494.4(380). P. 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [19] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S., Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. (2019). Foresight and the role of innovation in the development of education // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494.4(380). 93-101. <https://doi.org/10.32014/2019.2518-1467.96>
- [20] Mamyrbayev O.Z., Othman M., Akhmediyarova A.T., Kydyrbekova A.S., Mekebayev N.O. Voice verification using I-vectors and neural networks with limited training data // *Bulletin of the National academy of sciences of the Republic of Kazakhstan*. 2019. N 3(379). P. 36-43. <https://doi.org/10.32014/2019.2518-1467.66>
- [21] Lavrinenko S.V., Arpentieva M.R., Kassymova G.K. (2019). The negative impact of the internet on the educational process. International youth scientific conference "Heat and mass transfer in the thermal control system of technical and technological energy equipment" (HMTTSC 2019). <https://doi.org/10.1063/1.5120671>
- [22] Atayeva M., Putro N.H.P.S., Kassymova G., Kosbay S. (2019) Impact of reading on students' writing ability // *Materials of International Practical Internet Conference "Challenges of Science"*. ISBN 978-601-323-144-0. Issue II, 2019. P. 5-13. <https://doi.org/10.31643/2019.001>

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## **INFLUENCE OF INCREASING THE MILK YIELD FOR THE FIRST LACTATION OF THE LITHUANIAN HEAVY DRAFT HORSES ON THEIR PRODUCTIVE LONGEVITY**

**Abstract.** Horses are late-ripening animals with low fecundity and therefore should be used in dairy horse breeding for a long time to ensure the profitability of the industry. In Central Russia, mare's milk is produced from draft horse breeds, including Lithuanian heavy-draft horses. They are highly productive animals. With intensive increasing the milk yield for the first lactation, the lifetime milk yield and the period of productive use may be declined. Studies have shown that the optimal level of increased milk yield for Lithuanian draft mares is 3001-4000 kg of milk. At this level, the mares give the highest possible lifetime yield of 24,403.66 and the highest amount of milk fat and milk protein. If the increase in the milk yield for the first lactation reaches 6000 kg and above, then in mares of the studied breed the period of productive use and the lifetime yield reduce.

**Keywords:** increase in the milk yield, lifetime yield, a period of economic use, productive longevity.

**Introduction.** In the dairy horse breeding, because of the low fertility and late ripeness of horses, their period of economic use (PEU) is of great importance. In the central part of Russia, the most advanced for milk production are heavy draft horse breeds, including the Lithuanian breed [1]. The milk productivity of the mare of the Lithuanian heavy draft breed enlarges in the process of ontogenesis from the first through the fifth lactation [2]. A high level of milk yield per lactation preserves in animals of this breed till 10–12 lactations [2]. The increase in the milk productivity of mares and the extension of the terms of their economic use depends including on the level of productivity of mares for the first lactation. Intensive increasing the milk yield of mares for the first lactation may cause a reduction in the period of their economic use due to heavy loads on the developing animal body that has not fully strengthened. To a considerable degree, this applies to the Lithuanian heavy draft mares, which are world leaders in dairy productivity among all horse breeds [3, 4]. Possessing a good milk-forming system, these highly productive animals often have to use the tissue reserves of their bodies to synthesize milk that can reduce their period of economic use and lifetime milk yield in the future.

**The aim of the research.** The aim of our study was to determine such a level of increased milk yield for the first lactation of the Lithuanian heavy draft mares that would not reduce their productive longevity.

**Materials and methods of research.** The dairy productivity of the mares was studied according to the milk recording logs at the kumiss breeding complex of ZAO Semenovskiy Breeding plant of the Republic of Mari El. In total, data were taken into account for 166 mares of the Lithuanian heavy draft breed, which left the dairy herd. Recording of milk yields from dairy mares was carried out by the method of control milkings, conducted twice a month, the daily milk yield was determined by the I.A. Saygin formula [5]. The period of economic use (PEU) of mares was determined from the moment of the first

foaling to rejection from the broodstock or forced slaughter of the animal. The age of the studied mares in lactation ranged from 1 to 21 lactation. Milk samples were taken according to GOST 26809-85. Fat mass fraction (FMF) in milk was determined according to GOST 5867-90 - Milk and dairy products, protein mass fraction (PMF) in mare's milk was determined according to GOST 23327-98 - Milk and dairy products.

**Research results.** The average estimated yield of the Lithuanian heavy draft horses for the first lactation, the average lifetime yield, the average period of economic use (PEU) of animals and the average number of lactations are given in Table 1.

The investigations have shown that the Lithuanian mares can give milk up to the 21 lactation and produce up to 88,138 kg of milk during their lifetime. According to such indicators as the period of economic use, the number of lactations and lifetime milk yield, selection has not been carried out among heavy draft breeds, therefore, according to these traits, there is a very high level of variability (74.52-84.27%), especially in terms of lifetime milk yield (84.27%).

Table 1 – Calculated average milk yield for the first lactation, average lifetime milk yield, and PEU

Indicators	M±m	Lim: min-max	С	C <sub>v</sub> , %
Calculated average milk yield for the first lactation, kg	3456.48±94.63	940-7479	1219.21	35.27
Average PEU, lactations	6.48±0.37	1-23	4.83	74.52
Average number of lactations	5.34±0.32	1-21	4.07	76.17
Average lifetime milk yield, kg	20970.52±1371.65	940-88138	17672.57	84.27

In our studies, it became clear that more than half of the mares were rejected after the first four lactations - 53.01% - as a result of low dairy productivity and disturbances in the reproductive function. After the first lactation, 18.67% of mares were rejected, after the second - 15.06%, after the third - 10.24% and after the fourth - 9.04% of animals.

There was a slight positive correlation ( $r = +0.18$ ) between the milk yield for the first lactation and the lifetime milk yield in the studied population of mares. The inheritance of lifetime milk yield was very low, almost zero.

In order to determine how the level of increased milk yield in mares affected their lifetime productivity, all animals were divided into six groups depending on the amount of milk yield for the first lactation: in the first group there were mares with milk yield from 1001 to 2000 kg, in the second group - from 2001 to 3000 kg, in the third group - from 3001 to 4000 kg, in the fourth group - from 4001 to 5000 kg, in the fifth group - from 5001 to 6000 kg, in the sixth group - more than 6000 kg of milk.

Table 2 shows the data on the average lifetime milk yield, the calculated average milk yield for the first and for the highest lactations of the Lithuanian heavy draft mares in each of the formed groups. When analyzing the period of economic use of mares with different levels of intensity of increase in milk yield for the first lactation, we took animals as control which yield for the first lactation was within 1001-2000 kg of milk or the first group mares. According to the indicators of the highest milk yield for lactation over the period of economic use in the studied livestock, it was established an advantage for mares with over 6,000 kg of the increased milk yield for the first lactation.

Table 2 – Calculated milk yield on average for lactation and the highest lactation of the Lithuanian mares

Group	n, animals	Average lifetime milk yield, kg	Average milk yield for the first lactation, kg	Average milk yield for the highest lactation, kg
1	17	10210.13±2100.01	1511.20±88.94	3595.33±501.91
2	45	20149.40±2371.52	2514.55±48.28	4067.00±191.65
3	47	24403.66±2508.56	3487.04±44.82	4739.66±156.37
4	42	23350.76±3264.32	4461.93±44.12	5121.50±145.04
5	10	14236.00±5100.78	5205.10±67.69	5432.40±135.41
6	5	23609.00±3977.68	6299.00±135.64	6299.00±135.64

They had the average milk yield for the highest lactation of 6299.00 kg, which is more than the milk yield of all other groups. In turn, the indicators of lifetime milk yield were higher in mares with increased milk yield for the first lactation from 3001 kg to 4000 kg of milk. In mares tried to obtain more milk from 4001 to 5000 kg and above 6000 kg, lifetime milk yield declined, respectively, by 1053 kg and 794 kg, or by 4.31% and 3.25%. Mares with the increased milk yield for the first lactation from 5001 to 6000 kg, had the reduced lifetime milk yield by 10,167.66 kg or 41.66%.

The fat mass fraction in milk of mares of the studied breed was 1.85%, the protein mass fraction - 2.03%. Analyzing the indices of the mass fraction of fat and protein in the milk of mares of the experimental groups (table 3), it can be noted that the highest FMF was in animals with the increased milk yield for the first lactation up to 2000 kg of milk - 3.88%, and PMF - in mares with increased milk yield to 3000 kg.

Table 3 – Fat mass fraction and the amount of milk fat obtained from mares with different levels of the increased milk yield for the first lactation

Group	n, animals	Fat mass fraction, %	Protein mass fraction, %	Amount of milk fat, kg	Amount of milk protein, kg
1	17	1.88	2.03	191.95	207.26
2	45	1.87	2.04	376.79	411.05
3	47	1.85	2.03	451.47	495.39
4	42	1.84	2.02	429.65	471.68
5	10	1.81	2.02	257.67	287.57
6	5	1.80	2.01	424.96	474.54

At the same time, according to the amount of milk fat and milk protein produced by animals with milk for the whole period of their economic use, mares with a milk yield of 3001 to 4000 kg for the first lactation produced both fat and protein more than all other mares.

The period of economic use (PEU) of the Lithuanian heavy draft horses and the number of their lactations are presented in table 4. The longest period of economic use of the Lithuanian mares was observed in animals with the increased milk yield for the first lactation from 3001 to 4000 kg. Animals of the same group reliably milked longer than any other mare - 6.23 lactations.

Table 4 – Period of economic use of mares and the number of lactations, depending on the intensity of increasing the milk yield

Group	n, animals	PEU, years	Number of lactations, lactations
1	17	4.53±0.74	3.67±0.64
2	45	6.71±0.68	5.64±0.58
3	47	7.42±0.73	6.23±0.61
4	42	6.69±0.86	5.36±0.71
5	10	3.40±1.16	2.90±1.07
6	5	7.25±1.03	5.00±0.91

The presented data on the intensity of increasing the milk yield for the first lactation indicate significant differences in the longevity of animals of the compared groups. The shortest period of economic use of animals was observed in the group of mares with increased milk yield from 5001 to 6000 kg – 3.4 years and 2.9 lactations. And the highest period of productive use – 7.42 years and 6.23 lactations – was recorded in animals with increased milk yield from 3001 to 4000 kg of milk. The investigations have shown that animals given higher milk yield for the first lactation of more than 4001 kg to 6000 kg or more, had a slightly reduced period of economic use.

A large amount of milk secreted in the mammary glands of high productive mares initiated in the organism of these animals more intensive metabolic processes, for which their organisms, not strong enough, were not ready. As a result, such mares are in specific economic conditions not adapted for long-

term productive use, which leads to their premature reject from the broodstock. Their further stay in the milking herd depends mostly on environmental factors since in the current feeding and keeping conditions highly productive mares are susceptible to various diseases and disorders of the reproductive function more often than animals with average productivity indicators [6].

**Conclusion.** The optimal level of increasing the milk yield for the first lactation of the Lithuanian heavy draft horses is from 3001 to 4000 kg of milk. Intensive increasing the milk yield of mares for the first lactation of the studied breed of more than 4000 kg of milk leads to a shortening in the period of the economic use of animals and a decrease in their lifetime milk yield.

**Suggestion to the production.** The optimal level of increasing the milk yield of the Lithuanian heavy draft horses for the first lactation should be in the range of 3001 to 4000 kg of milk.

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#### **БІРІНШІ ЛАКТАЦИЯ КЕЗІНДЕ САУЫНДЫ АРТТЫРУДЫҢ ЛИТВАЛЫҚ АУЫРЖҮК ТАРТАТЫН ЖЫЛҚЫЛАРДЫҢ ТҰҚЫМЫНЫҢ ӨНІМДІЛІК ҰЗАҚТЫҒЫНА ӘСЕРІ**

**Аннотация.** Кеш дамитын жылқылар негізінен жылқы сүт шаруашылығында төмен өнімділігі бар, сондықтан олардың шаруашылықтағы қолданысы негізгі табыс болып табылады. Орталық Ресейде жылқы саумалын көбіне литвалық жүк тартатын жылқыдан өндіреді. Олар өте жоғары өнімді жылқылар. Бірінші сауын кезіндегі интенсивті сауын әсерінен олардың өнімділігі ұзақтығы және өмір сүру ұзақтығы төмендейді.

Зерттеулер көрсеткендей, Литвалық ауыр жүк тартатын жылқы үшін сауудың оңтайлы деңгейі – 3001-4000 кг сүт. Оған қарамастан осындай сауын деңгейіне қарамастан олардың өнімділік ұзақтылығы 24403,66 және өте жоғары сүт майы және белок алады.

Егерде бірінші лактация деңгейін 6000 кг көбейтсе жылқының өмір сүру ұзақтығы мен сауын ұзақтығы төмендейді.

**Түйін сөздер:** сауын, өмірлік сауын, шаруашылық қолданысы, өнімділік ұзақтығы.

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#### **ВЛИЯНИЕ РАЗДОЯ ЗА ПЕРВУЮ ЛАКТАЦИЮ КОБЫЛ ЛИТОВСКОЙ ТЯЖЕЛОВОЗНОЙ ПОРОДЫ НА ИХ ПРОДУКТИВНОЕ ДОЛГОЛЕТИЕ**

**Аннотация.** Лошади – позднеспелые животные с невысокой плодовитостью и поэтому должны использоваться в молочном коневодстве продолжительное время, чтобы обеспечивать рентабельность отрасли. В центральной России кобылье молоко получают от тяжеловозных пород лошадей, в том числе от литовских тяжеловозов. Они являются высокопродуктивными животными. При интенсивном раздое по первой лактации у них может сокращаться пожизненный удой и снижаться продолжительность продуктивного исполь-

зования. Исследования показали, что оптимальным уровнем раздоя для кобыл литовской тяжеловозной породы является 3001-4000 кг молока. При этом уровне раздоя от кобыл получают максимально высокий пожизненный удой 24403,66 и наибольшее количество молочного жира и молочного белка. Если раздой по первой лактации увеличивается до 6000 кг молока и выше, то у кобыл исследуемой породы уменьшается возраст продуктивного использования и снижается пожизненный удой.

**Ключевые слова:** раздой, пожизненный удой, продолжительность хозяйственного использования, продуктивное долголетие.

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#### REFERENCES

- [1] Yavorsky V.S., Chirgin E.D., Novoselova K.S. (2001). Dairy horse breeding - a reserve for increasing the efficiency of the industry // Horse breeding and equestrian sport. N 2. P. 9 (in Russ.).
- [2] Chirgin E.D. (1998). Features of lactation of draft mares and selective and genetic indicators of their selection for milk production: Abstract of diss. ... Cand. Sc. biol. Specialty 06.02.01. Kazan. 18 p. (in Russ.).
- [3] Chirgin E.D., Romanyuk V. (2013). Improving the technology of mare's milk production // Bulletin of the Mari State University. N 11. P. 21-23 (in Russ.).
- [4] Chirgin, E.D. (2015). Increased production of mare's milk // Horse breeding and equestrian sport. N 4. P. 33-36 (in Russ.).
- [5] Saigin I.A. (1962). Zootechnical foundations of dairy horse breeding (experimental studies on dairy horse breeding of the Bashkir ASSR): Author's abstract dis. ... D. Sc. agricult. Leningrad. 32 p. (in Russ.).
- [6] Akimbekov A.R., Iskhan K.Zh., Aldanazarov S.S., Aubakirov Kh.A., Karynbayev A.K., Rzabayev T.S., Geringuli Mukhatai, Asylbekov S.B., Baimukanov A.D. Meat productivity of young stock of the Kazakh horse of Jabe type in the conditions of the Almaty region // Bulletin of National academy of sciences of the Republic of Kazakhstan. 2019. Vol. 1, N 378. P. 146-160. ISSN 2518-1467 (Online), ISSN 1991-3494 (Print). <https://doi.org/10.32014/2019.2518-1467.51>
- [7] Iskhan K.Zh., Akimbekov A.R., Baimukanov A.D., Aubakirov Kh.A., Karynbayev A.K., Rzabayev T.S., Geringuli Mukhatai, Dzhususova R.Z., Apeev K.B. (2019). Dairy productivity of the kazakh horse mares and their cross breeds with roadsters // Bulletin of National academy of sciences of the Republic of Kazakhstan. 2019. Vol. 3, N 379. P. 22-35. ISSN 2518-1467 (Online), ISSN 1991-3494 (Print). <https://doi.org/10.32014/2019.2518-1467.65>
- [8] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedyorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494.4(380). P. 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [9] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S., Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. (2019). Foresight and the role of innovation in the development of education // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494.4(380). 93-101. <https://doi.org/10.32014/2019.2518-1467.96>

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## OPTIMIZATION OF CONDITIONS FOR THE ACTIVATION OF XANTHINE OXIDASE AND THE FORMATION OF NITRIC OXIDE IN FRESH SHEEP MILK

**Abstract.** For the detection of sheep milk XO activity a various natural and artificial antioxidants were examined. Among the natural antioxidants L-cysteine was more effective in the stabilization of XO in heated milk. XO of sheep milk activated by heat treatment in the presence of cysteine and molybdenum became able to convert nitrate and nitrite to nitric oxide (NO). Therefore, L-cysteine was used for double purposes: as the protector of enzyme active center against the oxidation during heat treatment of milk and as a reagent for S-nitrosothiol formation. Hypoxanthine, a natural substrate of XO, was the effective electron donor for NaR and NiR activities. Heat treatment of the milk in the presence of exogenous lecithin increased the activity of NaR and NiR of XO and CysNO formation. Thus, during the heat treatment: a) excess of exogenous phospholipids disintegrate the structure of MFGM and b) enzyme molecules denatured partially and their active center became available for exogenous cysteine, molybdenum, hypoxanthine and nitrate or nitrite.

**Key words:** milk, xanthine oxidase, NO, NO<sub>3</sub>, NO<sub>2</sub>, antioxidants, molybdenum, tungsten, phospholipids.

**Introduction.** At present, the pollution of environment with nitrates is a big problem in the world. In the environment and in human and animal body a microorganisms may convert nitrates to nitrites.

It is well known that nitrates (NO<sub>3</sub><sup>-</sup>) and nitrites (NO<sub>2</sub><sup>-</sup>) cause various diseases, including cancer. It is well known that nitrites irreversible bind to haemoglobin forming methhaemoglobin which losses the ability to transport oxygen [1]. Deficiency of oxygen causes asphyxiation and it is particularly hazardous to health for babies. Furthermore, nitrites easily bind to primary amines, such as cadaverine, putrescine, spermidine and form potential carcinogens – nitrosamines [2, 3].

In 1980 one of the authors of this article for the first time observed that purified and homogeneous xanthine oxidase (XO) of cow's milk has the ability to reduce NO<sub>3</sub><sup>-</sup> and NO<sub>2</sub><sup>-</sup> [5]. Later, other groups of scientists have found that animal XO converts NO<sub>3</sub><sup>-</sup> and NO<sub>2</sub><sup>-</sup> to physiologically important gas – nitric oxide (NO) [6, 7, 8]. It is generally recognized that NO is one of the major biological messenger molecules, regulating blood pressure and blood flow, neurotransmission and brain function, immune system function, wound healing inhibition of platelet aggregation. NO is also involved in defense mechanisms against pathogens and some kinds of cancer cells [9]. In 1992 the nitric oxide was recognized as a molecule of year and in 1998 scientists studying its properties have been awarded the Nobel Prize [10].

Because of the ability to form nitric oxide the XO of milk harbors an antimicrobial activity. It is known that NO as the oxidant is a strong antibacterial agent. Antibacterial functions of XO are associated with peroxynitrite (ONOO<sup>-</sup>) which is the product of the reaction between NO and O<sub>2</sub><sup>-</sup> (superoxide anion). XO is also involved in protective and antiviral responses by catalyzing the conversion of retinaldehyde to retinoic acid. Retinoic acid derivatives can inhibit viral replication and, thus, preventing the spread of viral disease [11, 12].



Xanthine oxidoreductase or dehydrogenase/oxidase (XO; EC 1.1.3.22) – molybdenum and iron-containing flavoprotein. Each of the two subunits of XO contains one molybdenum center, two iron-sulfur center and one FAD. XO of the breast milk of women shows a molecular mass of 160 kDa subunit, XO of the cow's milk - 150 kDa. It is believed that the main biological function of XO is the catalyses the final step of purine oxidation in eucaryotes, it catalyzes the sequence of hydroxylations that convert hypoxanthine to xanthine, then to uric acid [13]. However, the enzyme has broad substrate specificity and is capable of reducing oxygen to generate the reactive oxygen species (ROS), superoxide and hydrogen peroxide, as well as oxidative transformation of pteridines and some aliphatic and aromatic aldehydes. Xanthine oxidase (XO) is not strongly specific to the oxidation of hypoxanthine or xanthine, it may catalyze the oxidation of about thirty nitrogen containing heterocycles and aldehydes [13]. Therefore because of its multifunctional enzymatic reactions XO is considered as a potential enzyme detoxifying different xenobiotics [14]. It is known that numerous heterocyclic xenobiotics (including pesticides) are carcinogens. Thus, in the case of contamination of milk with harmful xenobiotics the active XO makes possible their biotransformation into harmless forms. XO reduces nitrite (and nitrate), yielding reactive nitrogen species (RNS), such as nitric oxide and peroxynitrite [15].

In cow's milk XO localized in the inner membrane layer of the fat globules (XO content is about 8% of total proteins of cow milk fat globules) [16]. However, XO of milk fat globule membranes (MFGM) contains tenth times less molybdenum or does not contain it which results in a very low enzyme activity [17-19]. Study of the cofactor composition of XO isolated from cow's and women's milk showed that more than 85-90 % of enzyme molecules don't contain molybdenum in its active center and are inactive molecules [18]. The occurrence of xanthine oxidase in animal milk was a matter of slight controversy for a long time, because in the milk xanthine oxidation never been observed, although the levels of XO in the milk are relatively high. Presumably, this is due to the fact that before inclusion of Mo atoms in the active center of the enzyme, Mo-free molecules of XO already is associated with inner membrane of milk fat globules. As a result, of XO molecules become molecules without molybdenum. It is proposed that XO is involved in secretion of milk fat globules in a process dependent on the enzyme protein rather than on its enzymic activity [15].

Thus, in the presence of molybdenum atom in the active centre XO is active but in the absence of the metal it becomes inactive. Like other molybdoenzymes, in the active center XO contains so called molybdocofactor which has a pterin nature (therefore, it is called also molybdopterin) [20]. Molybdenum atom is bound to the pterin via its vicinal thiol groups (figure 1). This pterin is synthesized *in vivo* independently on the presence of molybdenum, i.e. in the absence of molybdenum cellular XO contains a normal amount of the cofactor. The cofactor is buried deeply within the interior of enzyme molecule and a tunnel-like structure makes it accessible to the appropriate substrates [21].

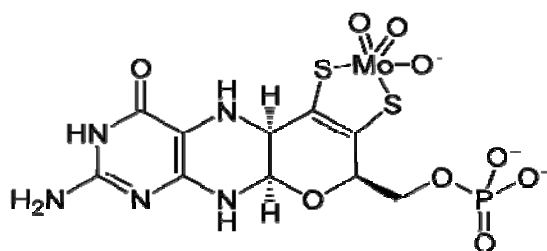


Figure 1 – Structure of molybdocofactor and its bond with molybdenum atom via vicinal SH-groups in the active center of XO [20]

**Materials and Methods.** *Preparation of the milk to the detection of the various enzymatic activities.* Before treatment in the milk of domestic animals added 10  $\mu$ M ethylenediaminetetraacetic acid (EDTA) to bind heavy metals. For boiling fresh milk is poured into the narrow conical tubes in a volume of 2 ml. Then, for further determine of the enzymatic activity the tubes are placed in water bath with 35 °C temperature and kept for 10 min, then using the special reagents different activities of XO are determined.

*Method for determination of the intrinsic activity of xanthine oxidase (XO).* To determine the intrinsic activity of XO 200  $\mu$ l aliquot of milk was mixed with 700  $\mu$ l 0.1 M sodium phosphate buffer containing

10  $\mu\text{M}$  EDTA, 5  $\mu\text{l}$  phenylmethylsulfonylfluor (for inhibition of protease activity). To this mixture was added 100  $\mu\text{M}$  10 mM hypoxanthine. The mixture was incubated at 30°C for 10 min under aerobic conditions. The proteins in the mixture is precipitated with trichloroacetic acid. After centrifugation, the amount of uric acid (under the influence of XO converted hypoxanthine to uric acid) in the supernatant was determined by measuring the absorbance of the reaction mixture in a spectrophotometer at 295 nm [22]. The amount of uric acid also is determined by its chemical oxidation with potassium permanganate ( $\text{K}_2\text{MnO}_4$ ) or hydrogen peroxide ( $\text{H}_2\text{O}_2$ ), thereby forming allantoin [23]. Allantoin in biological liquids is easy to very accurately determined by a known method [24].

*Method for the determination of nitrate- and nitrite-reducing activity of XO.* Nitrate-reducing activity of XO determined by the disappearance of the added nitrate ( $\text{NO}_3^-$ ) or by the appearance of nitrite ( $\text{NO}_2^-$ ) in the reaction medium [5]. Nitrite-reducing activity of XO is determined by the disappearance of the nitrite to the reaction medium or by the appearance of nitric oxide (NO) [25].

**Results and Discussion.** *Proposed mechanisms of milk XO activation.* As mentioned above, milk XO in exists in molybdenum-free form and it is localized in the inner layer of MFGM. Therefore, the activation of milk XO requires the incorporation of exogenous molybdenum into its active center [4]. It is generally known that XO belongs to heat-stable enzymes – it remain active at 75-80°C temperature in several minutes [5]. However, at this temperature, the enzyme molecules undergo partial reversible denaturation. Therefore, one of possible ways for the availability of XO molecules for exogenous molybdenum is the disintegration of milk fat globule membranes and partial denaturation of enzyme molecules. Thus, during the heat treatment: a) excess of exogenous phospholipids disintegrate the structure of MFGM and b) enzyme molecules denatured partially and their active center became available for exogenous cysteine, molybdenum, hypoxanthine and nitrate or nitrite. Cysteine not only protects SH-groups of Mo-co against oxidation but also promotes the binding of molybdenum to the cofactor.

*Effects of different antioxidants in the stabilizing of heat-denatured milk XO.* Our preliminary experiments showed that the optimal heating temperature and its duration for detection of all activities in fresh milk XO were 80°C and 7 min (data not shown). Besides, the presence of 0.1 mM concentrations of cysteine and exogenous molybdenum was also necessary for the detection. Thus, to detect the activity of MFGM-bound enzyme is really required heat treatment and the addition of cysteine as an antioxidant and molybdenum to fresh sheep milk. In the next experiments we examined various natural and artificial antioxidants for the detection of milk XO activity. An natural antioxidants – cysteine, glutathione, lipoic acid and ascorbic acid, and artificial antioxidants – dithiotreitol, unithiol and mercaptoethanol (2,3-dimercapto-1-propanesulfonic acid) were used in different concentrations (table 1).

Results present in the table 1 show that among the natural antioxidants L-cysteine was more effective in the stabilization of XO in heat treated milk. In the same concentrations the effectiveness of cysteine containing antioxidant – glutathione was considerably lower. Apparently, this is due to the fact that tripeptide molecule of glutathione contains only one cysteine residue. Although both the oxidized (disulfide) and reduced (dihydro) forms of lipoic acid (dithiol) show antioxidant properties [26], its stabilizing effect for milk XO was lower than glutathione. Among the artificial antioxidants monothiol mercaptoethanol was more effective in the stabilization of heated milk XO. Although dithiotreitol and unithiol contain two sulfhydryl groups they don't stabilize heat treated milk XO. Recently we found that dithiotreitol in the presence of sulfanilamide forms stable blue complex with molybdate ion (on the basis of this finding we developed new fast method for molybdenum determination in the biological materials). Therefore, dithiotreitol associated with molybdenum does not show a stabilizing or antioxidant effect. The absence of such a stabilizing effect of unithiol remains unclear.

*Effect of different electron donors on associated activities of fresh sheep milk.* In the experiment for comparison various electron donors were used for own XO, NaR and NiR activities of fresh milk enzyme. Fresh sheep milk heated at 80°C in 7 min in the presence of 10  $\mu\text{M}$  EDTA, 0.1 mM cysteine, 0.1 mM  $\text{Na}_2\text{MoO}_4$  (or  $\text{Na}_2\text{WO}_4$ ). After cooling to the milk aliquots (200  $\mu\text{l}$ ) were added different electron donors separately (their concentrations are shown in the Table) and incubated for 15 min at 35°C. The final volume of reaction mixture was brought to 0.5 ml with 0.1 M Na-phosphate buffer (pH 6.0). After incubation the volume of the mixture was adjusted to 3 ml. The mixture was precipitated with acetic acid at pH 3.5 and centrifuged at 15000g in 15 min. In the supernatant the associated activities of milk XO were determined. In fresh untreated sheep milk none of associated activities was detected.

Table 1 – Effects of different antioxidants on the stability of XO during the heat treatment of fresh sheep milk in the presence of  $\text{Na}_2\text{MoO}_4$ 

Antioxidant	Concentrations, mM	Associated activities		
		XO	NaR	NiR
Cysteine	0.05	$9.5 \pm 1.4$	$75.2 \pm 8.4$	$42.1 \pm 6.3$
	0.1	$13.5 \pm 1.7$	$93.5 \pm 10.2$	$53.2 \pm 6.8$
	0.5	$11.5 \pm 2.4$	$78.7 \pm 8.5$	$39.7 \pm 7.1$
Glutathione	0.05	$4.8 \pm 0.9$	$66.3 \pm 1.7$	$35.2 \pm 4.2$
	0.1	$10.3 \pm 1.6$	$78.6 \pm 3.9$	$48.6 \pm 8.7$
	0.5	$12.6 \pm 2.1$	$94.3 \pm 9.7$	$54.3 \pm 8.2$
Ascorbic acid	0.05	$7.6 \pm 1.0$	$57.7 \pm 9.7$	$42.7 \pm 7.2$
	0.1	$9.5 \pm 0.9$	$78.4 \pm 4.9$	$48.6 \pm 5.2$
	0.5	$10.3 \pm 1.6$	$84.2 \pm 9.3$	$50.2 \pm 7.2$
Lipoic acid	0.05	$7.3 \pm 1.6$	$69.7 \pm 9.2$	$40.4 \pm 6.2$
	0.1	$9.5 \pm 1.3$	$77.5 \pm 15.0$	$51.2 \pm 6.4$
	0.5	$8.9 \pm 1.2$	$74.3 \pm 9.9$	$48.2 \pm 8.7$
Dithiotreitol	0.05	0	0	0
	0.1	0	0	0
	0.5	0	0	0
Unithiol	0.05	0	0	0
	0.1	0	0	0
	0.5	0	0	0
Mercaptoethanol	0.05	$9.2 \pm 1.6$	$73.8 \pm 9.2$	$41.3 \pm 5.9$
	0.1	$10.7 \pm 1.7$	$89.7 \pm 11.3$	$53.0 \pm 6.2$
	0.5	$9.2 \pm 1.3$	$71.3 \pm 9.7$	$40.4 \pm 8.3$
XO: nmoles of uric acid/0.1 ml/min; NaR: nmoles of $\text{NO}_2^-$ formed/0.1 ml/min; NiR: nmoles of $\text{NO}_2^-$ reduced/0.1 ml/min.				

Table 2 – Effects of different electron donors on nitrate- and nitrite-reducing activity and own activities of sheep milk XO in the presence of cysteine

Electron donors	Associated activities		
	XO	NaR	NiR
10 $\mu$ NADPH	0.0	0.0	0.0
10 $\mu$ NADH	$18.3 \pm 2.7$	$114.7 \pm 18.7$	$68 \pm 9.4$
10 $\mu$ FADH <sub>2</sub>	$2.4 \pm 0.6$	$21.3 \pm 1.6$	$27.2 \pm 4.2$
0.1 mM hypoxanthine	–	$92.8 \pm 8.5$	$57.6 \pm 7.6$
*Reduced methylviologen (MVH)	–	$128.6 \pm 21.3$	$98.6 \pm 14.3$
XO: nmoles of uric acid/0.1 ml/min; NaR: nmoles of $\text{NO}_2^-$ formed/0.1 ml/min; NiR: nmoles of $\text{NO}_2^-$ reduced/0.1 ml/min; MVH: Reference 4.			

Results in the table 2 show that the highest levels of the associated activities of milk XO observed with artificial electron donor – methylviologen reduced by dithionite ( $\text{Na}_2\text{S}_2\text{O}_4$ ). Among the physiological electron donors the highest associated activities were obtained using reduced NADH. Natural substrate of XO – hypoxanthine was also effective in the donating of electrons for NaR and NiR activities of the enzyme in fresh sheep milk. Thus, the electron transfer may also occur from the hypoxanthine (the reducing substrate) to nitrite and nitrate (the oxidizing substrates). Because in the presence of tungstate in the reaction mixture the associated activities were not detected, during nitrate reduction by hypoxanthine, the

XO molybdenum centre may participate directly in both the oxidative (hypoxanthine oxidation) and the reductive (nitrate and nitrite reduction) half-reactions.

*Detection of the products of nitrate- and nitrite reduction by XO in heat treated sheep fresh milk.* As mentioned above, it is found that animal XO converts  $\text{NO}_3^-$  and  $\text{NO}_2^-$  to physiologically important gas – nitric oxide (NO) [6-8]. NO effectively reacts with L-cysteine or reduced glutathione (GSH) at pH 7.0 and 7.4, to form orange-pink products of S-nitrosocysteine (CysNO) or S-nitrosogluthathione (GSNO). These products exhibited a peak absorbances at around 340 and 540 nm [25]. It is known that NADH is one of potential physiological electron donors for XO and it also has absorbance at 340 nm (reduced NADH exhibits strong UV absorption at 340 nm whilst the oxidized form has virtually no absorption at this wavelength). Therefore, to avoid mutual interference between the optical density of NADH and CysNO at 340 nm, instead of NADH we used hypoxanthine as an electron donor for NaR and NiR activities of milk XO (see above).

It was demonstrated that heat treatment (80°C, 10 min) of homogenic XO resulted in the release of molybdenum cofactor (Mo-co) from the active center of denatured enzyme molecule. During the heat treatment of XO ascorbic acid was the potential protector against the oxidation of released Mo-co. However, in the absence of ascorbic acid it quickly inactivated by oxygen (even in anerobic condions) [4]. Later we showed that glutathione and cysteine were the more powerful protectors for isolated Mo-co [27].

However ascorbic acid decomposes S-nitrosocysteine [28] and, therefore, we used L-cysteine as the protector against the oxidation of the cofactor in the active center of XO localized in MFGM. Thus, in our experiments L-cysteine was used for double purposes: as the protector of enzyme Mo-co against the oxidation during heat treatment of milk and as a reagent for S-nitrosothiol formation. For construction of calibration curve we used nitroprusside as a donor of NO. Increasing concentrations of nitroprusside from 10 nM to 1.0  $\mu\text{M}$  mixed with constant 0.1 mM concentration of cysteine in milk serum. Micromolar concentrations of nitroprusside release nanomolar concentrations of NO [20]. The serum was obtained by heating fresh milk, precipitating its proteins with acetic acid and centrifuging. In order to obtain a transparent milk serum, its filtration was carried out through an “Merk Millipore” membrane (33 mm Millex Filter Units).

For NO determination sheep milk mixed in the ratio of 1:1 with 0.2 M chlorinated phosphate buffer (PBS), pH 6.5, containing 10mM NEM, 2.5 mM EDTA [28], 0.2 mM  $\text{Na}_2\text{MoO}_4$  or  $\text{Na}_2\text{WO}_4$  and 0.1 mM cysteine. After incubation in 15 minutes at a temperature of 36°C the milk proteins were precipitated by diluted acetic acid added to the reaction mixture until pH 4.0. After centrifugation in the supernatant absorbance at 340 nm and 540 nm were measured.

For many years tungsten was considered to be a biological antagonist of molybdenum and was used for study of the properties and functions of molybdenum in Mo-enzymes. This was due to the fact that tungsten is able to replace molybdenum in Mo-enzymes, forming catalytically inactive analogs [30]. Therefore, to make sure that it is the molybdenum enzyme that catalyzes the formation of NO, instead of molybdenum we incubated the milk in the presence of tungsten (table 3).

Thus, the results obtained (table 3) convincingly show that the heat treatment of fresh sheep milk in the presence of exogenous molybdenum actually activates XO and the enzyme becomes capable of converting nitrate and nitrite to nitric oxide. However, when nitrates were used as a substrate NO formation was very low. At the same time, using nitrites as substrate resulted in 10 times higher amount of formed NO (i.e. CysNO) in comparison with nitrate substrates. The levels of CysNO determined by absorbances at 340 and 540 nm were completely different. It is likely that this was due to the difference in the sensitivity of the absorption at the ultraviolet and visible wavelengths of the spectrophotometer.

*Effect of exogenous phospholipid on the associated activities of sheep milk XO.* Phospholipids (PLs) are formed by glycerol, phosphoric acid, fatty acids and a hydroxy compound (e.g., choline, ethanolamine, serine, inositol). It is well known that milk fat globule membranes (MFGM) are composed of four main species of PLs: phosphatidylcholine (PC), phosphatidylethanolamine (PE), phosphatidylinositol (PI) and phosphatidylserine (PS). The most abundant PLs in milk fat, expressed as percentage of total, are PE (26.4 % – 72.3 % of total PLs), PC (8.0 % – 45.5 %), PI (1.4 % – 14.1 %) and PS (2.0 % – 16.1 %). Of the lipids, phosphatidylcholine is largely located on the outside while the neutral lipids, phosphatidylethanolamine, phosphatidylserine and phosphatidylinositol are concentrated on the inner surface [31]. Amphiphilic properties of PLs derive from the presence of both a hydrophobic tail and a hydrophilic head

Table 3 – Formation of CySNO in fresh sheep milk after heat treatment in the presence of cysteine and molybdenum or tungsten

Treatments of the milk	Substrate in reaction mixture	Absorbance at:	Amount of CySNO, *nanomoles
Control – PBS only without milk	NO <sub>3</sub> <sup>-</sup>	340 nm	0.0
		540 nm	0.0
	NO <sub>2</sub> <sup>-</sup>	340 nm	0.0
		540 nm	0.0
Control – milk without heat treatment	NO <sub>3</sub> <sup>-</sup>	340 nm	2.7 ± 0.3
		540 nm	0.0
	NO <sub>2</sub> <sup>-</sup>	340 nm	5.8 ± 0.2
		540 nm	0.0
Heating + Na <sub>2</sub> MoO <sub>4</sub> at 80°C, 7 minutes	NO <sub>3</sub> <sup>-</sup>	340 nm	12.6 ±0.8
		540 nm	3.2 ± 0.2
	NO <sub>2</sub> <sup>-</sup>	340 nm	35.5 ± 3.5
		540 nm	7.3 ± 1.3
Heating + Na <sub>2</sub> WO <sub>4</sub> at 80°C, 7 minutes	NO <sub>3</sub> <sup>-</sup>	340 nm	0.0
		540 nm	0.0
	NO <sub>2</sub> <sup>-</sup>	340 nm	0.0
		540 nm	0.0
Heating of milk without MoO <sub>4</sub> <sup>=</sup> or WO <sub>4</sub> <sup>=</sup>	NO <sub>3</sub> <sup>-</sup>	340 nm	0.0
		540 nm	0.0
	NO <sub>2</sub> <sup>-</sup>	340 nm	0.0
		540 nm	0.0
*CysNO nanomoles/0.1 ml/min.			

make them natural detergents. Thus, under high temperature phospholipids may effectively disrupt hydrophobic bonds between fatty acids, e.g., the integrity of all membrane layers of MFGM. Therefore, the destruction of MFGM makes the enzyme molecules available for exogenous molybdenum and its substrates (hypoxanthine, nitrate and nitrite).

In the next experiments, we examined the effect of the lecithin on NaR and NiR activities of heat-treated fresh sheep milk. Egg yolk lecithin from AppliChem (Panreac, ITW Companies, Darmstadt, Germany) was used in the experiments. The main phospholipids of this lecithin are phosphatidylcholine and phosphatidylethanolamine, i.e. they are components of the outer and inner layers of the membrane. The lecithin was dissolved in isopropyl alcohol and then added to the milk before heat treatment. The other components required for the heat treatment of milk have already been written above. Hypoxanthine was used an electron donor for NaR and NiR activities.

Table 4 – Effect of increasing concentrations of the lecithin on nitrate- and nitrite-reducing activities and CysNO formation in sheep milk

Lecithin content	Associated activities		Amount of CySNO*	
	NaR	NiR	From NaR	From NiR
Control	92.8 ± 8.5	57.6 ± 7.6	13.2 ± 1.2	33.7 ± 5.2
0.01 mg/ml	91.2 ± 10.2	58.4 ± 6.8	14.3 ± 2.6	33.5 ± 7.3
0.05 mg/ml	92.7 ± 9.5	57.8 ± 9.3	14.4 ± 1.8	34.7 ± 7.1
0.1 mg/ml	95.8 ± 11.6	62.9 ± 9.7	18.4 ± 3.2	42.9 ± 8.2
0.5 mg/ml	122.5 ± 14.7	117.6 ± 12.8	33.6 ± 4.5	78.9 ± 12.2
1.0 mg/ml	128.6 ± 12.8	135.2 ± 18.6	36.7 ± 7.3	93.8 ± 11.70
*Results obtained from 340 nm absorbance.				

The results presented in table 4 show that exogenous lecithin in relatively high concentrations (0.5–1.0 mg/ml) increases the activity of NaR, NiR and the formation of CysNO. Apparently, during heat treatment, exogenous lecithin does partially decompose the membrane of MFGM of milk and enzyme molecules become more accessible. Thus, the results obtained may be important in the cleaning of animal milk contaminated with nitrates or nitrites. Thus, our results suggest the possible use of XO activation by heat treatment to remove nitrates from milk. Usually fresh sheep's milk is consumed after heat treatment.

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### **ҚОЙДЫҢ САУМАЛ СҮТІНДЕГІ КСАНТИНОКСИДАЗАНЫ АКТИВТЕНДІРУ ЖӘНЕ АЗОТ ТОТЫҒЫНЫҢ ТҮЗІЛУ ЖАҒДАЙЛАРЫН ОҢТАЙЛАНДЫРУ**

**Аннотация.** Қойдың сүтіндегі КО-ның активтігін анықтау үшін әртүрлі табиғи және жасанды антиоксиданттар тексерілді. Табиғи антиоксиданттардың арасында L-цистеин қыздырылған сүттегі КО-ны күштірек тұрақтандыратын болып шықты. Цистеин мен молибденнің қатысуымен қыздырылған кезде активтенген сүттің КО-сы нитрат пен нитритті азот тотығына (NO) айналдыратын қабілетке ие болды. Сондықтан, цистеин екі мақсатта: қыздыру кезінде ферменттің активті орталығын тотығудан қорғайтын протектор және S-нитрозотиолдардың түзілуіне қажет реагент ретінде пайдаланылды. КО-ның табиғи субстраты – гипоксантин НаР мен НиР-дің активтіктері үшін күшті электрондар доноры бола алатыны анықталды. Сүтті сырттан берілген лецитиннің қатысуымен қыздырғанда НаР мен НиР-дің активтігі және CysNO-ның түзілуі жоғарылады. Сонымен, қыздыру кезінде: а) сырттан берілген фосфолипидтер СМГМ-ның құрылысын бұзды және б) ферменттің молекулалары жартылай денатурацияланады және оның нәтижесінде олардың активтік орталықтарына сырттан берілген цистеин, молибден, гипоксантин, нитрат немес нитрит ене алады.

**Түйін сөздер:** сүт, ксантиноксидаза, NO, NO<sub>3</sub>, NO<sub>2</sub>, антиоксиданттар,, молибден, вольфрам, фосфолипидтар.

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### **ОПТИМИЗАЦИЯ УСЛОВИЙ ДЛЯ АКТИВАЦИИ КСАНТИНОКСИДАЗЫ И ОБРАЗОВАНИЯ ОКСИДА АЗОТА В ОВЕЧЬЕМ МОЛОКЕ**

**Аннотация.** Для обнаружения активности ксантиноксидазы (КО) в овечьем молоке были исследованы различные природные и искусственные антиоксиданты. Среди природных антиоксидантов L-цистеин был более эффективным в стабилизации КО прогревом молока. КО молока, активированная прогреванием в присутствии цистеина и молибдена, обладала способностью превращать нитрат и нитрит в оксид азота (NO). Поэтому, цистеин был использован для двух целей: в качестве протектора активного центра фермента от окисления во время термообработки и в качестве реагента для образования S-нитрозотиолов. Природный субстрат КО – гипоксантин был эффективным донором электронов для НаР и НиР активностей. Прогревание молока в присутствии экзогенного лецитина повышало НаР и НиР активности фермента и образование CysNO. Таким образом, во время термообработки: а) экзогенные фосфолипиды разрушают структуру МЖГМ и б) молекулы фермента частично денатурируются и в результате их активные центры становятся доступными для экзогенных цистеина, молибдена, гипоксантина и нитрата или нитрита.

**Ключевые слова:** молоко, ксантиноксидаза, NO, NO<sub>3</sub>, NO<sub>2</sub>, антиоксиданты,, молибден, вольфрам, фосфолипиды.

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**REFERENCES**

- [1] Reynolds J.D., Ahearn G.S., Angelo M., Zhang J., Cobb F., Stamler J.S. S-nitrosohemoglobin deficiency: A mechanism for loss of physiological activity in banked blood // *Proc. National Acad. Sciences*. 2007. N 104(43). P. 17058-17062.
- [2] Bryan N.S. Nitrite in Nitric Oxide Biology: Cause or Consequence? A Systems-Based Review // *Free Radical Biology & Medicine*. 2006. N 41. P. 691-701.
- [3] Gladwin M.T., Schechter A.N., Kim-Shapiro D.B., Patel R.P., Hogg N., Shiva S., Cannon R.O., Kelm M., Wink D.A., Espey M.G., Oldfield E.H., Pluta R.M., Freeman B.A., Lancaster Jr.J.R., Feelisch M., Lundberg J.O. The Emerging Biology of the Nitrite Anion // *Nature Chemical Biology*. 2005. N 1(6). P. 308-314.
- [4] Mukhamejanova A.S., Kulataeva M.S., Shalakhmetova G.A., Alikulov Z. The effect of in vivo exogenous molybdenum on the activity of xanthine oxidase in milk and liver of a sheep // *News of NAS RK. Series of biology and medicine*. 2018. N 5(323). P. 253-241. ISSN 2518-1629 (Online), ISSN 2224-5308 (Print).
- [5] Alikulov Z.A., L'vov N.P., Kretovich V.L. Nitrate and nitrite reductase activity of milk xanthine oxidase // *Biokhimiia*. 1980. N 45. P. 1714-1718.
- [6] Millar T.M., Stevens C.R., Benjamin N., Eisenthal R., Harrison R., Blake D.R. Xanthine oxidoreductase catalyzes the reduction of nitrates and nitrite to nitric oxide under hypoxic conditions // *FEBS Letters*. 1998. N 427. P. 225-228.
- [7] Zhang Z., Nauthon D., Winyard P.G., Benjamin N. Generation of nitric oxide by a nitrite reductase activity of xanthine oxidase: a potential pathway for nitric oxide formation in the absence of nitric oxide synthase activity // *Bioch. Biophys. Res. Comm.* 1998. N 249. P. 767-772.
- [8] Hord N.G., Ghannam J.S., Garg H.K., Berens P.D., Bryan N.S. Nitrate and nitrite content of human, formula, bovine, and soy milks: implications for dietary nitrite and nitrate recommendations // *Breastfeed Med*. 2011. N 6(6). P. 393-399.
- [9] Andrew M., Garg H., Coughlin J., Bryan N. Nutritional epidemiology in the context of nitric oxide biology: Risk-Benefit evaluation for dietary nitrite and nitrate // *Nitric Oxide*. 2010. N 22. P. 110-119.
- [10] Bryan N.S., Bian K., Murad F. Discovery of the nitric oxide signaling pathway and targets for drug development // *Frontiers in Bioscience*. 2009. P. 1-18.
- [11] Taibi G., Paganini A., Gueli M.C., Ampola F., Nicotra C.M. Xanthine oxidase catalyzes the synthesis of retinoic acid // *J Enzyme Inhib.* 2001. N 16(3). P. 275-85.
- [12] Taibi G., Nicotra M., Concetta A. Xanthine oxidase catalyzes the oxidation of retinol // *Journal of Enzyme Inhibition and Medicinal Chemistry*. 2007. N 22:4. P. 471-476.
- [13] Harrison R. Physiological Roles of Xanthine Oxidoreductase // *Drug Metabolism Reviews*. 2004. Vol. 36, P. 363-375. doi:10.1081/DMR-120037569
- [14] Beedham C. Molybdenum hydroxylases. In: «Enzyme systems that metabolize drug and xenobiotics» Ed. Costas Ioannidis // John Wiley & Sons Ltd. 2001. P. 146-188.
- [15] Harrison R. Milk xanthine oxidase: Properties and physiological roles. // *International Dairy Journal*. 2006. Vol. 16, Iss. 6. P. 546-554.
- [16] Mondy B.L., Keenan T.W. Butyrophilin and xanthine oxidase occur in constant molar proportions in milk lipid globule membrane but vary in amount with breed and stage of lactation // *Protoplasma*. 1993. N 177. P. 32-36.
- [17] Godber B., Sanders S., Harrison R., Eisenthal R., Bray R. More or 95% of xanthine oxidase in human milk is present as the demolybdo form, lacking molybdopterin // *Biochem. Soc. Trans.* N 25. P. 519-529.
- [18] Bray R.S., Lowe D., Godber B., Harrison R., Eisenthal R. Properties of xanthine oxidase from human milk: grossly deficient in molybdenum and substantially deficient in iron-sulfur centers // *Agency for Scientific Publications*. 1999. P. 775-778.
- [19] Atmani D., Benboubetra M., Harrison R. Goat's milk xanthine oxidoreductase is grossly deficient in molybdenum // *J. Dairy Res*. 2004. N 71. P. 7-13.



- [20] Kramer P. Steven, Jean L. Johnson, Anthony A. Ribeiro, David S. Millington, K. V. Rajagopalan. The Structure of the Molybdenum Cofactor // *The Journal of Biological Chemistry*. 1987. Vol. 262, N. 34. P. 16357-16363.
- [21] Kisker C., Schindelin H., Rees D.C. Molybdenum-cofactor-containing enzymes: structure and mechanism // *Annual Review of Biochemistry*. 1997. N 66. P. 233-267.
- [22] Suzuki Go, Okamoto Ken, Kusano Teruo, Yoko Matsuda, Akira Fuse, Hiroyuki Yokota. Evaluation of Neuronal Protective Effects of Xanthine Oxidoreductase Inhibitors on Severe Whole-brain Ischemia in Mouse Model and Analysis of Xanthine Oxidoreductase Activity in the Mouse Brain // *Neurol Med Chir*. 2015. N 55(1). P. 77-85.
- [23] Mirko P. The Mechanism for the Conversion of Uric Acid into Allantoin and Dehydro-Allantoin // *A New Look at an old Problem. Tetrahedron*. 1986. N 42. P. 747-751.
- [24] Vogels G., Van der Drift C. Differential analyses of glyoxylate derivatives. // *Analytical Biochemistry*. 1970. N 33. P. 143-157.
- [25] Kuo W.N., Kocis J.M., Nibbs J. Nitrosation of cysteine and reduced glutathione by nitrite at physiological pH // *Front Biosci*. 2003. N 8. P. 62-69.
- [26] Rochette L., Ghibu S., Richard C., Zeller M., Cottin Y., Vergely C. Direct and indirect antioxidant properties of  $\alpha$ -lipoic acid and therapeutic potential // *Mol Nutr Food Res*. 2013. N 57(1). P. 114-125.
- [27] Alikulov Z.A., Mendel R.R. Molybdenum cofactor from tobacco cell cultures and milk xanthine oxidase: involvement of sulfhydryl groups in dimerization activity of cofactor // *Biochemie und Physiologie der Pflanzen*. 1984. N 179(8). P. 693-705.
- [28] Stsiapura V., Stepuro I., Morozkina T., Lewis S., Smith L. S-Nitrosoglutathione formation at gastric pH is augmented by ascorbic acid and by the antioxidant vitamin complex // *Journal Pharmaceutical Biology*. 2018. Vol. 56.
- [29] Marley R. Formation of nanomolar concentrations of S-nitroso-albumin in human plasma by nitric oxide // *Free Radical Biology & Medicine*. 2001. N 31(5). P. 688-696.
- [30] Kletzin A., Adams M. W. Tungsten in biological systems // *FEMS Microbiol Rev*. 1996. N 18(1). P. 5-63.
- [31] Garcia C., Lutz N.W., Confort-Gouny S., Cozzone P.J., Armand M., Bernard M. Phospholipid fingerprints of milk from different mammals determined by <sup>31</sup>P NMR: Towards specific interest in human health // *Food Chem*. 2012. N 135. P. 1777-1783.
- [32] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494.4(380). P. 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [33] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S., Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. (2019). Foresight and the role of innovation in the development of education // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494.4(380). 93-101. <https://doi.org/10.32014/2019.2518-1467.96>
- [34] Mamyrbayev O.Z., Othman M., Akhmediyarova A.T., Kydyrbekova A.S., Mekebayev N.O. Voice verification using I-vectors and neural networks with limited training data // *Bulletin of the National academy of sciences of the Republic of Kazakhstan*. 2019. N 3(379). P. 36-43. <https://doi.org/10.32014/2019.2518-1467.66>
- [35] Lavrinenko S.V., Arpentieva M.R., Kassymova G.K. (2019). The negative impact of the internet on the educational process. International youth scientific conference "Heat and mass transfer in the thermal control system of technical and technological energy equipment" (HMTTSC 2019). <https://doi.org/10.1063/1.5120671>
- [36] Atayeva M., Putro N.H.P.S., Kassymova G., Kosbay S. (2019) Impact of reading on students' writing ability // *Materials of International Practical Internet Conference "Challenges of Science"*. ISBN 978-601-323-144-0. Issue II, 2019. P. 5-13. <https://doi.org/10.31643/2019.001>
- [37] Kassymova K.G., Tyumaseva Z.I., Valeeva G.V., Lavrinenko S.V., Arpentieva M.R., Kenzhaliyev B.K., Kosherbayeva A.N., Kosov A.V., Duvalina O.N., Dossayeva S.K. Integrative model of student and teacher stress coping: the correction of relations in educational, professional and personal interaction // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494. 2019. Vol. 3, N 379. P. 169-179. <https://doi.org/10.32014/2019.2518-1467.83>
- [38] Arpentieva M.R., Kassymova G.K., Lavrinenko S.V., Tyumaseva Z.I., Valeeva G.V., Kenzhaliyev O.B., Triyono M.B., Duvalina O.N., Kosov A.V., Dossayeva S.K. Environmental education in the system of global and additional education // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494. 2019. Vol. 3, N 379. P. 158-168. <https://doi.org/10.32014/2019.2518-1467.82>
- [39] Azatbek T., Panzabekova A., Bekenova L., Yegizbyeve Zh. The share of drug trafficking in Kazakhstan's GDP: methods for evaluation // *Economic Annals-XXI* (2017). 166(7-8). P. 31-36(Scopus). DOI: <https://doi.org/10.21003/ea.V166-06>
- [40] Khalitova M.M., Praliev G.S., Panzabekova A.Z., Andreeva Z.M., Dzhubaliyeva Z.A. Financial instruments of state regulation industrial and innovative development of Kazakhstan economy // *Life Sci J*. 2014. 11(10s):369-378. (ISSN:1097-8135). <http://www.lifesciencesite.com.70>



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## **CULTIVATING JUNIOR HIGH SCHOOL STUDENTS' CRITICAL THINKING SKILLS BY USING A SHORT-VIDEO IN ENGLISH LANGUAGE CLASSROOM**

**Abstract.** An effective teaching method for cultivating students' critical thinking skills of Junior High School students in Indonesia is very necessary as their critical thinking ability is still low. This research is a descriptive study which aims at cultivating learners' critical thinking by using a short-video since it is believed that technology can motivate the students to learn, increase their interest, engage them to the lesson matter, provide effective learning activities, and demand them to think critically and creatively. The subjects of this study were 130 students of grade IX of State Junior High School 1 (henceforth SMP N 1) Sedayu, Yogyakarta. The students were homogeny in term of age, economic, and social background as well as in English language scores. Facione's critical thinking rubrics were used to indicate the level of students' critical thinking in terms of their interpretation, analysis, evaluation, inference, explanation, and self-regulation skill of a short-video. The average score of all items in pre-test critical thinking skills was at fair level with the score 9 out of 20. The results revealed that the students' interpretation skills were fair with the score of 9 out of 20; analytical skill was 12 out of 20; evaluation skill was 9 out of 20; self-regulation was in fair criterion with the score of 5 out of 10 and good level of explanatory's skill with the score 6 out of 10, while 12 for inferences. Thus, it can be concluded that the critical thinking skill of the students of grade IX of SMP N 1 Sedayu, Yogyakarta, was still unsatisfactory due to their fair levels. The use of a short-video as an instrument cannot improve their critical thinking skills. It is, therefore, recommended to practice more pertaining to the critical thinking for the students by using any similar instrument.

**Keywords:** Critical thinking, Cognitive skills, Short-videos, Junior High School, teaching method, students.

**Introduction.** There is an importance to manage the self-development of children and adults at additional and other levels and types of environmental education in the context of educational globalization. It is also important to develop school children's cognitive skills while they are at a young age (Kassymova, G. K.; Stepanova, G. A.; Stepanova, O. P.; Menshikov, P.V.; Arpentieva, M.R.; Merezchnikov, A. P.; Kunakovskaya, L. A., 2018; Arpentieva, M. R., Kassymova, G. K., Lavrinenko, S. V., Tyumaseva, Z. I., Valeeva, G. V., Kenzhaliyev, O. B., Triyono, M. B., Duvalina, O. N., Kosov, A. V., Dossayeva, S. K., 2019). The need for obtaining an effective teaching method for cultivating students' critical thinking skills of junior high school students in Indonesia is paramount because their critical thinking ability is still low. A research done by the Program for International Student Assessment (PISA) 2015 states that Indonesia science literacy score is 403, which is lower than Organization for Economic Co-operation and Development (hereafter OECD) namely 493. The average performance in the reading of 15-year-olds is shown 397, compared to an average of score OECD 493 (PISA, 2015). It reflects that Indonesian students' skill in answering the questions refer to critical, logical, and problem-solving skills are still insufficient. Students need to be trained during the learning process.

Kamali & Fahim (2011:2), mentioned,

...critical thinking is the skill to look over, against with own perspectives, and promote ideas; to argue inductively and deductively, and to reach factual or judgmental conclusions based on firm inferences drawn from clear statements of knowledge or belief.

There are some factors that affect critical thinking of Indonesian students: the language proficiency, assessment methods, motivation, the support from home, prior linguistic knowledge, learning environment, teaching strategies, comprehensible input, student personality, age, and feel comfort in their country of residence (Indah, 2016).

Several studies have been conducted to foster the Indonesian students' critical thinking (Elisanti, 2017; Haridz and Irving, 2017; Saputri, Sajidan, and Rinanto, 2018) yet the results are still unsatisfactory as the students' critical thinking were at the average level. The results of previous research have not achieved the Indonesian National Education Standards Agency (BSNP) standard that must be met in the 21st-century education process in which the students should have changed factual thinking style to the critical, and from the delivery of knowledge to the exchange of knowledge (BSNP, 2010)

For this reason, this research was done to foster students' critical thinking skills through the use of a short-video since it is believed that technology can motivate the students to learn; increase their interest; engage them to the lesson matter; provide them with effective learning activities; and involve them to think critically and creatively (Carvajal, & Paulina, 2019; Ding, Ottenbreit-Leftwich, & Glazewski, 2019; Gurbangeldiyewna, 2016; McQuiggan, McQuiggan, Sabourin, & Kosturko, 2015; Ohler, 2013; and Sulla, Bosco, & Marks, 2019).

**Literature review.** The idea of combining critical thinking into education was developed by Greek philosophers after World War II and strengthen by Bloom in the 1950s with his Taxonomy of Educational Objectives. The idea was gladly accepted in the 1980s. It has held the probe of time and yet there is still a deliberate need for strengthening the critical thinking skills in schools and colleges (Djiwandono, 2013). It is effortless and common by the teachers to transfer the knowledge from textbooks to the students, nevertheless, to make learners think more independently and learn from themselves beside textbooks is a great challenge/effort (Djiwandono, 2013). Combine critical thinking into education could help learners to deal with social and environmental issues (Djiwandono, 2013).

Critical" is from the Greek word "*krisis*", which means "to separate". Without critical thinking one might not be able to separate himself from the crisis which sucks into the damage, even he or she might block his or her pathways to success. Non-traditional thinking, grounded in traditional, logical idea, allows us to determine exactly what the crisis is and how to move out of it (Caroselli, 2009). Paul (1995) says, "Critical thinking is thinking about your thinking while you are thinking in order to make your thinking better".

According to Fahim (2010), critical thinking is learning how to ask and answer questions of analysis, synthesis, and evaluation. In detail, Facione (2015) defined the core critical thinking skills into two categories, cognitive and disposition skills.

Cognitive skills are meant being in the very core of critical thinking. It involves six skills namely: interpretation, analysis, evaluation, inference, explanation, and self-regulation. Facione (2015) explains, *interpretation* is to comprehend and express the meaning or significance of a wide variety of "experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria" (p: 15). The *categorization*, decoding significance, and clarifying meaning is considered the sub-skills of interpretation (Facione, 2015). The *analysis* is considered as an ability to identify the intended and real inferential relationships between statements, questions, concepts, descriptions, or other forms of representation. The experts infer examining ideas, detecting arguments, and analyzing arguments as sub-skills of analysis (Facione, 2015). The *evaluation* is judging about the arguments whether it is reliable and rational based on the logic and evidence given. The *inference* is the ability to identify, to decide what to believe, to draw reasonable conclusions based on strong logic, to form assumptions and hypotheses and to grasp relevant information or consequences of this decision. The experts involve querying evidence, conjecturing alternatives, and drawing conclusions as sub-skills of inference (Facione, 2015). The *explanation* is the ability to communicate and present in a cogent and coherent way. The sub-skills under clarification are describing methods and outcome, giving a reason on procedures, proposing and stand up for with good reasons one's factual and theoretical explanations of events or points of view, and come with full and well-

reasoned, arguments in the context of findings the best comprehension possible (Facione, 2015). The *self-regulation* is one's the ability to monitor his or her own thinking, being conscious in cognitive activities. Two sub-skills were defined by experts in self-regulation: self-examination and self-correction. Which means one has the ability to monitor and correct flaws in logic (Facione, 2015).

The disposition is,

... the ideal critical thinker who is habitually curious, well-literate, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit (Facione, 2015:15).

The ability to think critically, however, will not ensure unless one has a strong intention and initiative to combine in the process relevant to it. In addition, besides the ability to enhance in cognitive skills, good critical thinkers need to have strong intention to identify the significance of good thinking and have the creativity to seek better judgment (Shirkhani & Fahim, 2011).

Engaging critical thinking into the language learning processes or activities is considered as one of the language teachers' innovation because the students will expand their learning experience and will learn the language meaningfully. The learners' good performance indicates that they have good critical thinking skills (Pinter, 2017). Some studies have confirmed that critical thinking skills improve EFL writing ability language proficiency, oral communication ability, and so forth (Alharbi, 2015; Hawks, Turner, Derouin, Hueckel, Leonardelli, & Oermann, 2016; Indah, 2013; Samanhudi, & Sampurna, 2010; and Shirkhani & Fahim, 2011).

Language skills cannot be separated from cognitive or critical thinking. Teaching critical thinking skills includes transferring the facts or information or concepts (Krathwohl, & Anderson, 2009). Critical thinking is focused on deciding what to believe or to do (Norris & Ennis, 1996).

Language learners who have critical thinking skills are more creative and capable than those who haven't to achieve the goals of the curriculum. Shirkhani & Fahim (2011:3) mentions,

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 well-balanced.

According to Brown (1999), notwithstanding that the communicative approach cannot develop critical thinking among learners, the learners still have an ability to think critically. However, the activities that engage the learners to challenge, to solve the real-life tasks, through technology as a tool for learning, communication, and collaboration, would provide learners with occasions to view problems from a diversity of perspectives, that let the learners to cooperate and negotiate answers to the problems, and examine those answers within a real-world context (Bransford, Brown, & Cocking, 2000; and Hannafin et al. 1999 in Lee & Hannafin, 2016). It means that technology which provides real-life activities could foster the learners' 4C (collaborative, communicative, critical-thinking and creative-thinking) skills and motivate them to increase their interest and involve them to think critically and creatively.

Considering the definitions discussed above, the strategy preferred in this research to cultivate learners' critical thinking skills was - "short-videos". Short-video is a video that the longitude is less than the length of a traditional television program (Rundell, 2002) or it is unlike any other videos differ with its longitude or length. Richards, Willy, and Renandya (2002) have mentioned that video is a medium which incorporates a variety of visual elements and a sizable range of audio practices in it. The statement was supported by Salomon, Lowther, Russell, 2007) that video sections can illustrate a case or a procedure so that learners feel as though they are indeed there. Further, Harmer (2001) also marked the integration of video into the process of teaching and learning has great advantages for observing the language-in-use such as comprehension since students are able to see general meanings and moods that are conveyed through expression, gestures, and visual clues. It can be seen that video as motion pictures can deliver the messages. Solomon, as quoted in Pratiwi (2012), confirmed that videos can be arranged as effective interactive media as long as the teacher has a strategy in implementing it into the classroom. There are

some people who think that videos with a length of more than three or four minutes will lead learners to get easily bored. Consequently, short-video sequences of between one and four minutes can involve the number of cognitive exercises, (example: demonstrate the satisfying range of cognition language that can be highly motivating; engaging and keeping learners to stay focused) (Harmer, 2001).

**Previous research.** There have been done several studies related to this study. Hidayat, Rukmini, & Bharati (2019) conducted research on developing a problem-solving based assessment to stimulate critical thinking and creativity of students' writing skill. They developed the problem-solving writing module collaboratively with the teacher of X MIPA 6 at SMA Sultan Agung 1 Semarang in the academic year of 2017/2018. They used pre-post-tests to measure the students' writing skill, critical thinking skill, and creativity skill. They found significant improvement after implementing the designed module. The mean score of writing skill was 47.83 and improved up to 70.83, critical thinking and creativity skills were 42.67 and improved up to 60.13. The problem-solving based assessment implemented by researchers was applicable to stimulate the critical thinking and creativity of the students' writing skill.

Another research was conducted by Setyarini (2019) on critical thinking. She examined how storytelling could be used to instigate higher order thinking skills (HOTS) practices between young English learners through communicative skills and possible defies teachers might find while implementing critical thinking skills. She obtained the data through observation, interviews, and by analyzing the lesson plans. In her research open-ended questions such as, “*what*”, “*why*”, “*how*”, “*if*”, “*how about*”, and “*if you were-were*” used to enable the student to practice their speaking. The purpose of using open-ended questions was to know the learners' opinion, comments, imagination (while analyzing and evaluating the story), and critics about the implemented stories in the classroom. She found that students find difficulties in creating their own stories since they had limited language competence and unaccustomedness with the story context. The students' HOTS was still in a developing position and didn't reach the highest level of creating.

In 2012 Yang and Wu conducted quasi-experimental research with senior high school students in Taiwan. They used digital story-telling to enhance student academic achievement, critical thinking, and learning motivation. The independent variable of the study was information-technology-integrated instruction (ITII) on two various levels and digital storytelling (DST) as experimental participants. Their findings indicated that DST students of experimental class performed better than those compared class students. The participants in all terms or English achievement, critical thinking, and learning motivation achieved very well.

Familiar research was conducted by Fadhillah (2017) on critical thinking. Her research under the title “Embedding critical thinking through critical reading in teaching a narrative text to junior high school students” reported whether the critical reading strategy could improve the students' critical thinking skills. The results of her research after treatment indicated that only 18 students (or 51%) made a high improvement in their critical thinking skills. The critical reading strategy was effective in fostering the students' critical thinking skills, especially using previewing, outlining and summarizing, reflecting and evaluating had a good impact. She explored the scores from the most evident to the least evident, which include mainly 1. reasoning, 2. predicting, 3. recognizing context, and 4. questioning. Consequently, ‘reasoning’ was the most frequent critical thinking skill performed by the students. The second common was ‘predicting’ where the students got the chance to relate their prior knowledge to the current one. The third ‘recognizing context’ where the students trained to judge the things objectively. The students met the criteria of being critical thinkers, they started being open to the new opinion and ideas. However, the research couldn't support well to achieve the students' ‘questioning’ ability. The students almost never asked the logical questions during the process or the asked questions were irrelevant to the study.

The study on modeling the relationship among prior English level, self-efficacy, critical thinking, and strategies in reading performance was conducted by Chou (2017) who says that critical thinking and metacognition had a positive correlation with surface preceding strategies in English reading.

Navaie, Saeedi & Khatami (2018) assumed that other variables had effects on critical thinking or they might play a role in this regard. They conducted correlational research to find out whether there was any relation between critical thinking and mindfulness of Iranian EFL learners. However, the results of their study showed that there wasn't a significant relationship between critical thinking and mindfulness and even there wasn't any interaction between the sub-constructs of critical thinking and sub-constructs of

mindfulness. They also stated that learners' critical thinking skills depended more on their own abilities in learning. Learners needed to encourage themselves to learn the language, they needed to think about the practical benefits of learning the foreign language. Researchers suggested that learning materials and activities should stimulate learners' thinking process. Teachers needed to involve, motivate and build curiosity in the students to learn things by themselves. In the learning process, teachers needed to make the learners conscious, so that they could absorb the language deliberately.

Ilyas (2018) argue that "critical thinking is almost impossible to be taught to the students in non-Western countries since Western and non-Western countries have different cultural background". The students of non-Western countries could improve their English proficiency however, they will still be at the same level in critical thinking, because the educational system has not fully supported it well.

Singh & Shaari (2019) also support that, in order to achieve the standard of High Order Thinking Skills (HOTS) of English examination papers in schools need some revisions which have become part of the new curriculum of the 21st century.

The case study was conducted by Omar & Albakri (2016) in the ESL classroom. The purpose of their study was to examine the teachers' implementation of the thinking maps promoted CT during the teaching of literature in the ESL classroom. They came up with the result that teachers could implement and engage the students to think critically using the particular strategy. The results were significant or it had a good impact on learners' critical thinking since the used strategy included powerful instruction which called the students to think differently.

Masduqi (2011) believes that students' critical thinking skills will be improved if the English lessons involve the meaning of the things the students learn. Moreover, he considers critical thinking and meaning could be implemented through collaborative activities (teacher with students). The thinking process and meaning negotiation of the students could change their point of view because when the students learn things consciously the realization could be productive. Those two important elements only could be achieved when the teachers do collaborative activities. Teachers' responsibilities were to provide the learners with adequate exposure to the thinking process and meaning negotiation.

Different studies showed different results. However, they have the implication that EFL students at Primary, Junior or Senior High School have not been able to reach a good level of critical thinking skills (Setyarini, 2019). They cannot make a reasonable decision on a particular problem as their proposed solutions have no scientific explanation or lack of logical reason (Fadhilah, 2017 and Navaie, Saeedi & Khatami, 2018). To think critically means to evaluate the correctness, the merit, and the validity of claims or arguments (Ruggiero, 2012).

**Method.** The most widely used at the moment are integrated lessons using multimedia tools (Kassymova, G. K., Arpentieva, M. R., Kosherbayeva, A. N., Triyono, M. B., Sangilbayev S. O., Kenzhaliyev B. K., 2019). It is considered when students possess too much information or they do not understand the video well, it will cause them stress. Under stress cognitive skills do not develop well. However, there are many stress coping methods such as the physiological, behavioral, social and psychological methods to deal with stress (to its prevention and coping). Authors (Kassymova, G. K., Kosherbayeva, A. N., Sangilbayev, O. S., Schachl, H., Cox, N., 2018; Kassymova, K. G., Tyumaseva, Z. I., Valeeva, G. V., Lavrinenko, S. V., Arpentieva, M. R., Kenzhaliyev, B. K., Kosherbayeva, A. N., Kosov, A. V., Duvalina, O.N., Dossayeva S. K., 2019) outline and suggest stress management techniques, which are easy to practice for students and teachers even during the lesson and in special activities. This research uses the rubrics of critical thinking skills (CTSs) developed by Facione (2015) to indicate the level of students' CTSs. The subjects in this study were 130 students in grade 9 (5 classes) of State Junior High School students 1 (*SMP Negeri 1*) Sedayu, Yogyakarta selected through purposive sampling technique. The data were obtained from the analysis of student answers. After coding each student's answers and scoring them, then they were categorized into several score levels excellent, good, average, fair, poor, or very poor in term of students' interpretation, analysis, evaluation, inference, explanation, and self-regulation skills. The Facione's critical thinking rubrics can be seen in table 1 and 2 as the following.

Additionally, the short-video used in this research was based on the "TED ED RIDDLES". It was obtained from YouTube Channel along with this <https://www.youtube.com/watch?v=9uZ-jeZS8d0&t=70s>. The allocation time was about 03.24 minutes. The title of the video was in line with the given topic that was "Can you solve the jail break riddle" by Dan Finkle. The format of the video was mp.4. After all, the researchers tried out to the students for the first time without giving a pause on it.

Table 1 – Rubric for rating the critical thinking (Facione, 2015. p: 9)

Skill / category	Core critical thinking skills Experts' Consensus Description	Subskill / elements	Score
Interpretation	“To comprehend and express the meaning or significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria”	Categorize Decode significance Clarify meaning	Excellent - 18-20 Good - 13-17 Average - 10-12 Fair - 7-9 Poor - 5-6 Very poor- 0-5
Analysis	“To identify the intended and actual inferential relationships among statements, questions, concepts, descriptions, or other forms of representation intended to express belief, judgment, experiences, reasons, information, or opinions”	Examine ideas Identify arguments Identify reasons and claims	Excellent - 18-20 Good - 13-17 Average - 10-12 Fair - 7-9 Poor - 5-6 Very poor - 0-5
Inference	“To identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to reduce the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation”	Query evidence Conjecture alternatives Draw logically valid or justified conclusions	Excellent - 18-20 Good - 13-17 Average - 10-12 Fair - 7-9 Poor - 5-6 Very poor - 0-5
Evaluation	“To assess the credibility of statements or other representations that are accounts or descriptions of a person's perception, experience, situation, judgment, belief, or opinion; and to assess the logical strength of the actual or intended inferential relationships among statements, descriptions, questions, or other forms of representation”	Assess credibility of claims Assess quality of arguments that were made using inductive or deductive reasoning	Excellent - 18-20 Good - 13-17 Average - 10-12 Fair - 7-9 Poor - 5-6 Very poor - 0-5
Explanation	“To state and to justify that reasoning in terms of the evidential, conceptual, methodological, criteriological, and contextual considerations upon which one's results were based; and to present one's reasoning in the form of cogent arguments”	State results Justify procedures Present arguments	Excellent- 9-10 Good - 7-8 Average - 5-6 Fair - 3-4 Poor - 1-2 Very poor/Fail- 0
Self-Regulation	“Self-consciously to monitor one's cognitive activities, the elements used in those activities, and the results educed, particularly by applying skills in analysis, and evaluation to one's own inferential judgments with a view toward questioning, confirming, validating, or correcting either one's reasoning or one's results”	Self-monitor Self-correct	Excellent - 9-10 Good - 7-8 Average - 5-6 Fair - 3-4 Poor- 1-2 Very poor/Fail - 0

Table 2 – Critical Thinking category and its score

Category	Score
1. Interpretation	20
2. Analysis	20
3. Inference	20
4. Evaluation	20
5. Explanation	10
6. Self-Regulation	10
<b>Total</b>	<b>100</b>

**Results and discussion.** To cultivate students' critical thinking skills by using a short-video, the researchers used pair discussion forum in which the students work in a pair of two and keep giving and asking for opinions. Among the questions are; (1) what do you think about the video?, (2) why do you think so?, (3) what is your knowledge based upon the video?, (4) what does it implies and presuppose?, (5) what explains it, connects to it, leads from it?, (6) how are you viewing it?, (7) should it be viewed from different perspective?, and additional questions students could create by using (8) "if", "how about", and "if you were-were". The students have a very limited answer and most of them cannot explain the reasons.

From those questions, the students, actually, are expected to perform the 4C skills: communicative. 1) by responding to the questions (they will achieve communicative skill); collaborative. 2) by working in pairs (they will collaborate); critical thinking and problem-solving. 3) by thinking about the hidden part of the shown videos (they will think critically, and will try to solve the problem logically based on their own perspectives); and creative and innovative. 4) by relating the short-video to their own life activities (they will improve their creativity and innovation to solve any kind of problem that might appear in their life activities).

After the researchers turned the video for one to four minutes with a pause in the middle or in the required minutes, the students have to guess what will happen or the students have to answer the related questions and explain it with good reason(s). After watching the whole part of the short-video, they have to start thinking critically, evaluate the problem, and try to give logical answers for the questions by connecting the video to their real life.

**Students' critical thinking skills.** The researcher after implementing the short-videos with junior high school students she analyzed the collected data using Facione (2015) rubric which includes six objectives of critical thinking skills, interpretation, analysis, inference, evaluation, explanation, and self-regulation. The analyzed data didn't display good results. It can be clearly seen in the following table;

Table 3 – Scoring critical thinking skills of students' based Facione (2015) cognitive skills

No	Category	Excellent (18-20)	Good (13-17)	Average (10-12)	Fair (7-9)	Poor (5-6)	Very poor (0-5)
1	Interpretation	0st / 130st	4st / 130st	10st / 130st		12st / 130st	4st / 130st
2	Analysis	2st / 130st	2st / 130st		32st / 130st	12st / 130st	4st / 130st
3	Inference	8st / 130st	24st / 130st		6st / 130st	2st / 130st	2st / 130st
4	Evaluation	2st / 130st	2st / 130st	28st / 130st		8st / 130st	2st / 130st
No	Category	Excellent (9-10)	Good (7-8)	Average (5-6)	Fair (3-4)	Poor (1-2)	Very poor (0)
5	Explanation	8st / 130st	26st / 130st		6st / 130st	4st / 130st	0st / 130st
6	Self-regulation	4st / 130st	4st / 130st		38st / 130st	4st / 130st	0st / 130st

st = students

2st = 1 pair / = out of

Since the researchers used the pair work in their teaching process, the data also obtained from pairs and the students' respond accepted directly based on two students' discussions. The results of their response show that they were still on average and fair levels. The majority of the students barely on in fair level performed the meaning, situations, data, events, judgments, conventions, beliefs, rules, or procedures, which are belong to the category of interpretation. Only 2 pairs from 5 classes (130 students) performed better than others. There were 5 pairs responded in average level, and the rest pairs almost couldn't respond anything or they performed poorly and very poorly.

The students watching the short-video are also asked to analyze by examining the ideas, identifying the arguments, and identifying the reasons and claims. However, they admitted that they didn't understand the narrator's speech in the video and couldn't identify what was actually going in the video. As a result, the majority of the students' response only showed the average level of critical thinking.

The same problem happened when the students were doing the evaluation. They weren't really sure with their answers and were expecting the exact answers from the instructor. They made very weak conclusions. The students respond to what they see from the video but they still were far to do the logical evaluation. Only 2 pairs could give good examples. Those students linked the played video with their life experience and it was clear that those 2 pairs had developed their thinking skills even before this treatment-video was implemented to them. They had good logical reasons with examples and the answers were suitable to the questions.

The self-regulation also was at an average level since the students mostly were learning the language using digital translators and they weren't even aware that they were making mistakes while speaking in English. However, there were many students who used the phrases *"I mean"*, *"how to say"*, *"how to explain"*. That self-monitor still was accepted at an average level. Only 2-3 pairs were clearly aware of their mistakes, for example, instead of saying *"she says that"* they said *"she say that"*, *"there is"* instead of *"there are"*, or *"how many"* instead of *"how much"*. However, they asked for apologizing by saying *"sorry"* and directly corrected themselves using the correct tenses and words. There were students even didn't know the meaning of the words, and they made funny answers for the questions. Some answers were unclear until they used their first language.

The next step that students needed to do were to explain, or after each short-video, they had to state the results, justify procedures, and present arguments based on their point of view. Since they got some information while doing an evaluation, it wasn't that hard for them to do an explanation later on. However, most of the students' results still showed the average level of critical thinking skills. Despite the fact, while applying the explanation step, the researchers realized that the students more preferred memorizing the information than arguing with logical viewpoints.

The same results were obtained from students' inference skill. They couldn't make logically valid or justified conclusions. The same repetition appeared in their responses to the questions. The researcher also found that most students almost never asked questions. The reasons most probably the students were shy, or indeed didn't understand the topic, or they didn't have any interest in learning the English language, or they were afraid to make mistakes while asking questions. Nevertheless, they couldn't hide how happy they were when the classes become a competitive environment. Even though they couldn't debate with logical reasons, they still supported their pairs to answer the questions well and accurate.

Overall results tell us that the students' critical thinking skills couldn't be improved significantly after gaining the video-treatment. Their critical thinking levels were still in fairly average categories. The students' critical thinking skills also presented in the form of percentages in the following chart.

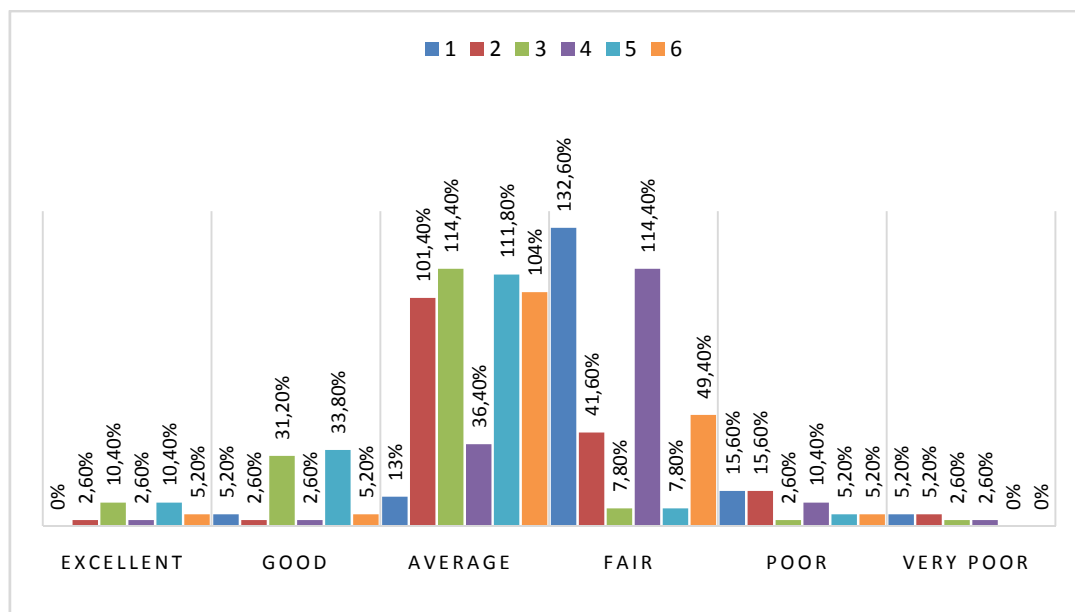


Figure 1 – The students' CT results in percentage



The findings are similar to the previous research which indicated a low level of students' critical thinking in English as Foreign Language (EFL) (Setyarini, 2019). Such low level to some extent can be affected by a lack of ideas, topic familiarity, lack of vocabularies to express the ideas, prior knowledge (Fadhillah, 2017 and Navaie, Saeedi & Khatami, 2018), or classrooms tradition which rely heavily on instructor, or the transfer of information directly from teacher to student. As mentioned by Piker & Foster (1996), those traditional ways of teaching, which involved repetition and memorization of previously taught materials did not lead the students to critical thinking.

In general, the results indicate the students' interpretation skills were fair with the score of 9 out of 20; analytical skill was 12 out of 20; evaluation skill was 9 out of 20; self-regulation was in average criterion with the score of 5 out of 10 and in good level of explanatory's skill with the score 6 out of 10, while 12 for inferences (average level). It can be also seen in following graphic.

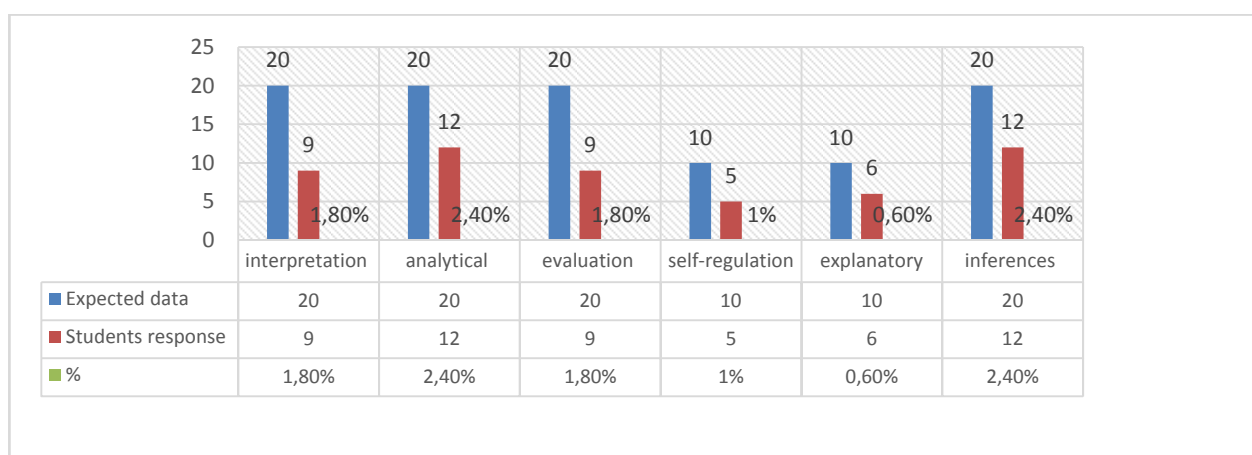


Figure 2 – 130 Students' critical thinking skill results

The researchers do aware of fostering students' critical thinking, whole-class dialogue strategies will shift the development of ideas towards the student to create an opportunity for practice in analyzing and evaluating information. The teachers should begin the class discussion before the students watch the video.

**Students' 4C (communicative, collaborative, critical and creative thinking) skills.** In order to cultivate students' critical thinking skills, integrating 4C skills and using technology in teaching and learning process might be real advantage (Dwyer, 2019). In this research, the researchers integrated 4C skills practically. Since the main focus of this study is on cultivating critical thinking skills to the students, the 4C skill information of the students they collected generally. The students' results presented in the following table.

Table 3 – Students' 4C skills

Objectives	Excellent	Good	Average	Fair	Poor	Very poor
Communicative skills			√			
Collaborative skills	√					
Critical thinking and Problem solving skills			√			
Creative and Innovative skills			√			

The table above presents the students' 4C ability in English subject. The results showed that, majority of the students were in average level at communicative skills, critical thinking and problem solving skills, and creative and innovative skills. However, the students had excellent collaborative skills. They really supported, assisted, respected, loved, listened and brought out the best of each other. They worked, solved

the problems, made decisions, and responded to the questions together with fellows, and there was not any problem with their collaborative skills.

According to studies about students' writing ability, which is connected with the cognition, author (Atayeva M. et al., 2019) recommends students to read as much as possible because reading improves students' critical thinking skills.

**Conclusion.** This research involved 130 State Junior High School students (*SMP Negeri 1 Sedayu*, Yogyakarta) with grade IX. The Facione's critical thinking rubrics were used to point out the level of their critical thinking in the forms of interpretation, analysis, evaluation, inference, explanation, and self-regulation skill of a short-video. The researchers believed that using technology can assist students to foster their critical-thinking skills. However, in this study the results are still considered important with notes. The researchers find that the students' answers towards the questions given pertinent to the short-video expound their critical thinking skills which are categorized as fair level. This means that the short-video used in this case does not have a significant influence on their critical thinking skills. Furthermore, their critical thinking levels are still in fairly average categories indeed. In other words, the students of grade IX of Junior High School 1 Sedayu, Yogyakarta, need to practice more on enhancing their critical thinking through utilizing any similar video.

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#### АҒЫЛШЫН ТІЛІ САБАҒЫНДА ҚЫСҚА БЕЙНЕ МАТЕРИАЛДЫ ҚОЛДАНА ОТЫРЫП, ОРТА МЕКТЕП ОҚУШЫЛАРЫНЫҢ СЫНИ ОЙЛАУ ҚАБІЛЕТТЕРІН ДАМУ

**Аннотация.** Индонезиядағы орта мектеп оқушыларының сыни ойлау қабілеттерін дамыту үшін оқытудың тиімді әдісі өте қажет, өйткені олардың сыни ойлау қабілеті әлі де төмен. Бұл зерттеу қысқаша бейне материалды қолдану арқылы оқушылардың сыни ойлауын дамытуға бағытталған сипаттамалық зерттеу болып табылады, өйткені технология студенттерді оқуға және сабаққа қызығушылықтарын арттыруға, тиімді оқу әрекетін қамтамасыз етуге итермелейді деген пікір қалыптасқан. Олардан сыни және шығармашылық ойлауды талап ету қажет. Бұл зерттеу жұмысына Ягьякарта қаласындағы мемлекеттік жасөспірімдер орта мектебінің IX сыныптың 130 оқушысы қатысты (бұдан әрі Sedayu NMP N 1). Студенттер жасына, экономикалық және әлеуметтік жағдайына, сондай-ақ ағылшын тіліне сәйкес біртекті болды. Фасионың сыни ойлауды дамыту айдары студенттердің қысқа бейнені түсіндіру, талдау, бағалау, тұжырымдау, түсіндіру және өзін-өзі басқару шеберлігі тұрғысынан сыни тұрғыдан ойлау деңгейін көрсету үшін пайдаланылды. Тестке дейінгі сыни ойлау дағдыларындағы барлық заттардың орташа баллы 20-дан 9-ы бойынша әділетті деңгейде бағаланды. Нәтижелер оқушылардың түсіндіру дағдылары 20-дан 9-ға дейін әділ болды; аналитикалық шеберлік 20-дан 12-ге жетті; бағалау шеберлігі 20-дан 9-ы; өзін-өзі реттеу әділ критерий бойынша 10-нан 5-ке және түсіндіру шеберлігінің деңгейі 10-нан 6-ға, ал нәтижелер үшін 12-ге ие болды. Осылайша, Sedayu N 1 SMP IX сынып оқушыларының сындарлы ойлау қабілеті әділетті деңгейіне байланысты қанағаттанарлықсыз деп қорытынды жасауға болады. Қысқа бейнені құрал ретінде пайдалану олардың сыни ойлау қабілеттерін жетілдіре алмайды. Сондықтан студенттерге кез келген ұқсас құралды қолдана отырып, сыни тұрғыдан ойлауға көбірек машықтану ұсынылады.

**Түйін сөздер:** сыни тұрғыдан ойлау, танымдық дағдылар, қысқа бейнефильмдер, орта мектеп, оқыту әдісі, оқушылар.

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### ВОСПИТАНИЕ НАВЫКОВ КРИТИЧЕСКОГО МЫШЛЕНИЯ УЧАЩИХСЯ МЛАДШИХ КЛАССОВ СРЕДНЕЙ ШКОЛЫ С ПОМОЩЬЮ КОРОТКОГО ВИДЕО В КЛАССЕ АНГЛИЙСКОГО ЯЗЫКА

**Аннотация.** Эффективный метод обучения для развития навыков критического мышления учащихся младших классов средней школы в Индонезии очень необходим, так как их способность критического мышления все еще остается низкой. Это исследование является описательным исследованием, целью которого является развитие критического мышления учащихся с помощью короткого видео, поскольку считается, что технологии могут мотивировать учащихся учиться, повышать их интерес, привлекать их к уроку, обеспечивать эффективную учебную деятельность и требовать от них критического и творческого мышления. Предметами этого исследования были 130 учеников IX класса Государственной младшей средней школы (далее Sedayu SMP N 1) в г. Джокьякарта. Студенты были однородны с точки зрения возраста, экономического и социального происхождения, а также по баллам английского языка. Рубрики критического мышления Facione использовались, чтобы указать уровень критического мышления студентов с точки зрения их интерпретации, анализа, оценки, умозаключений, объяснений и навыков саморегуляции короткого видео. Средний балл по всем предметам в навыках критического мышления перед тестированием находился на удовлетворительном уровне с показателем 9 из 20. Результаты показали, что навыки устного перевода учащихся были удовлетворительными с показателем 9 из 20; аналитический навык был 12 из 20; оценка навыка составила 9 из 20; Саморегуляция была в справедливом критерии с оценкой 5 из 10 и хорошим уровнем навыка объяснения с оценкой 6 из 10, а 12 для умозаключений. Таким образом, можно сделать вывод, что навыки критического мышления учеников IX класса Sedayu SMP N 1 Джокьякарта, все еще были неудовлетворительными из-за их удовлетворительного уровня. Использование короткого видео в качестве инструмента не может улучшить их навыки критического мышления. Поэтому рекомендуется практиковать более относящиеся к критическому мышлению для студентов, используя любой подобный инструмент.

**Ключевые слова:** критическое мышление, когнитивные навыки, короткие видеоролики, средняя школа, методика обучения, ученики.

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#### REFERENCES

[1] Alharbi, H. A. (2015). Improving Students' English Speaking Proficiency in Saudi Public Schools. *International Journal of Instruction*, 8(1), 105-116.

[2] Arpentieva, M. R., Kassymova, G. K., Lavrinenko, S. V., Tyumaseva, Z. I., Valeeva, G. V., Kenzhaliyev, O. B., Triyono, M. B., Duvalina, O. N., Kosov, A. V., Dossayeva, S. K. Environmental education in the system of global and additional education. *Bulletin of National Academy of Sciences of the Republic of Kazakhstan*. ISSN 1991-3494. Volume 3, Number 379 (2019), p. 158 – 168. <https://doi.org/10.32014/2019.2518-1467.82>

- [3] Atayeva M., Putro, N. H. P. S., Kassymova G., Kosbay S. (2019) Impact of reading on students' writing ability. Materials of International Practical Internet Conference "Challenges of Science". ISBN 978-601-323-144-0. Issue II, 2019. P. 5-13. <https://doi.org/10.31643/2019.001>
- [4] Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). How people learn (Vol. 11). Washington, DC: National academy press.
- [5] Brown, H. D. (1999). Some practical thoughts about student-sensitive critical pedagogy. LANGUAGE TEACHER-KYOTO-JALT-, 23, 15-16.
- [6] Pendidikan, B. S. N. (2010). Paradigma pendidikan nasional abad XXI. Jakarta: BSNP.
- [7] Caroselli, M. (2009). 50 Activities for Developing Critical Thinking Skill. HRD Press, Inc. Amherst. Massachusetts.
- [8] Carvajal, T., & Paulina, S. (2019). The flipped classroom method in English speaking skill development (Master's thesis, Universidad Técnica de Ambato. Dirección de Posgrado. Maestría en la Enseñanza del Idioma Inglés como Lengua Extranjera). <https://doi.org/10.12795/jdu.2018.i01.4>
- [9] Chou, M. H. (2017). Modelling the Relationship among Prior English Level, Self-efficacy, Critical Thinking, and Strategies in Reading Performance. The Journal, 1(1), 22.
- [10] Ding, A. C. E., Ottenbreit-Leftwich, A., Lu, Y. H., & Glazewski, K. (2019). EFL Teachers' Pedagogical Beliefs and Practices With Regard to Using Technology. Journal of Digital Learning in Teacher Education, 1-20. <https://doi.org/10.1080/21532974.2018.1537816>
- [11] Djiwandono, P. I. (2013). Critical thinking skills for language students. TEFLIN Journal, 24(1), 32-47.
- [12] Dwyer, W. (2019). Project Based Learning Course Integration for Elementary Science Methods.
- [13] Elisanti, E., Sajidan, S., & Prayitno, B. A. (2017, August). The Profile of Critical Thinking Skill Students in XI Grade of Senior High School. In 1st Annual International Conference on Mathematics, Science, and Education (ICoMSE 2017). Atlantis Press. <https://doi.org/10.2991/icomse-17.2018.36>
- [14] Pratiwi, E. B. (2012). Improving the speaking skill of the tenth grade students at SMA Berbudi Yogyakarta by using videos in the academic year of 2011/2012. Yogyakarta: Yogyakarta State University.
- [15] Facione, P. A. (2015). Critical Thinking: What It Is and Why It counts. Measured Reasons LLC, Hermosa Beach, CA. Journal.
- [16] Fadhillah, A. M. (2017). Embedding Critical Thinking Through Critical Reading: Teaching Narrative Text In Junior High School. Journal of English and Education, 5(2), 92-102.
- [17] Fahim, M., Bagherkazemi, M., & Alemi, M. (2010). The relationship between test takers' critical thinking ability and their performance on the reading section of TOEFL. Journal of Language Teaching and Research, 1(6), 830. <https://doi.org/10.4304/jltr.1.6.830-837>
- [18] Gurbangeldiyewna, A. M., & Hermayawati, H. (2017). The Effectiveness Of English Interactive Media In Teaching Writing (An Experimental Study Conducted For Eleventh Graders In SMA N 1 Sedayu, Bantul Yogyakarta). JELE (Journal of English Language and Education), 3(1), 17-28. <https://doi.org/10.26486/jele.v3i1.264>
- [19] Haridza, R., & Irving, K. E. (2017, February). Developing critical thinking of middle school students using problem based learning 4 core Areas (PBL4C) model. In Journal of Physics: Conference Series (Vol. 812, No. 1, p. 012081). IOP Publishing. <https://doi.org/10.1088/1742-6596/812/1/012081>
- [20] Harmer, J. (2001). The Practice of English Language Teaching. (3rd Ed.). London: Longman Group Ltd.
- [21] Hawks, S. J., Turner, K. M., Derouin, A. L., Hueckel, R. M., Leonardelli, A. K., & Oermann, M. H. (2016, October). Writing across the curriculum: Strategies to improve the writing skills of nursing students. In Nursing forum (Vol. 51, No. 4, pp. 261-267). <https://doi.org/10.1111/nuf.12151>
- [22] Hidayat, R. N., Rukmini, D., & Bharati, D. A. L. (2019). Developing Problem-Solving Based Assessment to Stimulate Critical Thinking and Creativity of Students' Writing Skill. English Education Journal, 9(2), 164-171.
- [23] Ilyas, H. P. (2018). The Quest for Critical Thinking Framework in ELT. Celt: A Journal of Culture, English Language Teaching & Literature, 18(2), 304-326. <https://doi.org/10.24167/celt.v18i2.685>
- [24] Indah, R. N., & Kusuma, A. W. (2016). Factors affecting the development of critical thinking of Indonesian learners of English language. Journal of Humanities And Social Science, 21(6), 86-94.
- [25] Indah, R. N. (2013). Topic familiarity, writing proficiency and critical thinking skills. Unpublished Dissertation. Malang: State University of Malang.
- [26] Kamali, Z., & Fahim, M. (2011). The Relationship between Critical Thinking Ability of Iranian EFL Learners and Their Resilience Level Facing Unfamiliar Vocabulary Items in Reading. Journal of Language Teaching & Research, 2(1). <https://doi.org/10.4304/jltr.2.1.104-111>
- [27] Kassymova G. K. Stress management techniques recommended for students. Conference: International Practical Internet Conference "Challenges of Science", November 2018. P. 110-116. <https://doi.org/10.31643/2018.008>
- [28] Kassymova, G. K., Arpentieva, M. R., Kosherbayeva, A. N., Triyono, M. B., Sangilbayev S. O., Kenzhaliyev B. K. (2019). Science, education & cognitive competence based on e-learning. Bulletin of the National academy of sciences of the Republic of Kazakhstan, 2019, (1), pp. 269-278. <https://doi.org/10.32014/2019.2518-1467.31>
- [29] Kassymova, G. K., Kosherbayeva, A. N., Sangilbayev, O. S., Schachl, H., Cox, N. (2018). Stress management techniques for students. Proceedings of the International Conference on the Theory and Practice of Personality Formation in Modern Society (ICTPPFMS 2018). <https://doi.org/10.2991/ictppfms-18.2018.10>
- [30] G.K. Kassymova, O.V. Tokar, A.I. Tashcheva, G.V. Slepukhina, S.V. Gridneva, N. G. Bazhenova, E.Yu. Shpakovskaya, M. R. Arpentieva. Impact of stress on creative human resources and psychological counseling in crises. International journal of education and information technologies. Volume 13, 2019. Pp.: 26-32. URL: <http://www.naun.org/main/NAUN/educationinformation/2019/a102008-ao.pdf>

- [31] Kassymova, G. K.; Stepanova, G. A.; Stepanova, O. P.; Menshikov, P.V.; Arpentieva, M.R.; Merezchnikov, A. P.; Kunakovskaya, L. A. Self-development management in educational globalization. *International journal of education and information technologies*. ISSN 2074-1316. Volume 12, 2018. P. 171-176.
- [32] Kassymova, K. G., Tyumaseva, Z. I., Valeeva, G. V., Lavrinenko, S. V., Arpentieva, M. R., Kenzhaliyev, B. K., Kosherbayeva, A. N., Kosov, A. V., Duvalina, O.N., Dossayeva S. K. Integrative model of student and teacher stress coping: the correction of relations in educational, professional and personal interaction. *Bulletin of National Academy of Sciences of the Republic of Kazakhstan*. ISSN 1991-3494. Volume 3, Number 379 (2019), p. 169-179. <https://doi.org/10.32014/2019.2518-1467.83>
- [33] Krathwohl, D. R., & Anderson, L. W. (2009). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. Longman.
- [34] Lee, E., & Hannafin, M. J. (2016). A design framework for enhancing engagement in student-centered learning: Own it, learn it, and share it. *Educational technology research and development*, 64(4), 707-734. <https://doi.org/10.1007/s11423-015-9422-5>
- [35] Masduqi, H. (2011). Critical thinking skills and meaning in English language teaching. *TEFLIN Journal*, 22(2), 185-200.
- [36] McQuiggan, S., McQuiggan, J., Sabourin, J., & Kosturko, L. (2015). *Mobile learning: A handbook for developers, educators, and learners*. John Wiley & Sons. <https://doi.org/10.1002/9781118938942>
- [37] Navaie, L. A., Saeedi, Z., & Khatami, M. (2018). The Compatibility of Mindfulness and Critical Thinking among EFL Learners. *The Journal of AsiaTEFL*, 15(3), 811-818. <https://doi.org/10.18823/asiatefl.2018.15.3.17.811>
- [38] Ennis, R. H. (1996). Critical thinking dispositions: Their nature and assessability. *Informal logic*, 18(2). <https://doi.org/10.22329/il.v18i2.2378>
- [39] Ohler, J. B. (2013). *Digital storytelling in the classroom: New media pathways to literacy, learning, and creativity*. Corwin Press. <https://doi.org/10.4135/9781452277479>
- [40] Omar, A., & Albakri, I. S. M. A. (2016). Thinking maps to promote critical thinking through the teaching of literature in the esl context. *Indonesian Journal of English Language Teaching and Applied Linguistics*, 1(1), 23-35. <https://doi.org/10.21093/ijeltal.v1i1.6>
- [41] Paul, R. (1995). *Critical thinking: How to prepare students for a rapidly changing world*. Foundation for Critical Thinking.
- [42] Pikkert, J. J., & Foster, L. (1996). Critical thinking skills among third year Indonesian English students. *RELC Journal*, 27(2), 56-64. <https://doi.org/10.1177/003368829602700204>
- [43] Pinter, A. (2017). *Teaching young language learners*. Oxford University Press.
- [44] PISA. (2016). PISA 2015 result. <https://doi.org/10.1787/9789264266490-12-en>
- [45] Richards, J. C., & Renandya, W. A. (Eds.). (2002). *Methodology in language teaching: An anthology of current practice*. Cambridge university press.
- [46] Ruggiero, V. R., & Ruggiero, V. R. (2004). *The art of thinking: A guide to critical and creative thought*. Pearson/Longman.
- [47] Ruggiero, V. R., & Ruggiero, V. R. (2004). *The art of thinking: A guide to critical and creative thought*. Pearson/Longman.
- [48] Salomon, S., Lowther, D. Russell, J. (2007). *Instructional Technology and Media for Learning*. 9th Ed. New Jersey: Pearson Education Inc.
- [49] Samanhudi, U., & Sampurna, P. (2010). Researching students' critical thinking in EFL writing class (a case study in English education department, Untirta). *TEFLIN 57th Revitalizing Professionalism in ELT as a Response to Globalized World*. Bandung: Indonesia University of Education.
- [50] Saputri, A. C., & Rinanto, Y. (2018, April). Critical thinking skills profile of senior high school students in Biology learning. In *Journal of Physics: Conference Series* (Vol. 1006, No. 1, p. 012002). IOP Publishing. <https://doi.org/10.1088/1742-6596/1006/1/012002>
- [51] Setyarini, S. (2019, March). Higher Order Thinking Skills in Storytelling for Teaching English to Junior High School Students: A shortcut to fulfill learning objectives of 21st century. In *Second Conference on Language, Literature, Education, and Culture (ICOLLITE 2018)*. Atlantis Press. <https://doi.org/10.2991/icollite-18.2019.47>
- [52] Shirkhani, S., & Fahim, M. (2011). Enhancing critical thinking in foreign language learners. *Procedia-Social and Behavioral Sciences*, 29, 111-115. <https://doi.org/10.1016/j.sbspro.2011.11.214>
- [53] Singh, R. K. V., & Shaari, A. H. (2019). The analysis of Higher-Order Thinking skills in English reading comprehension tests in Malaysia. *Geografia-Malaysian Journal of Society and Space*, 15(1). <https://doi.org/10.17576/geo-2019-1501-02>
- [54] Sulla, N., Bosco, T., & Marks, J. (2019). *Students Taking Charge Implementation Guide for Leaders: Inside the Learner-Active, Technology-Infused Classroom*. Routledge. <https://doi.org/10.4324/9781315229171-1>
- [55] Yang, Y. T. C., & Wu, W. C. I. (2012). Digital storytelling for enhancing student academic achievement, critical thinking, and learning motivation: A year-long experimental study. *Computers & education*, 59(2), 339-352. <https://doi.org/10.1016/j.compedu.2011.12.012>

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## **INCREASE IN NUTRITION AND BIOLOGICAL VALUE OF WHITE BREAD WITH USE OF THE GRAIN MIX «OMEGA-6»**

**Abstract.** In the course of research work, scientists of the Almaty Technological University have developed a technology for the production of bread on the basis of the Omega-6 grain mixture. The composition of the grain mixture includes grains and oilseeds: germinated corn, amaranth, flax seeds, sunflower seeds, pumpkins, sesame, wheat bran. This article presents the results of studies of the nutritional and biological value of wheat bread made from flour of the 1st grade and wheat bread with the addition of the "Omega-6" grain mixture.

When developing the formulation of grain mixtures based on grains and oilseeds, special attention was paid to the selection of enriching components of plant origin, depending on their functional orientation. In order to determine the optimal composition of the grain mixture, various versions of the ratios of the components were made and pastries were made using them. First of all, we focused on organoleptic characteristics, such as appearance, taste, aroma, color and porosity. According to the results of the analysis of the organoleptic indicators of variants of grain bread, using different dosages of the components of the Omega-6 grain mixture, clearly demonstrated using a profilogram, their optimal ratio was revealed. The optimum ratio: corn - 63%, amaranth - 1%, sunflower seeds - 2%, pumpkin seeds - 2%, flax seeds - 15%, sesame seeds - 2%, wheat bran - 15%.

Additionally, baking was carried out to determine the optimal dose of introducing the "Omega-6" grain mixture into the recipe from 5 to 30%. The best result in organoleptic and physico-chemical properties, the sample was obtained by adding 20% grain mixture. The finished products were sent to determine the nutritional and biological value of bread on the basis of the grain mixture "Omega-6" to the accredited testing laboratory "Food Safety". The following indicators of the control and experimental samples were determined: mass fraction of protein, fat, carbohydrates, vitamins of group B and vitamin E, magnesium, amino acid composition and antioxidant activity, microbiological indicators using modern standard research methods.

According to the results of the analysis, it was found that the content of essential amino acids increased by about 56.6%. The magnesium content increased by 33.8%. Sodium content increased by 7.3%. Potassium levels increased by 10.2%. Antioxidant activity in grain bread increased by 1.89 times compared with the control. The use of the "Omega-6" grain mixture in bread products allowed to increase the content of group B vitamins, vitamin E. The amount of mesophilic aerobic and optional anaerobic microorganisms decreased by 50% in experimental bread. Shelf life 72 hours. Thus, the use of the "Omega-6" grain mixture in the bakery industry will expand the range of grain types of bread with increased nutritional and biological value.

**Keywords:** bread, grain mix "Omega-6", germinated grain and olive grains, antioxidatic activity, amino acids, nutrition value.

**Introduction.** Modern bread baking is a highly developed branch of food production. However, in the field of bread baking, the problem of nutrient deficiency is still very acute, since the processing of grain into flour is accompanied by substantial losses of useful substances, such as vitamins, minerals, which are removed along with the embryo and the shell of the grain. From the point of view of food hygiene, varietal milling of wheat (flour of the highest and first grade) is depleted in useful nutrients that are of great importance for the metabolism in the human body [1-6].



One of the most urgent and sought-after ways to replenish biologically active substances is the creation of grain mixtures for their further enrichment of bread products [7-11]. Properly selected recipes and specially prepared cereal mixtures are a source of nutrient deficiencies in bread. This bread belongs to an exceptional place in human nutrition, due to the content in it of components with nutritional and biological value [12-16].

To improve the nutritional status of the population of the Republic of Kazakhstan in the field of healthy nutrition, it becomes necessary to expand the range and increase the production of functional bread products. One of the possible solutions is to attract new sources of plant origin (grain mixtures based on grains, oilseeds, wheat bran, rye) [17-21].

**The aim of the work is** to increase the nutritional and biological value of wheat bread using the "Omega-6" grain mixture, which consists of germinated grains and oilseeds rich in essential Omega 6 and Omega 3 essential fatty acids

**Objects and research methods.** Objects of study: grain mixture "Omega-6", wheat bread, grain bread based on the grain mixture "Omega-6".

Determination of the mass fraction of protein, fat, carbohydrates was performed by standard methods. The mass fraction of mineral substances was determined by atomic absorption spectroscopy (ACC) on a spectrometer with an electric atomization "QUANT-Z.ETA-T" with software according to GOST R 53152-2008. Water-soluble vitamins and the content of amino acids were determined using the "Kapel'-105" capillary electrophoresis system. Vitamin E was determined using high performance liquid chromatography on an Agilent Technologies 1200 Series high performance liquid chromatograph. The total determination of antioxidant activity was carried out on a "Tsvet Yauza 01-AA" instrument with an amperometric detector.

**Results and its discussion.** In the course of performing experimental studies, an optimal recipe for grain bread was developed based on the "Omega-6" grain mixture. To determine the optimal composition of the grain mixture, bread baking tests were carried out using different ratios of the ingredients of the "Omega-6" grain mixture. Additionally, bread baking was carried out to determine the optimal dose of the Omega-6 grain mixture in the recipe from 5 to 30%.

Table 1 shows the options for the percentage of ingredients of the grain mixture "Omega-6".

Table 1 – Percentage ratio of ingredients of the "Omega-6" grain mixture used for baking grain bread

Name	The percentage of ingredients, %			
Culture	Option 1	Option 2	Option 3	Option 4
Germinated, chopped corn grain	60	50	45	40
Germinated Amaranth	10	15	20	25
Sunflower	5	5	5	5
Pumpkin seeds	5	5	5	5
Flax seeds	5	7	10	15
Sesame seeds	5	4	3	2
Wheat bran	10	14	12	8

An organoleptic evaluation of grain bread baked with the addition of various variants of the "Omega-6" grain mixture was carried out. Figure 1 shows the profilogram of organoleptic indicators of variants of grain bread based on different dosages of the components of the Omega-6 grain mixture.

Option 1 - the crumb is poorly loosened, has a dense structure. It feels a well-pronounced taste of corn, bitterness appears when chewing.

Option 2 - the structure of bread is not developed, the crumb is characterized by low porosity. There is a strong flax flavor on the palate.

Option 3 - the taste is pleasant, there is a taste of wheat bran. Crumb has a uniform structure. Large pumpkin and sunflower seeds are often found in the crumb and evenly distributed.

Option 4 - the taste is pleasant and harmonious, all components are well-mixed and evenly distributed. The pulp has a well-developed porosity and texture.

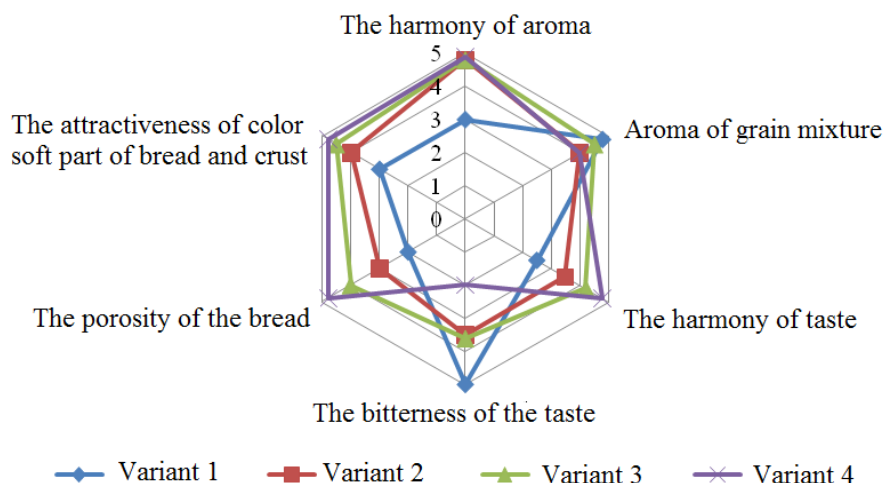


Figure 1 – Profilogram of organoleptic indicators of variants of grain bread based on different dosages of the components of the "Omega-6" grain mixture

As a result of the research, based on the analysis of the organoleptic indicators of grain bread options, using different dosages of the components of the Omega-6 grain mixture, clearly demonstrated using a profilogram, the optimum ratio of grain additives in the grain mixture was determined: sprouting crushed corn grain - 63%, germinated amaranth 1%, seeds of sunflower, pumpkin, flax, sesame - 2%, 2%, 15%, 2%, respectively, wheat bran - 15% (table 1).

Table 2 shows the organoleptic data on test baking, depending on the number of dosages applied to the grain mixture.

Table 2 – Comparative characteristics of grain bread with different content of the grain mix "Omega-6"

The name of indicators	Control (wheat bread)	The content of grain mixture in grain bread,%					
		5	10	15	20	25	30
Taste and aroma	Peculiar to wheat bread, pleasant	Peculiar to bread, pleasant	Peculiar to bread, pleasant	Peculiar to bread, pleasant	Peculiar to bread, pleasant	Peculiar to bread, pleasant	Peculiar to bread, pleasant
Appearance	Crust golden yellow	The crust of light brown color, traces and taste of the grain mixture is not observed	Crust of a pleasant brown color, the presence of a grain mixture is not pronounced	Crust of a pleasant brown color, the presence of a grain mixture is not very pronounced	Crust of a pleasant brown color, the presence of a grain mixture is poorly pronounced	Crust of a pleasant brown shade, with frequent appearances of grain mixture and gaps on the surface	Crust is light brown in color, with frequent appearances of grain mixture and large gaps
Acidity, OT	3,3	2,9	2,9	3,0	3,0	3,2	3,2
Porosity, %	63	52	48	45	43	40	38

The data of table 2 show that the best result on organoleptic and physico-chemical parameters is characterized by a prototype with the addition of 20% of the "Omega-6" grain mixture. Indicators of acidity and porosity correspond to the regulatory limits that determine the quality indicators of bakery products.

Figure 2 shows a photograph of grain bread based on wheat flour of the first grade with an Omega-6 grain mixture containing 20%.





Figure 2 – Grain bread on the basis of wheat flour of the first grade with the addition of the grain mixture "Omega-6" 20%

Indicators of the nutritional and biological value of wheat bread (control) and grain bread with the content of the Omega-6 grain mixture of 20% were determined in the accredited testing laboratory "Food Safety" of the Almaty Technological University. The results are presented in table 3.

Table 3 – Chemical composition and nutritional value of wheat bread (control) and grain bread on the basis of the Omega-6 grain mixture

Indicators	Amount	
	Control	Grain bread on the basis of Omega-6 grain mix
The nutritional value		
Proteins, g / 100 g	7.6	8.6
Fat, g / 100 g	0.9	1.4
Carbohydrates, g / 100 g	72.0	65.6
Antioxidant activity, %	215	406.25
Vitamins		
E, mg / 100 g	0.50	1.30
B <sub>1</sub> , mg / 100 g	0.02	0.07
B <sub>2</sub> , mg / 100 g	0.05	0.08
B <sub>3</sub> , mg / 100 g	0.02	2.0
B <sub>5</sub> , mg / 100 g	0.20	0.80
B <sub>6</sub> , mg / 100 g	0.13	0.20
B <sub>9</sub> , mg / 100 g	–	0.03
C, mg / 100 g	–	1.30
Minerals		
Magnesium, mg / 100 g	58.12	88.05
Sodium, mg / 100 g	380	410
Potassium, mg / 100 g	220	245
Amino acids		
Arginine, g / 100 g	0.28	0.59
Lysine, g / 100 g	–	0.26
Tyrosine, g / 100 g	–	0.22
Phenylalanine, g / 100 g	0.22	0.58
Leucine + isoleucine, g / 100 g	1.22	1.53
Methionine, g / 100 g	–	0.20
Valine, g / 100 g	0.10	0.35
Proline, g / 100 g	0.61	0.70
Threonine, g / 100 g	–	0.32
Serine, g / 100 g	–	0.30
Alanin, g / 100 g	–	0.27
Glycine, g / 100 g	–	0.29
The total number of amino acids, g / 100 g	2.43	5.61

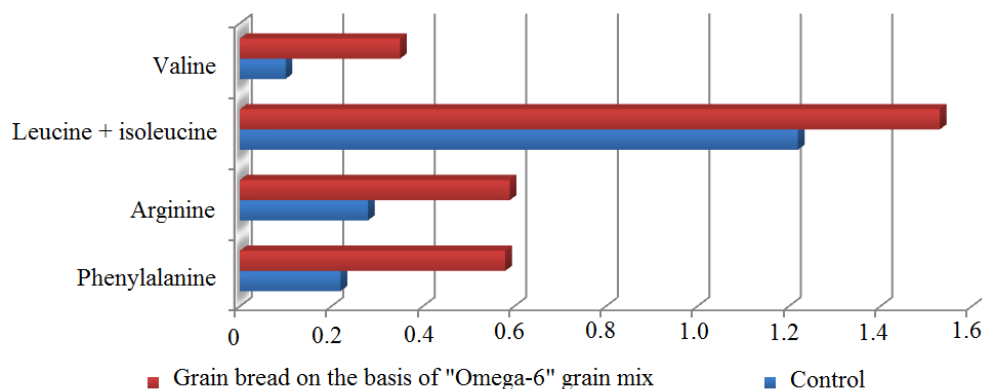


Figure 3 – Comparative chart of the content of essential amino acids in wheat bread on the basis of grain mixture "Omega-6" and control

The data in table 3 indicate that the content of essential amino acids increased by approximately 56.6%, especially among the essential amino acids essential for the organism, phenylalanine, arginine, threonine, leucine and isoleucine, and valine (figure 3). The protein content increased by 13.0%, the carbohydrate content decreased by 8.8%. In the grain bread, the content of vitamin E increased by 2.6 times, and the content of vitamin C was 1.30 mg / 100g, whereas in the control vitamin C was not found. The obtained results characterize the increase in the nutritional value of wheat bread using the Omega-6 grain mixture. The level of mineral substances also significantly increased, so the magnesium content increased by 33.8%, sodium by 7.3%, potassium by 10.2%. As compared with the control, the antioxidant activity in cereal bread increased 1.89 times.

The study found that bread based on "Omega-6" has better microbiological indicators than the control sample of bread. This is due to the addition of germinated grains to the grain mixture, which have enhanced antioxidant properties. Thus, the amount of mesophilic aerobic and optionally anaerobic microorganisms (CMAFAnM or total microbial number, TBC) in wheat bread using the Omega grain mixture decreased by 50%. The most optimal shelf life, based on a QMAFAnM study, is 72 hours.

Fat mass fraction increased by 0.5 g / 100 g compared to the control sample, however, the obtained data indicate that the increase in the fat mass fraction did not have a significant effect on the shelf life of finished products due to an increase in antioxidant activity in the germinated grains of the grain mixture.

Table 4 – Effect of the "Omega-6" grain mixture on the period of safe storage of bread at a temperature of 20-25 °C

Storage time, hour	QMAFAnM, CFU / g	
	Control	Grain bread on the basis of Omega-6 grain mix
24	40	31
36	44	36
48	50	40
60	57	44
<b>72</b>	<b>65</b>	<b>46</b>
84	78	57
96	88	63

The data of table 4 indicate that the best result of the safe storage of bread, characterized by a prototype grain mixture "Omega-6", stored for 72 hours.

**Conclusion.** The inclusion of the "Omega-6" grain mixture in bread products has significantly increased the content of B vitamins, vitamin E, magnesium, and essential amino acids. Also as a result of germination of grains increased antioxidant activity. The use of the "Omega-6" grain mixture allowed us to increase the safe storage of bread up to 72 hours.

Thus, the use of the "Omega-6" grain mixture in the bakery industry will expand the range of grain types of bread with increased nutritional and biological value.

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### **"ОМЕГА-6" АСТЫҚ ҚОСПАСЫН ПАЙДАЛАНА ОТЫРЫП БИДАЙ НАННЫҢ ТАҒАМДЫҚ ЖӘНЕ БИОЛОГИЯЛЫҚ ҚҰНДЫЛЫҒЫН АРТТЫРУ**

**Аннотация.** Ғылыми-зерттеу жұмыстарын орындау барысында «Омега-6» астық қоспасы негізінде нан өндіру технологиясы әзірленді. Астық қоспасының құрамына дәнді және майлы дақылдар кіреді: жүгері, амарант, зығыр, күнбағыс, асқабақ, күнжұт, бидай кебегі. Мақалада «Омега-6» астық қоспасы қосылған бидай наны мен 1-сұрыпты ұннан жасалған бидай нанының тағамдық және биологиялық құндылығын зерттеу нәтижелері берілген.

Дәнді және майлы дақылдар негізіндегі астық қоспасы рецептурасын әзірлеу кезінде өсімдік тектес байытушы компоненттерді олардың функционалдық бағытына байланысты іріктеуге ерекше көңіл бөлінді. Астық қоспасының оңтайлы құрамын анықтау мақсатында компоненттердің әртүрлі қатынастарының нұсқалары дайындалды және оларды пайдалана отырып нандар пісірілді. Бірінші кезекте органолептикалық көрсеткіштерге назар аударды, мысалы, сыртқы түрі, дәмі, хош иісі, түсі және кеуектілігі. Астықты нан түрлерінің органолептикалық көрсеткіштерін талдаудың нәтижелері бойынша, «Омега-6» астық қоспасы компоненттерінің әртүрлі дозаларын қолдана отырып, профилограмма көмегімен көрнекі түрде көрсетілген олардың оңтайлы қатынастары анықталды. Оңтайлы арақатынас: жүгері – 63%, амарант – 1%, күнбағыс тұқымы – 2%, асқабақ тұқымы – 2%, зығыр тұқымы – 15%, күнжіт тұқымы – 2%, бидай кебегі – 15%.

Нан рецептурасына 5 тен 30% дейін «Омега-6» астық қоспасын енгізудің оңтайлы дозасын анықтау үшін қосымша нан пісіру жүргізілді. Органолептикалық және физикалық-химиялық көрсеткіштер бойынша ең жақсы нәтиже 20% астық қоспасы қосылған үлгі кезінде болды. «Омега-6» астық қоспасы негізінде дайындалған нандардың тағамдық және биологиялық құндылығын анықтау үшін дайын өнімдер «Тағам қауіпсіздігі» аккредиттелген сынақ зертханасына жіберілді. Бақылау және тәжірибелік үлгінің төмендегі көрсеткіштері анықталды: ақуыз, май, көмірсулардың массалық үлесі, В тобының витаминдері және Е витамині, магний, амин қышқылдық құрамы және антиоксиданттық белсенділігі, зерттеудің қазіргі заманғы стандартты әдістері пайдаланыла отырылып микробиологиялық көрсеткіштері.

Жүргізілген талдаулардың нәтижелері бойынша алмастырылмайтын амин қышқылдарының құрамы шамамен 56,6%-ға артқаны анықталды. Магний құрамы 33,8%-ға өсті. Натрий құрамы 7,3%-ға өсті. Калий деңгейі 10,2%-ға артты. Астықтық нанда антиоксиданттық белсенділік бақылау үлгімен салыстырғанда 1,89 есе артты. Нан өнімдерінде «Омега-6» астық қоспасын қолдану В тобының витаминдерінің, Е витаминінің құрамын арттыруға мүмкіндік берді. Тәжірибелі нанда мезофильді аэробты және факультативті анаэробты микроорганизмдердің саны 50%-ға азайды. Сақтау мерзімі 72 сағат. Осылайша, нан пісіру өндірісінде «Омега-6» астық қоспасын пайдалану жоғары тағамдық және биологиялық құндылығы бар нан түрлерінің ассортиментін кеңейтуге мүмкіндік береді.

**Түйін сөздер:** нан, «Омега-6» астық қоспасы, өнген астық және дәнді дақылдар, антиоксиданттық белсенділігі, аминқышқылдар, тағамдық құндылығы.

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### **ПОВЫШЕНИЕ ПИЩЕВОЙ И БИОЛОГИЧЕСКОЙ ЦЕННОСТИ ПШЕНИЧНОГО ХЛЕБА С ИСПОЛЬЗОВАНИЕМ ЗЕРНОСМЕСИ «ОМЕГА-6»**

**Аннотация.** В ходе выполнения научно-исследовательских работ учеными Алматинского технологического университета разработана технология производства хлеба на основе зерносмеси «Омега-6». В состав зерносмеси входят зерновые и масличные культуры: пророщенная кукуруза, амарант, семена льна, подсолнуха, тыквы, кунжута, пшеничные отруби. В статье представлены результаты исследований пищевой и

биологической ценности пшеничного хлеба из муки 1 сорта и пшеничного хлеба с добавлением зерносмеси «Омега-6».

При разработке рецептуры зерносмеси на основе зерновых и масличных культур особое внимание уделялось подбору обогащающих компонентов растительного происхождения в зависимости от их функциональной направленности. В целях определения оптимального состава зерносмеси были изготовлены различные варианты соотношений компонентов и произведены выпечки с их использованием. В первую очередь акцентировали внимание на органолептические показатели, такие как внешний вид, вкус, аромат, цвет и пористость. По результатам анализа органолептических показателей вариантов зернового хлеба, с применением различных дозировок компонентов зерносмеси «Омега-6» наглядно продемонстрированной с помощью профилограммы было выявлено их оптимальное соотношение. Оптимальное соотношение: кукуруза – 63%, амарант – 1%, семена подсолнечника – 2%, семена тыквы – 2%, семена льна – 15%, семена кунжута – 2%, отруби пшеничные – 15%.

Дополнительно проводились выпечки для определения оптимальной дозы внесения в рецептуру хлеба зерносмеси «Омега-6» от 5 до 30 %. Лучший результат по органолептическим и физико-химическим показателям, получился образец при добавлении 20% зерносмеси. Готовые изделия были направлены для определения пищевой и биологической ценности хлеба на основе зерносмеси «Омега-6» в аккредитованную испытательную лабораторию «Пищевая безопасность». Были определены нижеследующие показатели контрольного и опытного образца: массовая доля белка, жира, углеводов, витамины группы В и витамин Е, магния, аминокислотный состав и антиоксидантная активность, микробиологические показатели с использованием современных стандартных методов исследований.

По результатам проведенных анализов было выявлено, что содержание незаменимых аминокислот увеличилось примерно на 56,6%. Содержание магния возросло на 33,8%. Содержание натрия повысился на 7,3%. Уровень калия увеличился на 10,2%. Антиоксидантная активность в зерновом хлебе по сравнению с контролем увеличилась в 1,89 раза. Применение зерносмеси «Омега-6» в хлебных изделиях позволило повысить содержание витаминов группы В, витамина Е. В опытном хлебе уменьшилось количество мезофильных аэробных и факультативно анаэробных микроорганизмов на 50%. Срок хранения 72 часа. Таким образом, использование зерносмеси «Омега-6» в хлебопекарном производстве позволит расширить ассортимент зерновых видов хлеба с повышенной пищевой и биологической ценностью.

**Ключевые слова:** хлеб, зерносмесь «Омега-6», пророщенные зерновые и масличные культуры, антиоксидантная активность, аминокислоты, пищевая ценность.

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#### **REFERENCES**

- [1] Derkanosova N.M., Shurshikova G.V. Application of methods of multidimensional statistical analysis for assessing consumer properties of bakery products // News of higher educational institutions. Food Technology, 2012 (in Russ.).
- [2] Drobot V.I. The use of non-traditional raw materials in the baking industry / V.I. Shotguns Kiev: Harvest, 2012. - 151 p. (in Russ.).
- [3] Valli V., Taccari, A., Di Nunzio M., Danesi F., Bordoni A. (2018) Health benefits of ancient grains. Comparison among bread made with ancient, heritage and modern grain flours in human cultured cells, Food research international, 107: 206-215. <https://doi.org/10.1016/j.foodres.2018.02.032>(in Eng).
- [4] Wandersleben T., Morales E., Burgos-Diaz C., Barahona T., Labra E., Rubilar M., Salvo-Garrido H. (2018) Enhancement of functional and nutritional properties of bread using a mix of natural ingredients from novel varieties of flaxseed and lupine, LWT-Food science and technology, 91: 48-54. <https://doi.org/10.1016/j.lwt.2018.01.029> (in Eng).

- [5] Marti A., Cardone G., Pagani M.A., Casiraghi M.C. (2018) Flour from sprouted wheat as a new ingredient in bread-making, *LWT-Food science and technology*, 89: 237-243. <https://doi.org/10.1016/j.lwt.2017.10.052> (in Eng).
- [6] Abugalieva A., Savin T., Chakmak I., Kozhakhmetov K., Chudinov V., Morgunov A. (2019) Grain mineral composition of introgressive wheat-wild forms in breeding of spring wheat on the nutritional properties, *Bulletin of national academy of sciences of the republic of Kazakhstan*, 1(377): 27-38. <https://doi.org/10.32014/2019.2518-1467.4> (in Eng).
- [7] Ozkaya B., Baumgartner B., Ozkaya H. (2018) Effects of concentrated and dephytinized wheat bran and rice bran addition on bread properties, *Journal of texture studies*, 49: 84-93. <https://doi.org/10.1111/jtxs.12286> (in Eng).
- [8] Heredia-Sandoval N. G., Calderon de la Barca A. M., Carvajal-Millan, E., Islas-Rubio A. R. (2018) Amaranth addition to enzymatically modified wheat flour improves dough functionality, bread immunoreactivity and quality, *Food & Function*, 1(9): 534-540. <https://doi.org/10.1039/c7fo01332a> (in Eng).
- [9] Victorio V.C.M., Souza G.H.M.F., Santos M.C.B., Vega A.R., Cameron L.C., Ferreira M.S.L. (2018) Differential expression of albumins and globulins of wheat flours of different technological qualities revealed by nanoUPLC-UDMSE, *Food chemistry*, 1(239):1027-1036. <https://doi.org/10.1016/j.foodchem.2017.07.049> (in Eng).
- [10] Luo K.Y., Zhang G.Y. (2018) Nutritional property of starch in a whole-grain-like structural form, *Journal of cereal science*, 79:113-117. <https://doi.org/10.1016/j.jcs.2017.09.006> (in Eng).
- [11] Banerji A., Ananthanarayan L., Lele S. (2018) Rheological and nutritional studies of amaranth enriched wheat chapatti (Indian flat bread), *Journal of food processing and preservation*, 42(1):e13361. <https://doi.org/10.1111/jfpp.13361> (in Eng).
- [12] Waters D.M., Jacob F., Titze J., Arendt E.K., Zannini E. (2012) Fibre, protein and mineral fortification of wheat bread through milled and fermented brewer's spent grain enrichment, *European Food Research and Technology*, 5 (235):767-778. <https://doi.org/10.1007/s00217-012-1805-9> (in Eng).
- [13] Lebedzińska A., Marszał M.L., Grembecka M., Czaja J., Szefer P., Kuta J., Garabato B.D., Kozłowski P.M. (2018). Detection of B6 Vitamers in Grain Products: Experimental and Computational Studies, *Food Analytical Methods*, 3 (11):725-732. <https://doi.org/10.1007/s12161-017-1045-5> (in Eng).
- [14] Szawara-Nowak D., Bączek N., Zieliński H. (2016) Antioxidant capacity and bioaccessibility of buckwheat-enhanced wheat bread phenolics, *Journal of Food Science and Technology*, 1 (53):621-630. <https://doi.org/10.1007/s13197-015-2074-y> (in Eng).
- [15] Srikanlaya Ch., Therdthai N., Ritthiruangdej P., Zhou W. (2018) Effect of hydroxypropyl methylcellulose, whey protein concentrate and soy protein isolate enrichment on characteristics of gluten-free rice dough and bread, *International journal of food science and technology*, 7 (53):1760-1770. <https://doi.org/10.1111/ijfs.13761> (in Eng).
- [16] Milani J.M. (2018) Application of coated wheat bran to producing barbari bread with increased nutritional value and improved bread texture and shelf life, *Acta alimentaria*, 3(47):259-266. <https://doi.org/10.1556/066.2018.47.3.1> (in Eng).
- [17] Otegbayo B.O., Adebisi O.M., Bolaji O.A., Olunlade B.A. (2018) Effect of Soy enrichment on bread quality, *International food research journal*, 3(25):1120-1125. (in Eng).
- [18] Lin J., Tan Yu.X.G., Leong L.P., Zhou W. (2018) Steamed bread enriched with quercetin as an antiglycative food product: its quality attributes and antioxidant properties, *Food & Function*, 6(9):3398-3407. <https://doi.org/10.1039/c8fo00818c> (in Eng).
- [19] Zhou J., Liu J., Tang X. (2018) Effects of whey and soy protein addition on bread rheological property of wheat flour, *Journal of texture studies*, 1 (49):38-45. <https://doi.org/10.1111/jtxs.12275> (in Eng).
- [20] Wojcik M., Dziki, D., Biernacka B., Rzylo R., Mis A., Hassoon W.H. (2017) Effect of the addition of mixture of plant components on the mechanical properties of wheat bread, *International agrophysics*, 4 (31):563-569. <https://doi.org/10.1515/intag-2016-0082> (in Eng).
- [21] Saccotelli M.A., Conte A., Burrafato K.R., Calligaris S., Manzocco L., Del Nobile M.A. (2017) Optimization of durum wheat bread enriched with bran, *Food science & Nutrition*, 3 (5): 689-695. <https://doi.org/10.1002/fsn3.448> (in Eng).
- [22] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494.4(380). P. 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [23] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S., Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. (2019). Foresight and the role of innovation in the development of education // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494.4(380). 93-101. <https://doi.org/10.32014/2019.2518-1467.96>
- [24] Mamyrbayev O.Z., Othman M., Akhmediyarova A.T., Kydyrbekova A.S., Mekebayev N.O. Voice verification using I-vectors and neural networks with limited training data // *Bulletin of the National academy of sciences of the Republic of Kazakhstan*. 2019. N 3(379). P. 36-43. <https://doi.org/10.32014/2019.2518-1467.66>
- [25] Lavrinenko S.V., Arpentieva M.R., Kassymova G.K. (2019). The negative impact of the internet on the educational process. International youth scientific conference "Heat and mass transfer in the thermal control system of technical and technological energy equipment" (HMTTSC 2019). <https://doi.org/10.1063/1.5120671>
- [26] Atayeva M., Putro N.H.P.S., Kassymova G., Kosbay S. (2019) Impact of reading on students' writing ability // *Materials of International Practical Internet Conference "Challenges of Science"*. ISBN 978-601-323-144-0. Issue II, 2019. P. 5-13. <https://doi.org/10.31643/2019.001>
- [27] Kassymova K.G., Tyumaseva Z.I., Valeeva G.V., Lavrinenko S.V., Arpentieva M.R., Kenzhaliyev B.K., Kosherbayeva A.N., Kosov A.V., Duvalina O.N., Dossayeva S.K. Integrative model of student and teacher stress coping: the correction of relations in educational, professional and personal interaction // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494. 2019. Vol. 3, N 379. P. 169-179. <https://doi.org/10.32014/2019.2518-1467.83>

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## **CHARACTERISTICS OF MOTIVATION IN THE SELLERS' PROFESSION**

**Abstract.** The research target is to reveal peculiarities of sellers motivational profile.

The research was carried out in “Kego-S” ltd in Almaty city. There have been sellers and founders of “Kego-S” ltd involved in research. The total volume of choice amounted to fifty people. There have been three men and forty-seven women among them. An average age of tested was 33. To research peculiarities of sellers motivational profile we applied the following methodic: Motivation profile of Ricci Martin, Psychological typology of leading roles identification of Meredit Bellbin, Definition of labor motivation type of V.I.Gerchikov, “Constructiveness of Motivation” methodic of O.P.Eliseyev. The recognition gain from other people is leading, i.e. in people around appreciated merits, achievements and various means: from oral gratitude to material encouragement that says about the prevailing factor of non-monetary motivation of the trade personnel. The received arithmetic-mean indicators of sellers role features in a section of Belbin test results correspond to a standard professiogram of the seller, implementers and diplomats on the role qualities correspond to this professional identity. The seller with the prevailing role of the diplomat, is adjusted on cooperation, a susceptibility, diplomacy and prevention of friction, has a high need for closer contacts with others for establishment of rules and directives of work performance and for a comfortable surrounding situation. As the conclusions drawn by results of research, authors state about need of "actions" system for introduction of not monetary motivation. The main effect reached by means of similar stimulation is an increase of loyalty level and interest of employees in the company.

**Key words:** motivational profile, non-monetary motivation, role features of professiogram.

**Introduction.** Consequences of financial crisis influenced the world can be seen now throughout the globe. Majority of enterprises in many regards are now suffering from negative impact of crisis and being unable to resist against current conditions fell down into hard financial and economic situation. At the present circumstances during transition from the stage of crisis to the stage of economical growth it is necessary to find a rational and effective approach to solve the problems which enterprises and companies face with. Labor is not now an incentive but became a means to survive. In such conditions no a word can be said about highly productive and effective work, or professional development of employees, or stimulation of initiatives, or producing a strong labor enthusiasm.

Practice shows that unsuccessful people and those who try to avoid difficulties find nothing or a little activity sphere where they could have realized their potentials. Recreating activities by means of building situation of success can provided a change in labor motivation, thus, the main task of a manager of any levels consists of promoting moral inspiration in a staff as a whole and high motivation of every employee in particular [1].

High motivation of staff is the most important condition for an enterprise success. No company can succeed without high intention of employees to work efficiently, without high level of devotion to their responsibilities, without employees' interest in final results and without their striving to remarkably contribute into achieving the goals. That is why the interest of managers and researches, who are involved in management, to the study of reasons, which make people to work with full potentials for company's interests, is so high. Retention of key-workers is one of the main concerns in the conditions of crisis and to

reach this goal it is important to realize adequate system of motivation and to inform staff in time. Mentioned above conditioned the urgency of research.

Questions of motivation are reflected in many scientific researches at the interface of disciplines: organization management, personnel management, labor economics, psychology and sociology of labor. Among the most important and useful in the theory and practice of motivational management in fundamental research there are: the theory of hierarchy of needs Maslow an individual, two-factor theory of F. Herzberg (Herzberg et. al., 1959), theory X and Y D. McGregor (McGregor, 1960), acquired needs theory D. McClelland (Mc Clelland, 1971.), the model needs categories K. Alderfer, (Alderfer, 1972.), V. Vroom (Vroom, 1983) expectations theory, a theory of justice John. Adams and comprehensive procedural model of Porter-Lawler (Porter & Lawler, 1968).

In terms of methodology contemporary Russian scientists' works the most thoroughly investigated are questions of material forms of motivation and stimulation of employees.

The research target is to reveal peculiarities of motivation profile of sellers.

Characteristics of choice of tested. The research was carried out in "Kego-S" ltd in Almaty city. There have been sellers and founders of "Kego-S" ltd involved in research. The total volume of choice amounted to fifty people. There have been three men and forty seven women among them. An average age of tested was 33.

**Methods.** In order to research peculiarities of motivation profile of sellers we applied the following methodic;

1. Motivation profile of Ricci Martin (Richie., Martin 2004),
2. Psychological typology of leading roles identification of Meredit Bellbin. (Samoukina, 2008).
3. Definition of labor motivation type of V.I.Gerchikov. (Samoukina, 2008).
4. "Constructiveness of Motivation" methodic of O.P.Eliseyev. (Shahova, Shapiro, 2006).

**Results.** A correlation analysis of the motivation type's interdependence of Gerchikov with dominating demands of Ricci was carried out. We used coefficient of linear correlation of Kendall. Correlation analysis was carried out with applying SPSS 16.0 program. Obtained data are presented in tables. For understanding data in tables only valuable correlations are given, the other indicators are not given, as they do not have required information for analysis.

Consider the results obtained.

Table 1 – Correlation links of motivation types of Gerchikov with dominating demands of Ricci Martin

Demands	Type of motivation				
	Instrumental	Professional	Patriotic	Managerial	Lumpish
Demand in friendly relations	-0,304**				
Demands in socializing	-0,274**		0,275**		
Demand in clear structuring of work		-0,282**			
Demand in authority and power				0,257**	
Demand in targeting	0,211*	0,238*			
Demand in recognition	0,214*				
Demand in sense of being required		0,186*			
Demand in development	0,232*	0,270**			
Demand in high payment		-0,242*	-0,234*		0,204*
Demand in being creative	0,188*	0,231*			

As it seen in the table, the instrumental type of motivation is correlating with the following demands:

- Demand in friendly relations -0,304\*\*
- Demands in socializing -0,274\*\*
- Demand in targeting 0,211
- Demand in recognition 0,214\*



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– Demand in development	0,232*
– Demand in being creativem	0,188*

Out of which: four – positive and two – negative links.

That is – the more a man considers work as only a source of earnings and other benefits received as payment for work, the more he is self-motivated to achieve higher and promising targets. The more willingness for independence, self-sufficiency and self-perfection the more demand in being respected for merits, achievements and accomplishments and higher apt to demonstrate curiosity and inquisitiveness; and less demand in closer relations with others and less credibility with colleagues.

On the contrary, the less man thinks of work as only source of earnings and other benefits received as payment for work - the less he is self-motivated to achieve difficult and promising targets; the less wish of self-sufficiency, independency and self-development, less demand in respect by surrounding people for his merits, achievement and success and lower inclination to demonstrate curiosity and inquisitiveness; and higher demand in closer relations with others, are investigated. Probably, that happens due to a man with such qualities is self-sufficient and within the frameworks of the environment cannot find a necessity in closer relations.

Professional type of motivation correlates with six pairs of the stated following dominating scale of demands:

– Demand in clear structuring of work	0,282**
– Demand in targeting	0,238*
– Demand in sense of being required	0,186*
– Demand in development	0,270**
– Demand in high payment	0,242*
– Demand in being creative	0,231*

The four are positive and the two are negative correlating links among them. That is the more a man appreciates in work its content, a chance to realize himself and demonstrate (not only for surrounding people but also for himself) that he can cope with difficult task, which is difficult for others. The more willingness for independence, self-sufficiency and self-perfection; the more he is self-motivated to achieve difficult and promising targets; the higher apt to demonstrate curiosity and inquisitiveness. The stronger is demand in work full of sense and meaning with the element of societal usefulness. Additionally, the lower is demand in rules and directives to work and lower demand to have a work with a sufficient social packet.

Opposite, the less man appreciates in work its content, a chance to realize himself and demonstrate (not only for surrounding people but also for himself) that he can cope with difficult task, which is difficult for others; the less wish of self-sufficiency, independency and self-development; the less he is self-motivated to achieve difficult and promising targets; the less apt to demonstrate curiosity and inquisitiveness and lower demand in work full of sense and meaning, with element of societal usefulness. Furthermore, the higher is demand in rules and directives to work and higher demand to have a work with a sufficient social packet. Probably, that happens due to workers distinguished by developed professional dignity towards established rules that often are posed to them with a certain sense of irony. It is a matter of honor for them to work perfectly whatever is the payment. It is typical for them to be mobilized and concentrated on achieving the targets.

Patriotic type of motivation correlates with two pairs of stated dominating scale of demands:

Demand in social relations	0,275**
Demand in high salary	-0,234*

That is the more a man is persuaded in his usefulness for organization, based on high moral, religious, ideological principles, the higher is a demand in communication with a large number of people, close relations with colleagues. Besides, the lower is demand to have a work with a sufficient social packet.

On the contrary, the less a man appreciate in work its content, a chance to realize himself and demonstrate (not only for surrounding people but also for himself) that he can cope with difficult task, which is not easy for others; the less wish for self-sufficiency, independency and self-perfection. The less he is self-motivated to reach promising targets; the less apt to demonstrate curiosity and inquisitiveness; the less demand in work full of meaning and sense with elements of societal usefulness. Additionally, the higher demand in established rules and directives for performing work and higher demand in having work with sufficient social packet. Probably, that happens due to workers distinguished by developed



professional dignity towards established rules that often are posed to them with a certain sense of irony. It is a matter of honor for them to work perfectly whatever is the payment. It is typical for them to be mobilized and concentrated on achieving the targets.

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On the contrary, the less a man is persuaded in his usefulness for organization, based on high moral, religious, ideological principles, the lower is a demand in communication with a large number of people, close relations with colleagues. The higher is demand to have a work with a sufficient social packet. Probably, it is related to satisfying demand in communication to collect and use information for individual purposes. An individual, weak in self-assertion, is compensated by belonging to a group (contact), providing by that to himself a feeling of safety, using mechanism of identification to valuable surrounding. Importance of social communications between co-workers can be explained, as a demand in understanding everything happens around. Without that an employee feels expelled from relations [2]. This fear causes a certain way of adaptation to situation, as a rule – non-functional (blackmail, manipulations, conflict situations).

Managerial type of motivation correlates with one pair of stated dominating scale of demands:

Demand in authority and power	0,257**
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The more a man voluntarily takes on full responsibility for performed work without any more directions and constant control, the higher is his persistent insistence for power. Opposite, the less a man voluntarily takes on full responsibility for performed work without any more directions and constant control, the less is his persistent insistence for power.

Demand in power and authority, is related to emotional maturity, quietness and self-confidence. Such employees are not afraid of looking to the face of difficulties, do not give in to occasional hesitations of mood, does not get upset over trifles and have a rich imagination and non-trivial thinking. That, probably, is related to the aspiration to escape control.

Lumpish type of motivation correlates with one pair of stated dominating scale of demands:

Demand in a high payment	0,204*
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The more a man has a very weak motivation to effective work and low qualification, the more he tries to avoid a work related to individual responsibility, the higher is his wish to have a work with sufficient social packet.

Seemingly, his aspiration to minimize working efforts to the level, acceptable for his direct manager, who can be quite satisfied with such comfortable for him situation. Such on employee can be given a work, which can be rejected by workers with other type of motivation, he agrees to leveling and agrees to rather low payment but if only the others had been paid less than he; he is extremely dependent on his manager and takes that dependence as something due.

Thus, if a man is more characterized by instrumental type of motivation, he is self-motivated to reach difficult, promising targets; he is self-sufficient, curious, inquisitive and has a demand in appreciation of his merits, accomplishments and success by others.

When a professional type of motivation is realized the wish for self-sufficiency, independence and self-perfection, high level of self-motivation, apt to curiosity and inquisitiveness can be observed. Demand in work full of sense and meaning with element of societal usefulness is dominating.

Managerial type of motivation demonstrates a man who voluntarily takes on full responsibility for performed work without any more directions and constant control and demonstrates a persistent aspiration for influence.

At lumpish type of motivation we can observe a high aspiration for having a work with sufficient social packet.

Further, figure 2 is described. It shows correlations of motivating strategies by O.Eliseev, and with stated dominating demands by Ricci Martin.

Table 2 – Correlations of motivating strategies by O.Eliseev, and with stated dominating demands by Ricci Martin

	Bear	Tiger	Panther
Demand in friendly relations	-0,242**		
Demand in influence and power	-0,170*		
Demand in targeting			0,177*
Demand in recognition	0,216*		
Demand in being required		-0,310**	
Demand in high earnings			-0,178*

Figure 2 shows that motivating strategy of Bear is correlating with three pairs of stated dominating scale of demands:

Demand in friendly relations	-0,242**
Demand in influence and power	-0,170*
Demand in recognition	0,216*

Out of them, one is positive and two are negative correlation links. That is the more man is inherent to the motif of internal and external mutual negation of the negative, which determines the stability and balance of a certain thorough, unhurried development of the individual, the more is demanded in appreciation of his merits, achievements and success by surrounding people; the less is demanded in a close, trustful relationships and the lower is demanded in persistent desire for competition and influence.

Conversely, the less a person is inherent in the motif of internal and external mutual negation of the negative, which determines the stability and balance of a certain thorough, unhurried development of individuality, the less is demanded in appreciation of his merits, achievements and success by surrounding people; the more is demanded in close, trustful relationships and higher is demand in persistent aspiration for competition and influence.

Probably, this is due to the inherent motivational profile of mechanism of “adaptation” (by K.Tomath) to the customs of other people and to his own habits, which provides a certain stability of existence. This correlation reflects the social orientation of individuality lying in the framework of partnering, belonging and, probably, compensates failure in the area of productivity (the inability to self-realization and self-assertion).

Motivation strategy of Tiger negatively correlates with one pair of stated dominating scale of demands:

Demand in being required	- 0,310**
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That is, the more individuality is inherent to motif of denying internal to external, not only to himself but also to others: all have to follow formally certain idea, so to say, rule-norm; the lower is demand in work which is full of meaning and sense and with element of societal usefulness.

Conversely, the lower is inherent to motif of denial internal to external, not only to himself but also to others: all have to follow formally certain idea, so to say, rule-norm; the higher is demand in work, which is full of meaning and sense and with element of societal usefulness.

Perhaps this is due to the inherent motivational profile mechanism of wish to “competition” (by K.Tomath), on the basis, which the self-education and self-assertion of the individual in outward. Motivational strategy Panther, correlates with two pairs of stated dominating scale of demands:

Demand in targeting	0.177 *
Demand in high earnings	-0.178 *

One positive and one negative of correlation links among them.

Thus, the more man is inherent to motif of interaction – “yes – no”, that is motif of the reconstruction unity of achievement motivation and motivation of relationship, when self-actualization is realized in communication rather of mind than the heart: the higher he is self-motivated to reach difficulties, promising targets and the lower is demanded to have a work with a sufficient social packet.

Perhaps, it is more important to test himself in solving difficult situations but not to have a sufficient social packet.

So, on the basis of the data obtained, if a seller has prevailing motivational strategy Bear, there is a demand to be appreciated for his merits, achievements and success; and demand in a close and trustful relationships and demand in persistent aspiration for competition and influence.

When motivational strategy Tiger is dominating, the staff has reduced demand in work, filled with meaning and sense and with element of social usefulness.

At Panther motivational strategy, the higher a person is self-motivated, the less is demand in having a work with a sufficient social packet.

Table 3 shows correlation links of roles by methodic of Bellbin and types of motivation by V.Gerchikov.

Table 3 – Correlation links of roles by methodic of Belbin and types of motivation by V.Gerchikov

	Instrumental	Managerial	Professional	Patriotic
Implementer	0,181*		-0,175*	
Coordinator			0,296**	
Creator		0,224*		-0,185*
Researcher	0,207*			
Diplomat			-0,268**	

In the figure, it can be seen, that instrumental type of motivation is positively correlating with two managerial roles

Implementer	0,181*
Researcher	0,207*

That is, the more an employee is considering a job only as a source of earnings and other benefits received as a reward for work, the more he is disciplined, reliable, conservative and practical; he often turns ideas into actions and the more a man is focused on the development of new fragments of ideas suggested by others.

Conversely, the less an employee considers work only as a source of earnings and other benefits received as a reward for work, the less he is disciplined, reliable, conservative, practical; less turns ideas into actions and less he is focused on the development of new fragments of ideas suggested by others.

Perhaps, this shows an adequate assessment of his capabilities and demands, where there is willingness for self-assertion in professional activity; and at a low intellectual productivity there are dominating compensatory aspirations focused on social approval [3].

Managerial type of motivation positively correlates with a command role of Creator.

The more an employee voluntarily takes on full responsibility for work without requiring any additional instructions or continuous monitoring the more he is energetic and courageous in overcoming obstacles.

Conversely, the less an employee voluntarily takes on full responsibility for the work performed without requiring any additional instructions or continuous monitoring the less he is energetic and courageous in overcoming obstacles.

This fully corresponds to motivational profile. Naturally feeling the owner, a man realizes inherent qualities to this role.

Professional type of motivation correlates with three team roles:

Implementer	-0.175 *
Coordinator	0.296 **
Diplomat	-0.268 **

Of these, one is positive and two are negative correlations.

That is, the more the employee values work in its content, opportunity to prove himself and prove (not only to others, but also to himself) that he can cope with a difficult task, which is not feasible for others. The less a person is disciplined, reliable, conservative, practical, the less he turns ideas into practical actions; the less he is focused on cooperation, sensitivity, diplomacy and prevention of conflict situations.

Conversely, the less an employee values its content in work, opportunity to prove himself and prove (not only to others, but also to himself), that he can cope with a difficult task, which is not feasible for others; the more a man is disciplined, reliable, conservative, practical; more often he turns ideas into practical actions and the more he is focused on cooperation, sensitivity, diplomacy and prevention of conflict situations.

Of full corresponding to motivational profile, a professional, as a rule, is oriented to the result, and it is not important for him to have background in the form of loyal charged environment or liberal leadership.

This correlation reflects the orientation of employees on the development in the long-term perspective, the willingness to invest in professional development, ensuring the competitiveness and increasing the rate of his value on labor market. It can serve as a ground for commitment to the organization, which creates conditions for the maintenance and development of both professional skills and career development.

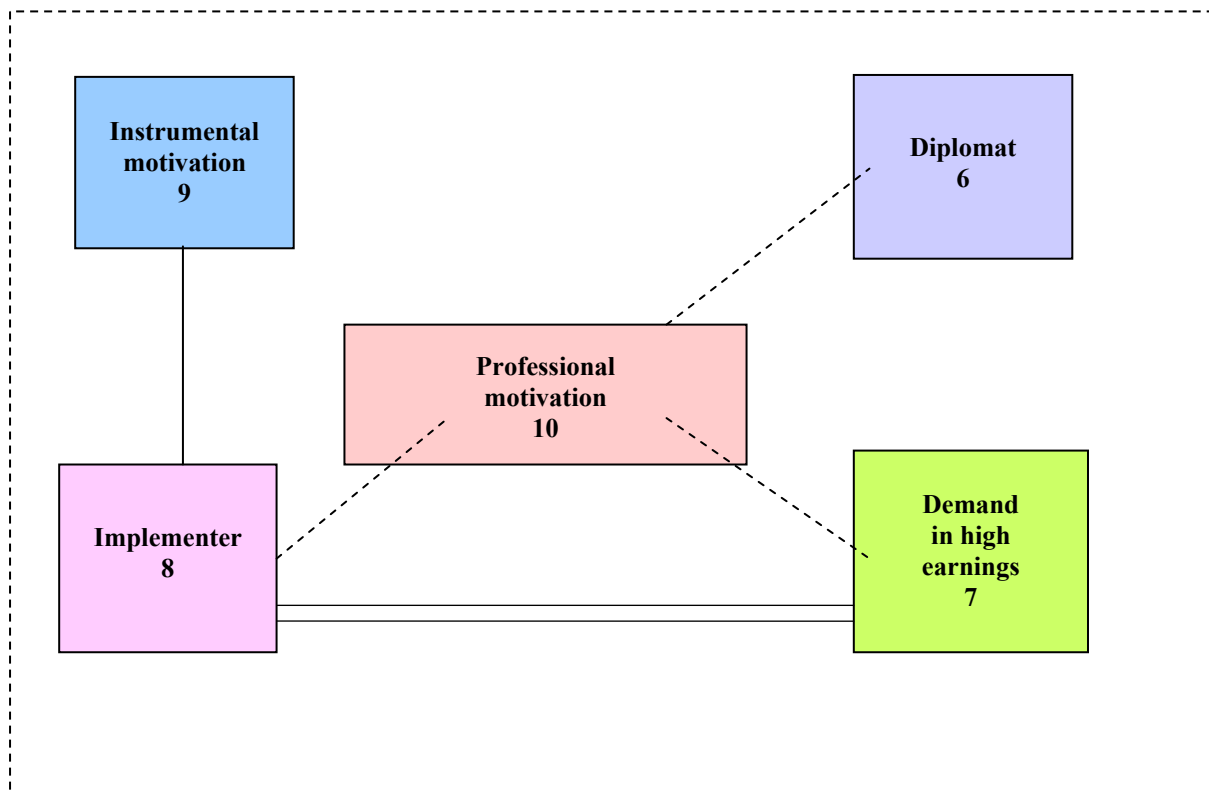
Patriotic type of motivation negatively correlates with one command role of Creator

That is, the more a man is convinced in his usefulness to the organization, the less a man is energetic and courageous in overcoming obstacles. Conversely, the less a man is convinced in his usefulness to the organization, the more a man is energetic and courageous in overcoming obstacles.

Perhaps, in this situation, patriotism is only a screen, justifying his passivity as an employee. Though, based on professiogram, we believe that a man, who shares values of company, put the social interests above those of his own.

Thus, on the basis of the above analysis, it is clear that a seller, who shows the instrumental type of motivation is disciplined, reliable, conservative, practical; he more often turns ideas into practical actions and is focused on development of new fragments of ideas suggested by others.

A seller with managerial type of motivation voluntarily takes on full responsibility for work without requiring any additional instructions or continuous monitoring; he is energetic and courageous in overcoming obstacles.



---- negative correlation ( $p \leq 0,05$ ); — positive correlation ( $p \leq 0,05$ )

Correlation pleiad of seller's motivation profile

A man with prevailing patriotic type of motivation convinced in his usefulness to organization; he is less energetic and courageous in overcoming obstacles.

Analyzing tables 1-3 we built up a correlation pleiad which represents professiogram of sellers.

Figure shows that the basis of the hierarchy is a factor of "professional motivation", having the largest number of correlations and that namely this factor will identify four other factors: instrumental motivation, implementer, demand in high earnings, a diplomat.

**Discussion.** Thus, the study carried out let reveal peculiarities of motivational profile of sellers. It was found that the more a man is disciplined, reliable, conservative, practical; the more often turns ideas into practical actions, the more an employee considers a work only as a source of earnings and other benefits received as reward for work; the more is his desire to have work with a sufficient social packet. It is important to note that there is no direct links between diplomat factor, focused on cooperation, gentleness, sensitivity, diplomacy, ability to listen, to build and to prevent conflict situations and the implementer factor with its qualities of discipline, reliability, conservatism, practicality. Figure 1 shows that they are negatively related through an additional variable professional motivation with which an employee appreciates its content, the ability to realize himself and prove (not only to others, but also to himself) that he can cope with difficult task which is not feasible for others.

Additional negative correlation can be observed, the following tendency can be visible: the less people like to work as a team and prefer to receive money for their own efforts, the less they value in work its content.

In our case, construction of the pleiad is one of the steps of motivational audit, as it demonstrates information about the peculiarities of motivational structure of personnel in modern trade organization.

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### **САТУШЫ МАМАНДЫҒЫНЫҢ МОТИВАЦИЯСЫНЫҢ СИПАТТАМАСЫ**

**Аннотация.** Зерттеудің мақсаты-сатушылардың мотивациялық бейінінің ерекшеліктерін анықтау.

Зерттеу Алматы қ. "Kego-S" ЖШҚ-да жүргізілді. Зерттеуге "Kego-S" ЖШҚ сатушылары мен құрылтайшылары қатысты. Таңдаудың жалпы көлемі елу адамды құрады. Олардың арасында үш ер және қырық жеті әйел болған. Сыналушылардың орташа жасы 33 жасты құрады. Сатушылардың мотивациялық бейінінің ерекшеліктерін зерттеу үшін мынадай әдістеме қолданылды: Риччи Мартиннің мотивациялық профилі, Мередит Беллбиннің жетекші рөлдерін сәйкестендірудің психологиялық типологиясы, В. И. Герчиковтың еңбек мотивациясының түрін анықтау, О. П. Елисеевтің "мотивацияның конструктивтілік" әдістемесі. Басқа адамдардың тарапынан, яғни, айналасына сіңірген еңбегі, жетістіктері мен әр түрлі құралдары бағаланған адамдардың мойындалуы көшбасшы: ауызша алғысынан материалдық көтермелеуге дейін, бұл сауда персоналының ақшалай емес уәждемесінің басым факторын білдіреді. Белбин тестінің нәтижелері бойынша сатушылардың рөлдік сипаттамаларының алынған орташа арифметикалық көрсеткіштері сатушының стандартты профессинограммасына сәйкес келеді, орындаушылар мен рөлдік қасиеттері бойынша дипломаттар осы кәсібі сәйкестікке дәл келеді. Дипломаттың басым рөлімен сатушы ынтымақтастыққа, сезімталдыққа, дипломатияға және кикілжің болдырмауға бағытталған, жұмысты орындаудың ережелері мен нұсқауларын белгілеу үшін және жайлы қоршаған жағдай үшін басқалармен неғұрлым тығыз байланыста болу қажеттігіне ие. Зерттеу нәтижелері бойынша жасалған қорытындылар ретінде авторлар ақшалай емес уәждемені енгізу үшін "әрекеттер" жүйесінің қажеттілігін көрсетеді. Мұндай ынталандырудың көмегімен қол жеткізілетін негізгі нәтиже-бұл қызметкерлердің компанияның адалдығы мен мүдделілігі деңгейін арттыру болып табылады.

**Түйін сөздер:** мотивациялық профиль, материалдық емес мотивация, рөл, профессинограмма ерекшеліктері

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## **ХАРАКТЕРИСТИКА МОТИВАЦИИ СПЕЦИАЛЬНОСТИ ПРОДАВЦА**

**Аннотация.** Цель исследования – выявить особенности мотивационного профиля продавцов.

Исследование проводилось в ТОО “Кего-S” г. Алматы. В исследовании принимали участие продавцы и учредители ТОО “Кего-S”. Общий объем выборки составили пятьдесят человек. Среди них было трое мужчин и сорок семь женщин. Средний возраст испытуемых составил 33 года. Для исследования особенностей мотивационного профиля продавцов применялась следующая методика: мотивационный профиль Риччи Мартина, психологическая типология идентификации ведущих ролей Мередита Беллбина, определение типа трудовой мотивации В. И. Герчикова, методика “конструктивность мотивации” О. П. Елисеева. Лидирует признание со стороны других людей, т.е. в людях, вокруг которых ценятся заслуги, достижения и различные средства: от устной благодарности до материального поощрения, что говорит о преобладающем факторе неденежной мотивации торгового персонала. Полученные среднеарифметические показатели ролевых характеристик продавцов в сравнении результатов теста Белбина соответствуют стандартной профессиограмме продавца, исполнитель и дипломаты по ролевым качествам соответствуют этой профессиональной идентичности. Продавец с преобладающей ролью дипломата, настроен на сотрудничество, восприимчивость, дипломатию и предотвращение трений, имеет высокую потребность в более тесных контактах с другими для установления правил и указаний выполнения работы и для комфортной окружающей обстановки. В качестве выводов, сделанных по результатам исследования, авторы констатируют необходимость системы “действий” для внедрения неденежной мотивации. Основной эффект, достигаемый с помощью подобного стимулирования – это повышение уровня лояльности и заинтересованности сотрудников в компании.

**Ключевые слова:** мотивационный профиль, нематериальная мотивация, роль, особенности профессиограммы.

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## **REFERENCES**

- [1] Absattarov G.R., Kim E.S. Legal person as new socio-political phenomenon. ISSN 2518-1467. 2018. Vol. 5, N 375. P. 129-136. website address <http://www.bulletin-science.kz/index.php/en/archiv>. DOI <https://doi.org/10.32014/2018.2518-1467.17>
- [2] Alderfer C.P. Existence, Relatedness, and Growth; Human Needs in Organizational Settings, N.Y., 1972.
- [3] Adams J.S. The Equity Theory. Ilin, E. (2003). Motivation and motives. SPb.: Peter, 1963.
- [4] Herzberg F., Mausner B., Snyderman B.B. The motivation to work. N.Y., 1959.
- [5] Maslow A.H. Motivation and Personality. N.Y., 1954.
- [6] McGregor D. The human side of enterprise. N.Y., 1960.
- [7] McClelland D.C. Assessing Human Motivation. N.Y., 1971.
- [8] Porter & Lawler. The Expectancy Theory of Motivation. 1968.
- [9] Richie S., Martin P. Management of motivation. M.: UNITY-DANA, 2004.
- [10] Sabirova R.K., Adietova E.M., Bisembieva Zh.K. State budget of Kazakhstan: problems of financing and use // Reports of the National academy of sciences of the Republic of Kazakhstan. ISSN 2224-5227. 2018. Vol. 5, N 319. website address <http://reports-science.kz/index.php/en/archive>. DOI <https://doi.org/10.32014/2018.2518-1483.3>
- [11] Shahova V., Shapiro S. Motivation work. M.: Alfa-Press, 2006.
- [12] Samoukina N. Effective motivation of personnel with minimal financial costs. M.: The vertex, 2008.
- [13] Vroom V.H. (1983). Management and Motivation, Penguin (first published 1970).

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## **STRATEGY AND TACTICS OF FINANCIAL POLICY OF KAZAKHSTAN IN THE CONDITIONS OF DEVELOPMENT OF INTEGRATION PROCESSES**

**Abstract.** This article discusses the strategy and tactics of the financial policy of Kazakhstan in the context of integration processes. In the process of creating a single financial market of the EAEU, subject to enhanced integration of the Union countries, great attention is paid to effective financial policy, since its effectiveness depends on completing the process of harmonization of state legislations in the financial sector, as well as ensuring the effective development of national economies of the participants of this integration association.

**Keywords:** Eurasian Economic Union, financial policy, EAEU.

**Introduction.** The financial sector is an important point of integration, which opens up new opportunities for capital utilization to the EAEU participants. All EAEU countries have similar economic model and financial system, which simplifies the process of consolidation of their stock markets. The similarity lies in the fact that the state plays a large role as an economic agent and regulator of the country's economic policy. It also manifests itself in a high concentration of assets owned by a narrow circle of people [1].

One of the most important goals of creating the Eurasian Economic Union (EAEU) is to conduct a unified economic policy, which is aimed at creating optimal conditions for the growth of national economies of the EAEU member countries, harmonizing legislation and strengthening integration in the field of economics.

Comprehensive implementation of financial policies in the framework of the Eurasian Economic Union is carried out by the Eurasian Economic Commission in the person of the Financial Policy Department.

**Methods.** When writing the article, general scientific and special methods were used, such as: system analysis method; content analysis method; comparative analysis method; method of analysis and synthesis; system approach method.

**Results.** The most important result of the transformation was the formation of a market economy, open to the movement of labor, goods and capital. Nevertheless, the structure of the economies and the level of development of the EAEU countries are significantly different. Kyrgyzstan, whose population exceeds the population of Armenia by more than two times, produces GDP at PPP (purchasing power parity), comparable to the corresponding figure for Armenia (23.2 billion international dollars and 28.3 billion international dollars, respectively, in 2017 (table 1).

At the same time, Belarus is slightly more than three times larger than the population of Armenia, but its GDP in PPP is 6.3 times higher than in Armenia. In 2017, the dispersion of GDP per PPP per capita at current prices within the EAEU was 7.5 times. The values of the per capita indicator for Russia and Kazakhstan reached 27.9 and 26.3 thousand int in 2017. USD / person respectively [1].

Table 1 – The main macroeconomic indicators of countries - members of the EAEU, 2017

	Armenia	Belarus	Kazakhstan	Kyrgyzstan	Russia
GDP at PPP, billionsdollar.	28,3	179,4	478,6	23,2	4016,3
GDP nominal, Trillion dollars. USA	11,5	54,4	159,4	7,6	1577,5
GDP percapitaby PPP, thous. doll.	9,5	18,9	26,3	3,7	27,9
Savings rate, % of GDP	20,7	26,2	27,1	31,3	24,3
Unemployment, % of labor force	18,9	1,0	5,0	7,1	5,2
Population, million people	3,0	9,5	18,2	6,3	144,0
State budget balance, % of GDP	-2,6	1,6	-6,4	-3,3	-1,0
National debt, % of GDP	53,5	53,4	20,8	56,0	15,5
Current account, % of GDP	-2,8	-1,7	-3,4	-4,0	2,2

*Note.* Compiled by the authors based on data [3].

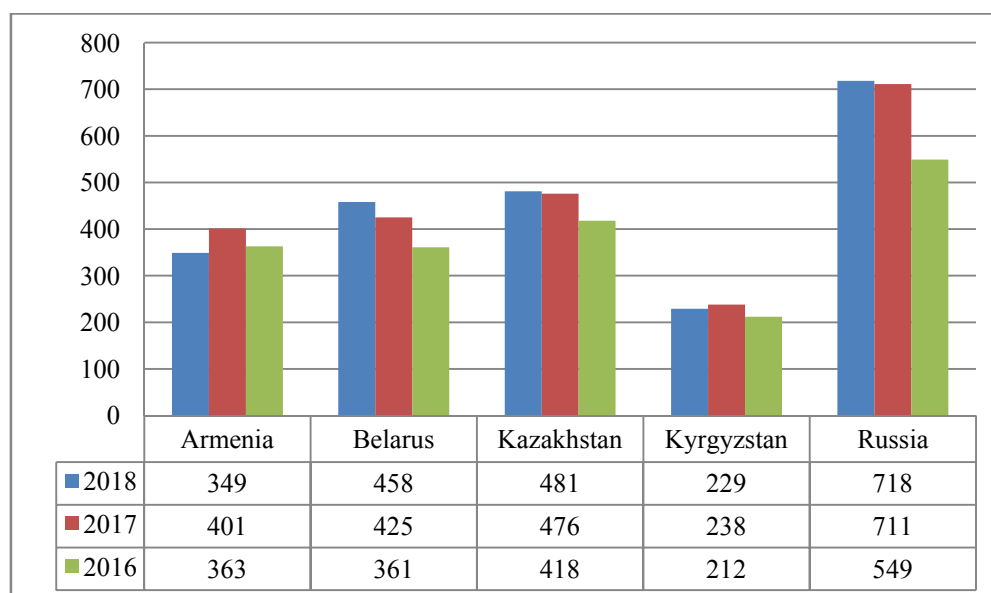


Figure 1 – Dynamics of the level of average monthly wages in the EAEU member countries for 2016-2018, in USD.  
*Note.* Compiled according to the source [3].

As we can see, in the EAEU member countries there is an increase in wages in dollar terms. Since 2016, there has been a steady growth in the level of the average monthly wage, but it is still far from the values of the pre-devaluation period. Amid falling oil prices in 2014–2015, a sharp decline in revenues began. In Kazakhstan, we observe a positive dynamics of wage growth, the growth rate by 2018 is 115%.

The dynamics of inflation in the member countries of the EAEU is shown in figure 2.

The lowest rates of inflation (consumer price index) in 2017 were recorded in the Russian Federation and the Republic of Armenia - 2.5% and 2.6%, respectively.

In the three countries of the Eurasian Economic Union (EAEU) - the Republic of Belarus, the Republic of Kazakhstan and the Russian Federation - consumer price growth rates declined. Thus, one of the main macroeconomic indicators - the level of inflation - is in the zone of macroeconomic stability.

In the Republic of Armenia and the Kyrgyz Republic, deflation was replaced by a moderate increase in prices as a result of a recovery in economic activity and domestic demand [2].

All member states ensured that the country levels comply with the limit value of the inflation rate set by the Treaty on the EAEU - 107.5%. In the Republic of Belarus, a similar result was achieved for the first time since the beginning of the operation of the Union.



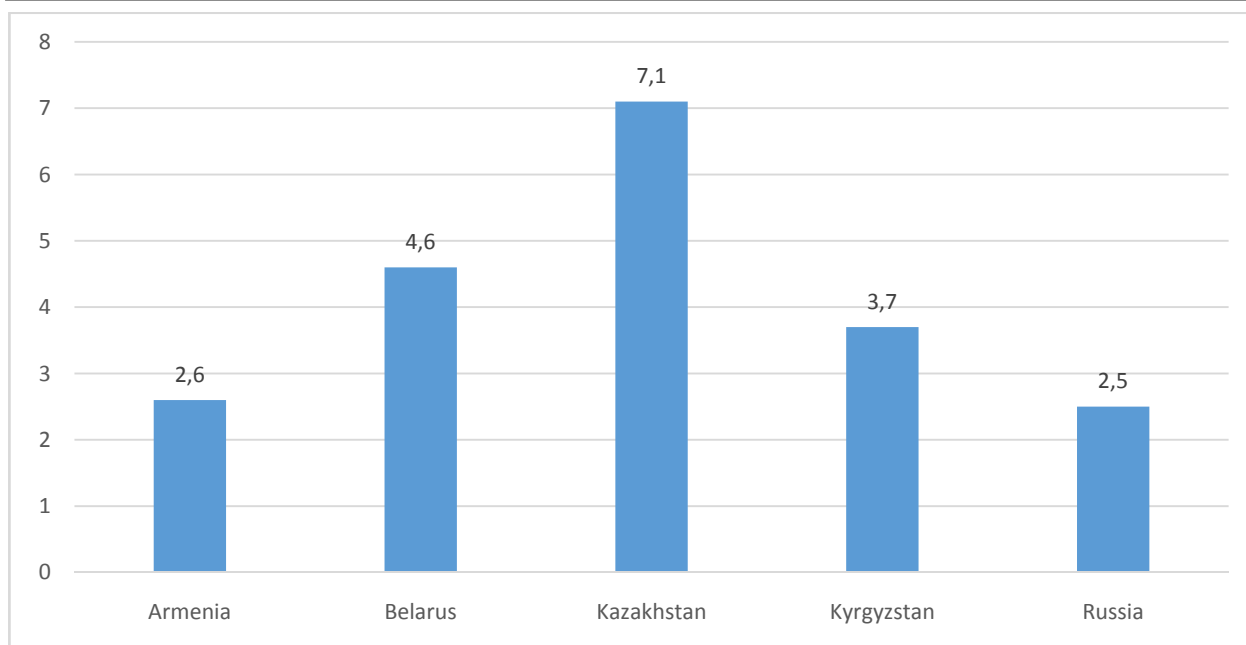


Figure 2 – Dynamics of inflation in the EAEU member countries for 2017, in percent.

Note. Compiled according to the source [3].

The implementation of economic policy measures, including taking into account the recommendations developed by the Eurasian Economic Commission, contributed to the reduction of inflation and the convergence of its values in the EAEU countries.

Data on the execution of the republican budget of the countries participating in the EAEU are given in table 2.

Table 2 – Execution of the republican budget of the countries participating in the EAEU for 2016-2018, million USD

	1half year.2016	2016	1half year.2017	2017	2018	2018B%K2017
Income						
Armenia	1131,5	2439,4	1200,6	2564,7	1257,9	104,8
Belarus	4082,5	8981,5	4710,0	10220,8	5762,1	122,3
Kazakhstan	9764,6	22774,3	12946,2	29992,9	13156,9	101,6
Kyrgyzstan	761,6	1657,6	916,8	1956,6	918,6	100,2
Russia	83924,5	202987,8	122838,7	258581,3	145334,5	118,3
Costs						
Armenia	1307,2	3019,4	1279,7	3118,2	1266,1	98,9
Belarus	3761,3	8474,3	4030,3	8779,4	4407,1	109,3
Kazakhstan	11592,0	24889,9	13843,2	34104,9	13718,7	99,1
Kyrgyzstan	961,5	1965,4	998,1	2208,6	945,6	94,7
Russia	104486,7	247734,5	129880,9	281467,1	129427,3	99,7
Deficiency (surplus)						
Armenia	-175,8	-579,9	-79,1	-553,5	-7,9	–
Belarus	321,2	507,2	679,7	1441,5	1355,0	–
Kazakhstan	-1827,4	-2115,6	-896,9	-4112,1	-561,9	–
Kyrgyzstan	-199,9	-307,8	-81,3	-252,0	-27,0	–
Russia	-20562,2	-44746,8	-7042,2	-22885,9	15907,2	–

Note. Compiled by the authors based on data[4].

In 2018, the reduction of the budget deficit of the EAEU countries continued, and the states noted an increase in fiscal reserves. The achievements of recent years in the field of reducing inflation and strengthening economic growth, along with improving the situation in global commodity markets, have created prerequisites for increasing fiscal sustainability in most countries of the region. From 2017, there has been a rapid growth in income over expenditure in the EDB countries, which has led to a reduction in budget deficits. The growth of the state budget deficit in the last year was noted only in Kazakhstan, mainly due to the growth of targeted expenditures for the improvement of the financial system of the country [3].

Let us analyze the benefits of Kazakhstan from participation in the Eurasian Economic Union. Most clearly this can be traced by the indicators of investment activity of Kazakhstan in the framework of the EAEU. It should be noted here that in 2017, the EAEU countries increased the volume of investments in Kazakhstan by 43%. Gross inflow of investments from the countries of the Union amounted to 1.3 billion dollars. 1.2 billion (92%) of them came from Russia.

Table 3 – Gross inflow of foreign direct investment in the Republic of Kazakhstan from foreign direct investors by country (million US dollars)

Country	2010	2011	2012	2013	2014	2015	2016	2017
Total	22 245,6	26 467,3	28 884,9	24 098,3	23 725,5	15 169,5	20 949,3	20 765,4
EAEU	973,1	1090,6	1187,7	1404,7	1 756,2	590,1	928,0	1 311,9
Armenia	0,0	0,0	-0,2	0,0	0,4	0,6	0,2	0,0
Belarus	41,7	85,8	122,5	165,0	202,0	79,5	63,5	81,4
Kyrgyzstan	-20,3	4,7	-4,1	-59,5	-26,2	-17,6	-3,1	-0,3
Russia	951,6	1000,1	1 069,5	1299,2	1580,1	527,7	867,4	1 230,8
<i>Note.</i> Compiled by the authors based on data [5].								

Russia has been increasing the volume of injections in the Kazakhstani economy for two years. In terms of the scale of investment in 2017, the Russian Federation ranked fourth among the investing countries in Kazakhstan. Belarus is the second largest gross inflow of investments into Kazakhstan from the countries of the Union in 2017 (\$ 81.4 million, which is 28% more than in 2016). Last year, Kazakhstan did not receive anything from Armenian investors, while Kyrgyzstan went to minus - a little less than in previous years. The share of the EAEU countries from the gross inflow of foreign direct investment increased from 4.4% to 6.3%.

Data on the gross outflow of direct investment abroad from Kazakhstan direct investors by country are shown in Table 6.

In turn, Kazakhstan invested \$ 435 million in the EEU countries in 2017. This is 23% of the total gross investment outflow from Kazakhstan.

Among the countries of the Union, the greatest interest of Kazakhstani investors is concentrated on the Russian Federation - \$ 374 million (86%). Kyrgyzstan is in the second place in Kazakhstani investments in the EEU countries - \$ 50 million (11.5%).

Table 4 – Gross outflow of direct investment abroad from Kazakhstan direct investors by countries (US \$ million)

Country	2010	2011	2012	2013	2014	2015	2016	2017
Total	10489,9	8034,4	3021,5	8690,8	3354,9	6929,7	4279,2	1890,9
EAEU	184,1	232,4	80,5	216,1	139,9	419,7	606,8	434,6
Armenia	1,6	3д	4,3	4,8	5,2	7,2	7,9	10,4
Belarus	0,0	0,0	0,0	0,9	0,9	0,4	9,1	0,3
Kyrgyzstan	17,9	46,5	26,7	21,7	15,7	10,8	31,7	50,0
Russia	164,6	182,8	49,6	188,7	118,2	401,2	558,2	373,9
<i>Note.</i> Compiled by the author on the basis of data [5].								

Last year, Kazakhstani investors invested only 300 thousand dollars in the economy of Belarus, despite the fact that from 2010 to 2012 they did not invest anything at all [4].

Last August, Kazakhstan launched a large-scale national investment strategy. New investment vision aimed at increasing and diversifying investments.

Thus, Kazakhstan, actively participating in integration processes, was able to significantly increase its investment attractiveness. The volume of foreign investment in fixed assets for the four months of 2018 exceeded \$ 2.5 billion. A year earlier, \$ 1.6 billion was raised in the same period.

During the period of the Union's existence, member states significantly improved the quality of their institutions. Institutional reforms have brought individual countries (in particular, Russia and Armenia) to a relatively high level of institutional quality, which, however, still lags noticeably behind developed countries. The most vulnerable places of institutional transformations are related to private property, which is explained by the incomplete privatization processes in the region. In addition, according to a study of the Eurasian Development Bank, significant problems of the development of institutions are present, for example, in the energy sector of Belarus.

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 5). 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].

Table 5 – 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	Doingbusiness	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	Doingbusiness	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	Doingbusiness	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].						

Thus, it can be concluded that in the process of creating a single financial market of the EAEU, subject to strengthening the integration of the interaction of the Union countries, great attention is paid to effective financial policy, since its effectiveness depends on the completion of the harmonization process of state legislations in the financial sector, as well as ensuring the effective development of national economies of the participants of this integration association.

Kazakhstan is an active participant in various integration associations. One of such associations is the Eurasian Economic Union (hereinafter referred to as the EEU). This supranational association, created in 2014, with a population of more than 180 million people and a market with a foreign trade turnover of 750 billion dollars, has every chance to strengthen its position in the international arena. Kazakhstan's interest in its participation in the EAEU comes primarily from an assessment of global trends [6].

The goal of cooperation among countries in the framework of the Eurasian Economic Union is to form a single market for goods, services, capital and labor resources. At this stage, mainly "common" markets are formed: within the framework of common markets, the same for all rules work, and within common markets, the activities of market participants from different countries are mostly only coordinated while maintaining references to national legislation.

On January 1, 2018, the Customs Code of the Eurasian Economic Union entered into force. As a result of this work, the following areas of customs policy were implemented:

1) the priority of electronic customs declaration and the application of a written declaration only in certain cases;

2) expansion of special simplifications for authorized economic operators, in particular, three types of certificates are provided depending on the simplification package;

3) expansion of the list of goods produced in the "after the fact" customs clearance mode;

4) synchronization of processes with the Tax Code of the Republic of Kazakhstan.

5) optimization of customs operations in order to develop transit potential, reducing transit completion times, carrying out inspections, the possibility of processing one transit declaration when goods are transported by two or more types of transport (multimodal transportation).

The agreements in the framework of the EAEU significantly improve the integration capabilities of Kazakhstan as compared to the package of basic agreements within the framework of the Customs Union and the Common Economic Space, and provide significant opportunities for the development of the Kazakhstan economy, full-scale realization of the existing potential in the fields of energy, transport, industry and agriculture.

In order to develop and strengthen trade relations, as well as create favorable conditions for the promotion of domestic goods on the world market, work is underway to create free trade zones and conclude preferential agreements with third countries that provide for more liberal trade rules.

Within the framework of the multilateral trade and economic system, the main priorities are to ensure the participation of Kazakhstan in this system, taking into account the norms and rules of the WTO, the use of preferential tools to ensure the sales market for Kazakhstani products and competitive conditions for producers in foreign markets.

Working conditions under the WTO provide for the liberalization of trade regimes of the participating countries, the reduction of various barriers to trade, the expansion of the geography of exports of Kazakhstan products by opening up access to the markets of most countries of the world, and also allow our producers to compete in equal conditions.

One of the key factors affecting the degree of access to competitive production areas, resources and markets is the elimination of restrictions and the creation of a favorable business environment.

In order to facilitate trade facilitation, existing customs and tariff, non-tariff measures are systematically reviewed by analyzing the applicable rates of import customs duties, identifying and eliminating illegitimate barriers from the point of view of world practice [7].

The Republic of Kazakhstan conducts a multi-vector international policy. A significant role in shaping and implementing trade and economic policies is played by the outcomes of meetings of intergovernmental commissions, the outcome of which can be a whole range of agreements.

The volume of foreign trade turnover of the Republic of Kazakhstan in 2017 amounted to 77.6 billion US dollars, which is higher compared to 2016 by 25.2% or 15.6 billion US dollars. Compared to 2015, Kazakhstan's foreign trade turnover increased by 1.3%, or 1 billion US dollars.

At the same time, the trade turnover with the countries of Eurasian Economic Community in 2017 amounted to 17.4 billion US dollars, which is higher by 25.9% or 3.6 billion US dollars compared to 2016. Compared to 2015, the foreign trade turnover of Kazakhstan with the countries of Eurasian Economic Community increased by 1.3% or by 1 billion US dollars. In 2018, foreign trade of Kazakhstan with the countries of the EEU amounted to \$ 19.1 billion, which is 10.1% more than in 2017 - \$ 17.1 billion.

Table 6 – Goods turnover of Kazakhstan with participants of the EAEU in 2018, billion US dollars

The name of indicators	Total	Name of the EAEU country			
		Armenia	Belarus	Kyrgyzstan	Russia
Turnover					
Total: including:	19 114 437,4	14 200,50	680 756,20	865 257,00	1 755 4223,7
the share of the country in the total volume of trade, %	100	0,1	3,6	4,5	91,8
in % to the corresponding period of the previous year	107,5	133,9	107,6	113,1	107,2
Export					
Total: including:	5 891 946,2	7449,80	87 543,10	634 866,50	5 162 086,8
the share of the country in the total volume of trade, %	100	0,1	1,5	10,8	87,6
in % to the corresponding period of the previous year	112	133,8	86,5	122,9	111,3
Import					
Total: including:	13 222 491,2	6750,70	593 213,10	230 390,50	12 392 136,9
the share of the country in the total volume of trade, %	100	0,1	4,5	1,7	93,7
in % to the corresponding period of the previous year	105,6	134,1	111,6	92,7	105,6
Note. Compiled from source data [7].					

Note. Compiled from source data [7].

The import component in the structure of commodity turnover is 69.2%, or 13.2 billion dollars. The export of domestic goods and services to the countries of the community, in turn, is 30.8% (5.9 billion dollars).

The structure of trade in the EAEU countries is shown in figure 3.

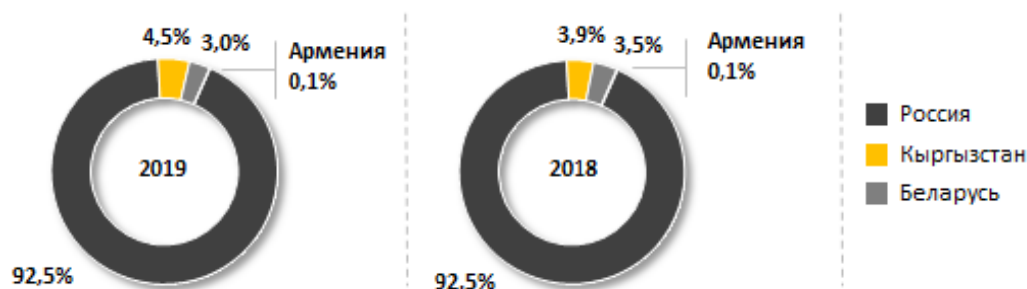


Figure 3 – The structure of trade in the EAEU countries.

Note. Compiled from source data [36].

From the data of the figure it is clear that Russia remains the main trading partner of Kazakhstan. The trade turnover between the countries in 2018 amounted to \$ 17.55 billion, which exceeds the volume of the previous year by \$ 1.2 billion.

The growing rates of mutual trade between Kazakhstan and the EAEU member countries are supported by investment activity from regional partners. Only in the first 9 months of 2018, the inflow of foreign investments into the national economy from the EAEU amounted to \$ 1.2 billion - 30.9% more than the same period a year earlier. At the same growth rate, the result of 2018 could be FDI in the amount of \$ 1.5 billion.

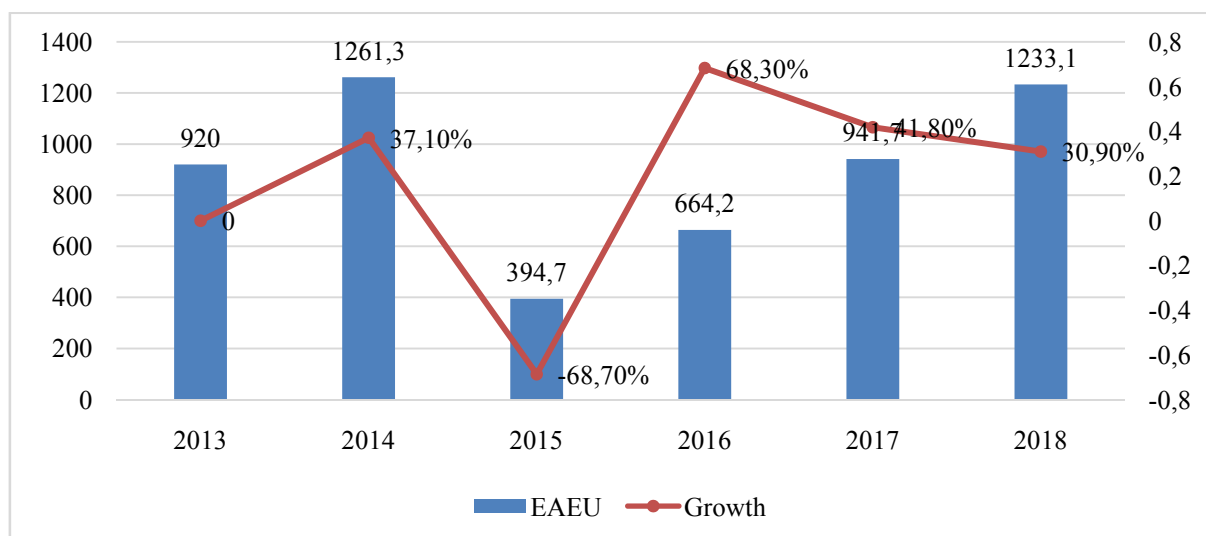


Figure 4 – Dynamics of foreign direct investment from EAEU countries to Kazakhstan (US \$ million).

Note. Compiled from source data [7].

The share of investments from the EEAC is 7.1% of the total volume of gross foreign investment: 17.3 billion dollars. In addition to the growth in the volume of investments themselves from the countries of the Union, their share also increases. In January-September, the share of FDI from the EAEU was 7.1%, whereas a year earlier it was only 5.9%. The increase in the presence of assets of regional partners in the economy of Kazakhstan indicates a growing investor interest in potential industries [8].

Maintaining the growth rate of foreign investment in the country will allow to increase production volumes and export potential.

In accordance with Articles 71 and 72 of the Treaty on the Eurasian Economic Union (hereinafter - the EAEU) of May 29, 2014, which entered into force on January 1, 2015, the collection of indirect taxes (VAT and excise taxes) in the mutual trade of the Customs Union member states destination countries providing for the application of a zero rate of value-added tax and (or) exemption from excise taxes on the export of goods, as well as their taxation with indirect taxes on imports.

The standards for the distribution of import customs duties for each Member State are set in the following amounts: Republic of Armenia - 1.22%; The Republic of Belarus - 4.56%; Republic of Kazakhstan - 7.055%; Kyrgyz Republic - 1.9%; Russian Federation - 85.265%

**Discussions.** Thus, over the years of the existence of the EAEU, its participants were able to appreciate the benefits of membership in the union. The total growth of indicators of foreign trade activities within the framework of the EAEU allowed the state budget of the Republic of Kazakhstan to provide additional amounts of customs duties.

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 7).

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

Table 7 – Key factors of various types of budget investments for monitoring and evaluating implementation

Criteria	Kinds	Key factors
on investment objectives	InvestmentsA*	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
	InvestmentsB**	- increase production efficiency; - increase in production and expansion of activities; - financial results;
on investment objects	InvestmentsA	- a comparative analysis of the planned technical and economic parameters with actual ones;
	InvestmentsB	- assessment of the value and liquidity of the invested funds, including financial assets;
according to the method of implementation	InvestmentsA	- the appropriateness of the choice and method of project implementation, the socio-economic efficiency of the project;
	InvestmentsB	- analysis of financial indicators confirming the increase in income and / or value of the state asset
<p>*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;</p> <p>**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 государства.</p>		

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).

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### **ИНТЕГРАЦИЯЛЫҚ ПРОЦЕССЕРДІ ДАМУ ШАРТТАРЫНДАҒЫ ҚАЗАҚСТАН ҚАРЖЫЛЫҚ САЯСАТЫНЫҢ СТРАТЕГИЯСЫ ЖӘНЕ ТЕХНИКАСЫ**

**Аннотация.** Мақалада Қазақстанның қаржылық саясатының стратегиясы мен тактикасы интеграциялық үрдістер тұрғысында талқыланады. ЕАЭО-ның бірыңғай қаржы нарығын құру үдерісінде, Одақ елдерінің интеграциясы күшейтіліп, тиімді қаржылық саясатқа үлкен көңіл бөлінеді, өйткені оның тиімділігі қаржы секторында мемлекеттік заңнамаларды үйлестіру үдерісін аяқтауға, сондай-ақ осы интеграциялық бірлестіктің қатысушыларының ұлттық экономикаларын тиімді дамытуды қамтамасыз етуге байланысты.

**Түйін сөздер:** Еуразиялық экономикалық одақ, қаржы саясаты, ЕАЭО.

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## СТРАТЕГИЯ И ТАКТИКА ФИНАНСОВОЙ ПОЛИТИКИ КАЗАХСТАНА В УСЛОВИЯХ РАЗВИТИЯ ИНТЕГРАЦИОННЫХ ПРОЦЕССОВ

**Аннотация.** В статье рассматривается стратегия и тактика финансовой политики Казахстана в условиях интеграционных процессов. В процессе создания единого финансового рынка ЕАЭС при условии усиления интеграционного взаимодействия стран Союза вопросам эффективной финансовой политики уделяется большое внимание, поскольку от ее эффективности зависит завершение процесса гармонизации законодательств государств в финансовой сфере, а также обеспечение эффективного развития национальных экономик участников данного интеграционного объединения.

**Ключевые слова:** Евразийский экономический союз, финансовая политика, ЕАЭС.

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### REFERENCES

- [1] Eskaraev O. State regulation of the market in the Republic of Kazakhstan // International Economic Forum. 2017. P. 23-30.
- [2] Kulakova E.V. Opportunities and prospects for the integration of the EAEU in the financial sector // World Economy. 2017. N 2. P. 38-45.
- [3] Kovalevich D.V. Development of the financial policy of the EAEU countries in the context of deepening their integration interaction // Global Scientific Potential. 2018. N 8(89). P. 82-85.
- [4] EAEU: Socio-Economic Development of Regions // Bulletin on Current Trends in the World Economy [Electronic resource]. Access mode: <http://ac.gov.ru/files/publication/a/19016.pdf>
- [5] Government finance statistics of the Eurasian Economic Union. Electronic resource: [http://www.eurasiancommission.org/ru/act/integr\\_i\\_makroec/dep\\_stat/fin\\_stat/statistical\\_publications/Documents/finstat\\_1/finstat\\_1\\_2Q2018.pdf](http://www.eurasiancommission.org/ru/act/integr_i_makroec/dep_stat/fin_stat/statistical_publications/Documents/finstat_1/finstat_1_2Q2018.pdf)
- [6] Official website of the Eurasian Economic Commission. Electronic resource: <http://www.eurasiancommission.org/>
- [7] Data from the Ministry of Finance. Electronic resource: [www.minfin.gov.kz/](http://www.minfin.gov.kz/)
- [8] The trade partnership between Kazakhstan and the EEU in 2018 exceeded \$ 19 billion <https://www.zakon.kz/4964243-torgovoe-partnerstvo-mezhdu-kazahstanom.html>
- [9] Treaty on the Eurasian Economic Union (Signed in Astana on 05.29.2014) (as amended on 03/15/2018). Electronic resource: [http://www.consultant.ru/document/cons\\_doc\\_LAW\\_163855/](http://www.consultant.ru/document/cons_doc_LAW_163855/)
- [10] Dyusegaliev. M.Zh., Sabirov R.K., Zinullina A.I., Kenzheshev A.A. State budget of the Republic of Kazakhstan // Reports of NAS RK. 2019. N 1. P. 99-104.
- [11] Usipbekov A.A., Alibekova A.B., Doskaliyeva B.B., Alibekova A.B. The current state of the financial market of Kazakhstan // Reports of the National academy of sciences of the Republic of Kazakhstan. 2019. N 1. P. 175-179. <https://doi.org/10.32014/2019.2518-1483.29>
- [12] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494.4(380). P. 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [13] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S., Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. (2019). Foresight and the role of innovation in the development of education // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494.4(380). 93-101. <https://doi.org/10.32014/2019.2518-1467.96>



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UNDER DIGITIZATION PROCESS:  
EXPERIENCE OF RUSSIA AND KAZAKHSTAN**

**Abstract.** The goal of the research is comparative analysis of approaches to regulatory impact assessment institute development under the digitization process in the largest post-Soviet countries – Russia and Kazakhstan, characteristics of digital technologies influence on the institute development in the countries of analyzed integrity.

The research was conducted using general scientific and special methods. The general scientific of comparative and evolution-genetic investigations were used for cross-national comparison of processes on implanting new governmental institutes in historical retrospective. The specialized methods of institutional and constitutional theory allowed analyzing the mutual influence of legislative and economic factors at making the governmental decisions in the field of digitization of regulatory policy within the settled national systems of public administration.

The digitization priorities of the public administration system in Russia and Kazakhstan and settled vision of the regulatory impact assessment institute modification under new conditions were characterized. The common and specific features in approaches implemented by these countries to assessment institute digitization were revealed. The functions, structure and content of the official Internet portals used for arrangement of rule-making process were compared as well as organizational ways of acquisition and collection of information characterizing the activity in the field of regulatory impact assessment.

The results of the research can be used by the national authorities of Russia and Kazakhstan, supranational structures of the Eurasian Economic Union to justify the most effective ways of digitization of the regulatory impact assessment institute, by specialists in the field of comparative investigations to broaden the perception on developing new institutes of public administration under digitization process. By the research results the prospective digitization development trends for the regulatory impact assessment institute were suggested for the analyzing countries.

**Key words:** regulatory impact assessment institute, digitization, governmental regulatory policy, comparative investigations.

**Introduction.** At the present moment, Russia and Kazakhstan are conducting a large-scale modernization of methods, mechanisms and technologies of the governmental social and economic policy. One of the key trends of the implemented modernization is digitization of the public administration system. The digitization favors broadening of direct and feed-back links between the state and civil society, enhances to a qualitatively new level the analytical justification of made decisions, and encourages rationalization of activity of the whole state machinery. The adoption of digital technologies transforms the content and forms of implementation of the most functions of the contemporary state including the function of regulatory policy running.

In this regard, the comparative assessment of instruments and approaches of Russia and Kazakhstan to digitization in the field of regulatory impact assessment (hereinafter, RIA) is of high interest. The interest to this field is stipulated by its role in improving the transparency of the governmental regulation of economics, interaction of the state, business, and civil society. The first steps on adopting the RIA institute were made by Russia and Kazakhstan in late 90-s of the past century. However, it can be said for certain on the high role of this institute in limiting the excess regulation of economics in post-Soviet countries.

The facts mentioned above determined the topicality and practical significance of the conducted research. The goal of the research is comparison of approaches to development of the regulatory impact assessment institute in Russia and Kazakhstan under digitization process, revealing of common and specific problems, and justification of development prospects of this institute under new conditions for the analyzing countries. The selection of these countries is stipulated by its interest in upgrading the RIA institute under digitization process, high level of economic integration, necessity to search for mutually beneficial solutions on key positions of the state regulatory policy.

**Methodology and methods of research.** The methodology of the research is based on methods and approaches that conditionally can be divided into two groups. The first group is focused on works of authors analyzing the issues of establishing and development of the national RIA systems in individual post-Soviet countries. Kazakhstan researchers G.B. Kysykova, S. Akhmetzhanova, K. Kopeshova consider the organizational issues of scientific investigation of regulatory legal acts grafts [11] and problems of enhancing the quality of regulatory decisions [12]. The issues of Kazakhstan transition of scientific investigation of the analysis of regulatory impact are discussed in the paper by Ye.A. Kapoguzova, K.Zh. Alzhakhanova, Sh.A. Tleyubergenova [13].

The second group is focused on works in which the authors compare the researches of legal institutes in general, and particularly the regulatory impact assessment institute in neighboring and remote countries. The meaning of comparative-legislative method is not only in theoretical understanding of different legal phenomena, but solving of definite practical tasks set not only before specific national legal systems, but common to humanity tasks [6].

The issues of comparative-legal method of investigation were studied by several generations of scientists-legists. In Czarist-era in Russia the comparative-legal method and foreign legislation was studied by G.F. Shershenevich, P.G. Vinogradov, N.M. Korkunov. The significant contribution into the development of Russian comparative legislation was made by M.N. Marchenko, Yu.A. Tikhomirov, V.Ye. Chirkin and other. Among foreign scientists are R. Schlesinger, E. Rabel, R. David, K. Zweigert, H. Kotz and other. This category was considered especially actively under the integration processes resulted in adoption of law [8]. The feature of this method is that an investigation is conducted in parallel regarding different legislative regulators basing on distinct criteria, and then the conclusions on advantages and disadvantages of the compared systems are made.

The important for forming of comparative pattern of adoption and functioning of the regulatory impact assessment institute are the proceedings by Scott Jacobs [5], one of the leading world experts in the field of development of models of the national regulatory policy for developing and post-socialist countries, Katarína Staroňová, Jan Pavel & Katarína Krapež [9], Camilla Adelle, Sabine Weiland, Jan Dick, Diana González Olivo, Jens Marquardt, George Rots, Jost Wübbeke & Ingo Zasada [10]. For the analysis of the situation in post-Soviet countries the significant are the works by A.A. Voloshinskaya [11], I.D. Turgel and S.I. Veybert [12], A.Ye. Golodnikova and D.B. Tsygankova [13]. At this, regarding the post-Soviet countries, the authors underline that the issues of RIA institute adoption are of systematic character and cannot be explained by side-effects of establishment only.

Along with this, among the researches to date, there are almost no works on comparative analysis of experience on designing and adopting of RIA institute in individual post-Soviet countries participating actively in the processes of economic integration.

The comparison of digitization process of RIA institute in Russia and Kazakhstan was conducted by the following criteria:

1. The national priorities of digitization in the field of the public administration in whole, and assessment of regulatory impact in particular;
2. Functions and details of the Internet portals supporting the RIA procedures;
3. Forms and criteria of data aggregation characterizing the functioning of the RIA institute on the nationwide level.

At this, the digitization is considered by the authors as logical continuation of the process on computerization of the public administration system, and as a main trend in public administration development strategy [4]. The policy of computerization of activity of the public administration authorities is interpreted as extended use of computational technique, computers and information technologies to solve individual managerial tasks. Digitization is a process on forming of the integral technological surrounding

medium having analytical and forecasting functions and allowing a user to create for himself a friendly environment (technological, instrumental, methodical, documentary, partner, etc.) to solve new classes of tasks.

**Priorities of Russia and Kazakhstan in the field of digitization of the public administration system.** Considering the digitization as natural continuation of computerization processes of the public administration system, the starting point of the analysis can be the adoption of the nationwide national programs in the field of IT. In Russia, this is a national program “Information society (2011-2020)”, adopted decree of the RF Government dated October 20, 2010, #1815-p<sup>1</sup>. As a result of the program implementation the wide range of opportunities to use information and communication technologies for manufacture, scientific, educational, social goals available for any citizen despite its age, state of health, living region and any other characteristics should be created. The Program consisted of six subprograms including the subprogram “E-government and efficiency of the public administration”. The priorities of this subprogram, in authors’ opinion, correspond to the adopted definition of computerization. This, first of all, is development of information instruments of the national authorities activity administration and local authorities, and, second, development of online interaction with citizens, provision of online services. The goals of computerization in the field of regulatory policy and RIA are not definite.

New vision of modernization priorities of the public administration system is shown in the national Program “Digital economics of the Russian Federation”<sup>2</sup>. The Program passport includes six federal projects: “Legislative regulation of digital medium”, “Information infrastructure”, “Personnel for digital economics”, “Information security”, “Digital technologies” and “Digital public administration”. The Federal project “Digital public administration” in comparison to the program mentioned above is distinguished by high level of concretization. In particular, it stipulates the creation of the united national system of development and adoption of regulatory decisions in RF covering all legal subjects of legislative initiative by 2024.

One of the steps to create the conditions for transition to information society in Kazakhstan was the national Program “Information Kazakhstan – 2020” adopted in January 2013<sup>3</sup>. The national Program included the measures on improving the public administration, creating institutes of “open and mobile government” and was focused on implementation of the following tasks:

- Ensure the efficiency of the public administration system basing on the architecture approach;
- Ensure the accessibility of the information and communication infrastructure;
- Create the information medium for social-economic and cultural development of the society;
- Develop Kazakhstan information space.

For the years of the national Program implementation, Kazakhstan had a great progress on e-government creating that determined its high positions in ratings on e-government developing. According to the Global report on information technologies development, Kazakhstan was ranked 3 in the rating on electronic participation index. This indicator shows quality, relevance and application of the governmental web-sites to receive information, tools and services by citizens [14].

During the national Program implementation the transition stage of e-government development was finished; the citizens of the Republic have got an opportunity to pay state fees and dues, fixed penalties, and public utilities. For entrepreneurs, during the transition period, the system of electron state procurement was introduced; it allowed enhancing of transparency and openness of the conducted competitions and tenders.

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<sup>1</sup>The definition of “computerization” appeared for the first time in the Federal Law dated 20.02.1995, #24 “On information, computerization and protection of information”. According to this law the computerization is organizational social and economic, and research-technical process on creating appropriate conditions to satisfy informational demands and implementation of rights of human, national authorities, local authorities, organizations, public associations on the base of forming and application of information resources.

<sup>2</sup>Passport of the National Program was adopted by decision of the Russian Federation President Council on strategic development and national projects on December 24, 2018 (2018-2024). The passport was elaborated by the Ministry of Communication of Russia pursuant to the order of the RF President dated May 7, 2018, #204 “On National goals and strategic tasks of the Russian Federation development until 2024”.

<sup>3</sup>The National Program “Information Kazakhstan – 2020” adopted by the decree of the President of the Republic of Kazakhstan dated January 8, 2013, #464.

To automate the processes of licensing, approval documents and to ensure effective, transparent mechanism of the government and business interaction at receiving the approval documents, the information system “Governmental database “E-licensing” was introduced. From 2014, all types of licenses and approval documents are in electron form.

To increase the involvement of population, business, non-profit organizations and society in whole into adoption and implementation of the governmental decisions, the platform “Open government” was created; it consists of the following portals: open data, open LSI, open budgets, open dialogue, assessment of the state authorities activity effectiveness.

The Program became a kind of a basement for digital transformation of the country economics, favored the creation of “open government” institutes. At the present time, the Republic of Kazakhstan has adopted a national program “Digital Kazakhstan” (2018-2022)<sup>4</sup>. The Program includes five focus areas: “Digitization of economics branches”, “Transition to digital State”, “Implementation of digital Silk Road”, “Development of human capital”, and “Creation of innovative ecosystem”. The focus area “Transition to digital State” assumes not only the set of some new services, but conceptual transformation of the State functions into the infrastructure of rendering the services to population and business anticipating its demands. The concrete view of the regulatory policy under the digitization process is not shown in the subprogram. Among the factors favoring the digitization of rule-making process are the activities on developing the “Open government” principles. It stipulates the creation of service “Open regulatory legal acts” to publish the draft legislative acts and laws for its further public discussions.

**Official Internet-portals to publish draft legislative acts as an instrument of RIA digitization.** In 2012 the official Internet-portal [www.regulation.gov.ru](http://www.regulation.gov.ru) was run in Russia. It serves for publication of information on draft legislative acts prepared by the federal executive authorities and results of its public discussion. In Kazakhstan, the Internet-portal <https://legalacts.egov.kz/> “Open LSI” to publish draft legislative acts was run recently, in August 2018. The portal is designed to place the draft concepts of laws and draft legislative acts that do not have the restricted information access for public discussions by users.

The created portals are to solve the following tasks:

- Ensure the accessibility of legislative acts developed for users;
- Ensure of feedback with users (comments, voting);
- Ensure the formation of public view regarding the advancement of this or that innovation in the field of legislative acts;
- Ensure of final reporting for further analysis.

It should be noted that these portals in Russia and Kazakhstan concentrate information on draft legislative acts supporting the rule-making stage only. In Russia, the information on already adopted legislative acts of federal bodies of the State authorities and State authorities of RF constituent units is shown in portal <http://pravo.gov.ru/>. In Kazakhstan, the information on adopted legislative acts of central state authorities, and local representative bodies, local administration, mayors is shown in the portal <http://adilet.zan.kz/> (information and legal system “Adilet” of the Republican State Enterprise “Republican Centre of legal information of the Ministry of Justice of the Republic of Kazakhstan”). At the moment of the paper preparing the portal [www.regulation.gov.ru](http://www.regulation.gov.ru) contained more than 60 thousands draft legislative acts, in portal <https://legalacts.egov.kz/> - more than 32 thousands.

The official Internet portals of Russia and Kazakhstan supporting RIA strive to form intuitive interfaces allowing a user to participate in discussions of interesting for him drafts and structure and generalize information on the current stage of rule-making process. The portal [www.regulation.gov.ru](http://www.regulation.gov.ru) allows a user to search for individualized and general information on such criteria as LSI name, LSI developer, OKVED code, stage of LSI passing (notification, text, grade, finishing, adoption), LSI type, LSI status (elaboration, discussion, finishing, etc.). A range of parameters characterizing RIA, activity of portal users etc. is represented using visual instruments. The availability of services providing in interactive mode the intellectual support of decisions made by users should also be noted. And namely, the availability of a special function – calculator of standard business charges that can result in introducing of new legislative acts. For this purpose, the portal has a special section where acts developers enter necessary data and can calculate in advance the expenses caused by a draft document created by them.

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<sup>4</sup>The National Program “Digital Kazakhstan” adopted by the governmental decree of RK #827 dated 12.12.2017

The portal is improved regularly considering the change of requirements to RIA running on the one hand, and necessity to enhance the quality and accessibility of digital medium, on another hand. In this regard, among the parameters characterizing LSI to be discussed are such as “regionally important”, related to “control and supervision activity”. There is also the integrated opportunity for simultaneous running of independent anti-corruption expertise of draft LSI. If before, the calculator of standard expenses operated for bodies-developers only, now it is available for all users. A separate portal section is dedicated to assessment of actual impact of adopted LSI.

The information on RIA running in RF constituent units is not shown in federal Internet-portal. Every RF constituent unit creates a regional portal (portal requirements are fixed on federal level, all regional portals are similar in view of design and information content). The portal of RF constituent unit also has information on LSI of municipal formations passing RIA.

The criteria of search and generalization of the information in the portal <https://legalacts.egov.kz/> are similar to those used in the portal [www.regulation.gov.ru](http://www.regulation.gov.ru) (LSI developer, discussion stage, LSI type). However, there are some differences. First, availability of search not only by the key words, but by topic categories (at the moment there are 21 categories, for instance, Information technologies, Family, Education, Healthcare, Real Estate, Taxes and Finances). Second, inclusion of information on RIA running at sub-national level: by RK regions and by cities of republican subordination (Nur-Sultan, Almaty, Shymkent). Third, lack of services similar to the calculator of standard expenses. This Internet-portal also does not have opportunities for simultaneous running of RIA and other types of expert assessments of LSI drafts (Kazakhstan, at the moment, has defined a notion and opportunities for scientific expertise running (legal, linguistic, ecological, economical and other) depending on legal relations regulated by a definite LSI<sup>5</sup>).

In Russia, along with the federal portal and regional portals supporting directly the RIA procedures implementation, the important is information and analytical portal [www.orv.gov.ru](http://www.orv.gov.ru). It contains the best practices in the field of RIA, opinions of experts on controversial issues of assessment development, informational and educational materials, monthly and annual reports of the Ministry of Economic Development on RIA implementing. This portal also has a special regional section dedicated to RIA running in the constituent units of the Russian Federation.

**Characteristics of the aggregated data characterizing the RIA institute functioning.** The nationwide official Internet-portals used today for the RIA implementation became an integral part of the rule-making process. However, the prospects of digitization process development are mostly determined by information streams arrangement, by the way the body-regulator aggregates data characterizing the functioning of RIA institute at different management levels. Here, two key formats of data aggregation can be marked. The first is submission of cumulative reports on RIA implementation. The Ministry of Economic Development of Russia publishes the report “Review of the Ministry of economic Development of Russia work in the field of regulatory impact assessment” from 2014. This report is published monthly and by annual results. Since 2017 the annual report “On development of the regulatory impact assessment institute at the Russian Federation constituent units and local administration authorities” has been published. In the Republic of Kazakhstan the system of activity monitoring in this field is still on the stage of its forming. It is worth to note the experience of inclusion of detailed sections on the RIA institute functioning into the “Annual report on the state of entrepreneur activity regulation in the Republic of Kazakhstan”. This practice is attractive as it allows considering the results of activity in the field of RIA not separately, but globally, in the frame of the national regulatory policy. The comparison of the national monitoring systems in Russia and Kazakhstan is shown in table 1.

In view of the nationwide monitoring structure, Russia and Kazakhstan accumulate the information on LSI types and RIA types; generalize information of activity of nationwide body-regulators, on RIA running at subnational level (regions, Federation constituent units). A specific feature of Kazakhstan is availability of confirmed on the governmental level and open for citizens form of report for regulatory body<sup>6</sup>. The comparison of the nationwide monitoring structure is shown in table 2.

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<sup>5</sup>The Law of the Republic of Kazakhstan dated April 6, 2016, #480-V “On legislative acts” (amended and revised as of 11.04.2019)

<sup>6</sup>The rules of elaboration and adoption of the annual report on regulating status of entrepreneur activity in the Republic of Kazakhstan. The decree adopted by Kazakhstan government on December 31, 2015, #1149.

Table 1 – The system of nationwide monitoring of RIA sphere

	Availability of nationwide monitoring system	Monitoring periodicity	Preparation of annual analytical report	Date of beginning	Accessability	Instrument of monitoring results informing
Russia	Yes	monthly	yes	2014	yes	National information portal
Kazakhstan	Under the forming stage	–	Yes	2016	Yes	The web-site of the Ministry of National Economics of RK does not have information on monitoring results

Table 2 – The nationwide monitoring structure of RIA sphere

	Nationwide regulatory bodies	Subnational level of management	Availability of adopted reporting form for regulatory body	Accessibility to regulatory body report	LSI Types	RIA types
Russia	Yes	RF constituent units	No	No	Yes	Yes (ex-ante and ex-post)
Kazakhstan	Yes	Regions, cities of republican subordination	Yes	Yes	Yes	Yes (ex-ante)

Second format is preparation of different ratings by national authorities and expert societies. In this regard, from 2014 the Ministry of Economic Development of Russia monitors the quality of regulatory impact assessment conducted by regions and the results of which are used to compile a rating of RF constituent units<sup>7</sup>. The effectiveness of RIA is a subindicator of the National rating of the investment climate state in the Federation constituent units published by the Agency of strategic initiatives<sup>8</sup>. The own approaches to RIA assessment quality in RF constituent units are proposed by the experts of RIA Centre of the High Economic School and the National Institute of systematic entrepreneurship problems investigation [5]. Kazakhstan experts are currently focused on elaborating the proposals on assessing the regulation policy of regulatory national authorities that could be a base for the nationwide rating of the regulatory bodies effectiveness.

**Conclusion.** Creation of digital interaction medium for the process of draft legislative acts elaboration will enhance the effectiveness of the rule-making process, ensure the capability of joint work over the documents, and transparency of these processes. However, within the frames of program governmental documents of Russia and Kazakhstan, the prospects and capabilities of RIA institute digitization are shown in simplified form, without justification of goals and mechanisms of its achievement.

1. The important step in creating the advanced digital interaction medium of RIA participants is introduction of official Internet-portals supporting the procedures of assessment and regulatory impact and actual impact, and providing the opportunity to everybody to take part in assessment procedure without special knowledge or position. These kinds of portals were created and operate actively in Russia and Kazakhstan. The improvement of these portals operation is reasonable to be conducted by three directions: extend the interactive services application; integration within the united RIA platform conducted on the nationwide and subnational levels; integration of different types of expertise of draft legislative acts within the united platform.

2. During RIA running the set of different indicators allowing assessing quantitative and qualitative characteristics of the rule-making process on the nationwide and subnational levels, and regarding individual regulatory bodies, LSI types etc. is aggregated. The criteria and forms of data aggregation will be determined by fixed ideas on effectiveness of public administration, maturity of the RIA institute, activity

<sup>7</sup> Techniques of forming a rating of regulatory impact assessment and expertise in RF constituent units dated October 26, 2016, #16130 CSH/D2bvn)

<sup>8</sup> The national rating of the investment climate in RF constituent units in 2017 [electron resource]. URL: <https://asi.ru/investclimate/rating/> (address date: 21.04.2019)

of business and civil society. And if in Russia the practice of RIA quality assessment is connected, first of all, with assessment of the Federation constituent units activity, in Kazakhstan the focus is on the assessment of regulatory bodies' effectiveness.

3. The efficiency of the RIA digitization improvement will be favored by active borrowing of the best managing practices. In this regard, it is worth to mention Kazakhstan experience on integrating the RIA priorities and common strategic view of the national regulatory policy development. In particular, the implementation of this conceptual approach allows for complex assessment of the regulatory bodies activity, consider the assessment of regulatory impact of LSI drafts as united management cycle the effectiveness of which is estimated considering the actual impact on business.

4. In the longer term, Russia and Kazakhstan need to elaborate the technical contours and implement technical design of the platform ensuring intellectual support of regulatory decisions and allowing transforming the rule-making activity to digital format using the advanced information exchange technologies.

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### **ЦИФРОВИЗАЦИЯ ШАРТТАРЫНДАҒЫ РЕТТЕУШІЛІК ЫҚПАЛДЫ БАҒАЛАУ ИНСТИТУТЫН ДАМУ: РЕСЕЙ ЖӘНЕ ҚАЗАҚСТАННЫҢ ТӘЖІРИБЕСІ**

**Аннотация.** Зерттеу мақсаты кеңестен кейінгі аумақтағы ірі мемлекеттер – Ресей және Қазақстандағы цифрландыру шарттарында реттеушілік ықпал ету институтын дамыту тәсілдерін салыстырмалы талдау болып табылады.

Зерттеу барысында жалпығылыми және арнайы әдістер қолданылған. Салыстырмалы және эволюциялық-генетикалық зерттеулердің жалпығылыми әдістері жаңа мемлекеттік институттардың имплантациялану процестерін тарихи ретроспективада кросс-ұлттық салыстыру жүргізу үшін қолданылған. Институционалдық және конституционалдық теорияның арнайы әдістерін қолдану мемлекеттік басқарудың қалыптасқан ұлттық жүйелері аясында реттеушілік саясатты цифрландыру саласындағы мемлекеттік шешімдер қабылдау кезіндегі құқықтық және экономикалық факторлардың өзара ықпалын талдауға мүмкіндік берді. Ресей мен Қазақстандағы мемлекеттік басқару жүйесін цифрландырудың басым бағыттары анықталып, жаңа шарттардағы реттеушілік ықпал етуді бағалау институтын модификациялаудың қалыптасқан көрінісі сипатталған. Осы елдер іске асыратын бағалау институтын цифровизациялау тәсілдерінің ортақ тұстары мен ерекшеліктері бөліп көрсетілген. Реттеушілік ықпал етуді бағалау саласында нормалар жасау процесін ұйымдастыруда, ақпаратты жинақтау және агрегациялау сызбаларын жасауда қолданылатын ресми интернет-порталдардың функциялары, құрылымы және контенттері салыстырылған.

Зерттеу нәтижелерін реттеушілік ықпал етуді бағалау институтын цифровизациялаудың анағұрлым тиімді жолдарын негіздеу үшін Ресей және Қазақстанның мемлекеттік билік органдары, Еуразиялық экономикалық одақтың ұлттық құрылымдары, цифровизациялау шарттарындағы мемлекеттік басқарудың жаңа институттарын дамыту туралы тұжырымдарды кеңейту үшін компаративтік зерттеулер саласындағы мамандар қолдана алады. Зерттеу нәтижелері бойынша талданған мемлекеттердегі реттеушілік ықпал етуді бағалау институтын цифровизациялауды дамытудың басым бағыттары ұсынылған.

**Түйін сөздер:** реттеушілік ықпал ету институты, цифрлеу, мемлекеттік реттеушілік саясат, салыстырмалы зерттеулер.

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### **РАЗВИТИЕ ИНСТИТУТА ОЦЕНКИ РЕГУЛИРУЮЩЕГО ВОЗДЕЙСТВИЯ В УСЛОВИЯХ ЦИФРОВИЗАЦИИ: ОПЫТ РОССИИ И КАЗАХСТАНА**

**Аннотация.** Целью исследования является сравнительный анализ подходов развитию института оценки регулирующего воздействия в условиях цифровизации в крупнейших странах постсоветского пространства – России и Казахстане, характеристика влияния цифровых технологий на развитие данного института в странах анализируемой совокупности.

Исследование проведено с использованием как общенаучных, так и специализированных методов. Общенаучные методы сравнительных и эволюционно-генетических исследований использованы для проведения кросс-национальных сравнений процессов имплантации новых государственных институтов в исторической ретроспективе. Специализированные методы институциональной и конституциональной теории позволили проанализировать взаимное влияние правовых и экономических факторов при принятии государственных решений в сфере цифровизации регуляторной политики в рамках сложившихся национальных систем государственного управления.

Охарактеризованы приоритеты цифровизации системы государственного управления в России и Казахстане и сложившееся видение модификации института оценки регулирующего воздействия в новых условиях. Выявлено общее и особенное в реализуемых данными странами подходах к цифровизации института оценки. Проведено сравнение функций, структура и контента официальных интернет порталов, используемых для организации процесса нормотворчества, организационных схем сбора и агрегирования информации, характеризующей деятельность в сфере оценки регулирующего воздействия.

Результаты исследования могут быть использованы органами государственной власти России и Казахстана, наднациональными структурами Евразийского экономического союза для обоснования наиболее эффективных путей цифровизации института оценки регулирующего воздействия, специалистами в сфере компаративных исследований для расширения представлений о развитии новых институтов государственного управления в условиях цифровизации. По итогам исследования предложены перспективные направления развития цифровизации института оценки регулирующего воздействия в анализируемых странах.

**Ключевые слова:** институт оценки регулирующего воздействия, оцифровка, государственная регуляторная политика, сравнительные исследования.

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#### **REFERENCES**

- [1] Turgel I.D., Veybert S.I. (2015). The Institute of regulatory impact assessment in CIS countries: integrated analysis. Yekaterinburg: Ural Institute – branch of RANEPa.
- [2] Turgel I.D., Panzabekova A.Zh. (2018). Regulatory impact assessment in post-Soviet countries: results, problems, prospects. *Management sciences*, (2).
- [3] Turgel I., Panzabekova A., Satpayeva Z. (2018). Comparative analysis of approaches to designing of regulatory impact assessment institute in Russia, Kazakhstan, and Kyrgyzstan.
- [4] Khalin V.G., Chernova G.V. (2018). Digitization and its impact of Russian economics and society: advantages, challenges, threats and risks. *Management consulting*, (10 (118)).
- [5] Rakhmeyeva I.I. (2019). Economic efficiency of regulatory impact assessment in Russia regions. *Azimuth of scientific researches: economics and management*. Vol. 8, N 1(26). P. 273-278.
- [6] Tikhomirov Yu.A. Comparative science of law: development of concepts and social practice // *Journal of Russian law*. 2006. N 6. P. 3-15.
- [7] Chirkin V.Ye. Contemporary federalism: comparative analysis. Moscow: INION RAS Publishing, 1995. 72 p.
- [8] Bekhruz Kh. Comparative science of law. Moscow, 2008. P. 7.
- [9] Katarina Staroňová, Jan Pavel, Katarina Krapež (2012) Piloting regulatory impact assessment: a comparative analysis of the Czech Republic, Slovakia and Slovenia // *Impact Assessment and Project Appraisal*, 25:4, 271-280. DOI: 10.3152/146155107X246314
- [10] Camilla Adelle, Sabine Weiland, Jan Dick, Diana González Olivo, Jens Marquardt, George Rots, Jost Wübbeke, Ingo Zasada (2015) Regulatory impact assessment: a survey of selected developing and emerging economies // *Public Money & Management*. 36:2, 89-96, DOI: 10.1080/09540962.2016.1118930
- [11] Voloshinskaya A.A. Assessment of regulatory impact in Russia and the world: one similarity and seven differences // *Public administration. Electron proceedings*. 2015. N 49. P. 52-74.
- [12] Turgel I.D., Veybert S.I. Institute of regulatory impact assessment in post-Soviet countries: establishment problems and prospects of development // *National interests: priorities and security*. 2015. N 37(322). P. 2-11.
- [13] Golodnikova A.Ye., Tsygankov D.B. "Targeting" of regulatory impact assessment: international approaches and Russian practice // *Issue of governmental and municipal management*. 2015. N 4. P. 7-40.
- [14] Alibekova G., Bapiyeva M. (2019) Digitalization processes and their impact on the development of the Republic of Kazakhstan // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. Vol. 4, N 380. DOI: 10.32014/2019.2518-1467.113



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**ABOUT SOME SIDES OF DIPLOMACY  
AND POLITICAL COOPERATION OF KAZAKHSTAN  
WITH THE COUNTRIES OF THE MIDDLE EAST**

**Abstract.** The general characteristic of diplomatic and political cooperation of the Republic of Kazakhstan with the countries of the Middle East is presented in this article. At the present stage the countries of the Middle East have powerful political, business and intellectual potential. In the international system of energy balance of the countries of this region hold a specific place, that allowed them to create the largest financial and economic centers, rendering on geopolitical alignment of forces in the modern world considerable influence. From the moment of independence the Republic of Kazakhstan tried to establish friendship with the countries of the Middle East, showed the intentions to the closest interaction. Kazakhstan defined them as the perspective partners in the economic, political and cultural relations have all necessary prerequisites and conditions for mutual understanding and cooperation. Signing by Astana and Ankara of a package of important interstate agreements contributed to the forward development both diplomatic contacts between two countries, trade and economic relations, including the summits of the Turkic-speaking states. Dynamically developing bilateral relations of Kazakhstan and Turkey found the reflection in joint actions for implementation of the Baku-Tbilisi-Ceyhan project.

**Keywords:** diplomacy, diplomatic relations, cooperation, trade, humanitarian contracts, international organizations, peace process, legal bases, bilateral relations, long-term cooperation.

Arab countries are considered by Kazakhstan as a basic part of its strategy to boost cooperation and interaction with Islamic world. Arab world is one of the very important players in the global policy. Arab world has big potential to impact or even change the balance of international powers in the future. First of all, as the most sensitive region in the world, Middle East has major influence on the global security system. Arab world has balanced and equal relations with the US, Russia, Europe and China. Arab countries have important place in the world economy. Though, they are not considered something whole and integrated, anyway, with vast energy resources, Arab states still conserve their strategic role in the energy security of global economy. Arab states are also can be seen as a biggest market of investments for Western companies and, vice versa as biggest investors for US and EU economies. Oil-rich Arab states are main consumer of technologies from developed countries. It is obvious that Arab nations have quite strong impact on cultural and civilizational impact on other Muslim nations.

When Kazakhstan has declared its independence, Arab counties totally supported its actions and initiatives in the foreign policy. According to the former Ambassador of Kazakhstan to Saudi Arabia Bagdad Amreyev, interaction with Arab states helps Kazakhstan to diversify its integration into the world community, to balance its foreign policy, to strengthen its position in the international issues, to attract some investments and funds, to reanimate its once-interrupted cultural ties, to have the support from Arab states in its international projects and initiatives and so on [1, p. 7]. And the most important thing is that Kazakh people have been always spiritually oriented to the South Muslim and Arab nations as an integral part of this great civilization. Muslim identity of Central Asian states makes this region an inseparable part of the Ummah.

As for now, Kazakhstan has good image owing its last chairmanship in the OSCE and OIC in the whole Arab world. Kazakhstan was given a chance to chair at the OIC to be closer integrated with the OIC member-states. The majority of Arab countries perceive Kazakhstan positively given its international reputation and pro-active foreign policy. Kazakhstan is seen by Arab experts as a dynamically developing state in Central Asian region. Arab counties support the initiatives of Kazakhstan in nuclear disarmament and non-proliferation of mass destructive armaments. Arab media highly estimates the economic, political and social developments being realized in Kazakhstan and do not criticize its domestic or foreign policies at all.

Arab experts also notice the growing importance of the region in the international policy. Nevertheless, they state that once forgotten Big Game between the global superpowers in the region has started to take place once again. Arab experts express some anxiety and worry about the weak role that Arab Countries play in the Central Asia. In this context, the only consolation for Arabs remains the Muslim identity of Central Asian nations. According to Tayzhan Bolathan, "Central Asia has to be regarded as continuation of Middle East in geopolitical and civilizational senses. As the expert concludes, Central Asian nations are closer historic relatives of Middle Eastern ones. Hesays that Central Asian countries have more in common with Middle Eastern Arab countries. Both regions has rich natural resources, they are important geopolitical spot, where the interests of global superpowers focused on with closely existed military bases, political elites of both regions still afraid of radical political changes, including possible shift of power, increasing Islamism and people protests" [2, p. 11].

Position of Arab countries in regard with Central Asia can be considered as a modest one. According to above mentioned expert, in the early period of their independency, Central Asian states needed more financial and political support from Arab world. "How could the leaders of Arab world manage to miss the opportunity of cooperation with this fertile and favorable region? Perhaps, Arabs did not yet realize the importance of Central Asiaacknowledges the expert". This can be explained by the domestic problems of Arab region by itself, lack of economic interest in Central Asian markets, closeness of some Central Asian states and limited geo-economic and political resources. But, this does not mean that Arab countries have no room in the foreign policy of the region. Some visible investments for infrastructure projects came from the Gulf Arab states like Saudi Arabia, United Arab Emirates.

There were strong political and cultural relations between Kazakhstan and Egypt before the so-called Arab Spring. Before the global economic crisis very important documents were singed between Kazakhstan and the Gulf Arab states concerning the future economic projects with more than \$ 30 billion. But, they were just expression of intention by Arab investors than their real and final decisions. For example, some Kazakh experts say that in the Western Kazakhstan Arab investors will invest the building of "new satellite-city" of Aktau, and the first energy hub in the Caspian region, development of new touristic zone Kenderli near the Caspian Sea. Financial crisis somehow affected investors from abroad who initially carried big economic ideas regarding development of new projects in Kazakhstan. But, having big financial opportunities Arab investment funds and companies still seek for the new favorable markets to invest. Arab businessmen have already been investing in construction, hotel business, technologies, banking and communications. It is also important for them to diversify their foreign economic relations [3, p. 58].

Kazakhstan's foreign policy towards Arab counties based on the ideas of prudence, benefits, building and cooperation. As for real policy, Kazakhstan actually seeks for Arab capital flows to be injected into its domestic economy, it need new financial resources and extra credit funds to support its own development. Kazakhstan signed up an agreement with the IDB Bank and approximately \$ 1.5 billion investments will be injected into Kazakh economy in the nearest future. Strategic Partnership Program was signed with IDB Islamic financial institutions and banks like al-Hilal have been successfully working in Kazakhstan. Later there has been declared that Kazakhstani National Bank will introduce principles of Islamic financing, and thus, will attract new credits from Arab financial markets.

In this paper we have studied three Arab countries which include Egypt, Saudi Arabia and UAE's strategies in Central Asia, and especially in the Republic of Kazakhstan.

Egypt as a leading and central country of Middle East and Arab world paid special attention to Central Asia, accurately observing all the development in the region. Egypt as a heavyweight of Arab world must be focused on. Egypt is an intellectual and political leader among all the Arab states. Egypt

once was political and economic partner of the former Soviet Union. As former ambassador of Kazakhstan to Egypt Bolatkhan Tayzhan said, Egypt's political strategy towards Central Asia shows that this region shares the same cultural and geo-economic zone, thus, both the regions can be symbolically considered in the entire geo-political framework. According to the Egyptian experts, Egypt as a rival of Iran, Turkey and Israel, is urged to implement its strategies in Central Asia by the means of cultural and religious tools, spreading the basic component of Islam - Arabic language.

Egypt has always major impact on the Middle Eastern issues including the Arab-Israel conflict. Neither global nor regional issues of Arab counties could be solved without Egypt's standard. In this context, Egypt had initially considered Central Asian states as possible supporters of its Palestine policy, thus, it would strengthen strategic power of Muslim community on the one hand, and insure mutual rapprochement of the two regions on the other. Both regions have significant labor forces, sufficient natural resources, industrial possibilities, some experience in market economy and so on [4].

Egypt has been making an effort to shape the Middle East region free from nuclear power and supports Kazakhstan's CICA initiatives. The common cultural features of Middle Eastern and Central Asian nations are predominated in their relations over their economic cooperation. Egypt needed new energy and fuel resources, new markets for its products and goods. For this purpose, it wanted to take advantage of its newly shaping relations with the Central Asian states. For Kazakhstan Egypt was an open window into the Arab world. Egyptian strategists understand the possible importance of the Great Silk Road project that would in the future connect together the Europe and Asia, thus, the transit role of Central Asia will might only strengthen. In this possible case, Egypt would be ready for international competition for access to these markets. Egypt's strategy is to be a leader among Arab counties in Central Asia [5].

Kazakhstan respects Egypt's leading historic role and its policies in Middle East peaceful regulations processes. Kazakhstan and Egypt are the main countries of their regions. Kazakhstan's exports to Egypt include industrial commodities, agricultural goods, natural resources etc. Egypt's exports to Kazakhstan comprise citrus goods, pharmaceuticals, leather, and furniture, etc. All the Middle East Arab countries need grain and meat. Kazakhstan could work in this direction. There are new opportunities in economy, commerce, tourism, energy. The main problem is a lack of information between the business circles of two countries. There are only 11 companies with Egyptian capital work in Kazakhstan. Iran, Turkey and Israel's cooperation with Kazakhstan in energy, transportation, technologies, military, industry sectors urges Egypt to develop its relations with the region. There are certain interests of Kazakhstan in the Arab world, yet they were not clearly formulated. The mutual relationship of the two regional powers meets long-term interests of Muslim community. But, unfortunately, the two states did not use all the existing possibilities. Two countries could cooperate together in the sphere of nuclear disarmament.

Achievements in education and culture are the good example of mutual relations between Kazakhstan and Egypt. The countries have much in common in terms of history, religion and culture. Egyptian cultural center and Kazakh-Egyptian University of Islamic Culture are real results of common works in this direction. Especially, this university became one of the respectable spiritual and religious centers in Kazakhstan. There is a big importance for Kazakhstan to further develop its relations with Egypt. Egypt could help and support Kazakhstan in its political initiatives and attempts to build closer relations with other Arab countries [6, p. 68].

Saudi Arabia is the most important oil-rich state with the big symbolic impact on the Muslim countries. It implements active Islamic policies, finances, different religious programs. Saudi Arabia is one of the key pragmatist and conservative political and economic players in the international and regional policies. Majority of the Central Asian states define Saudi Arabia as not only the biggest oil-exporter, but, also as financially rich state that could help them. There is certain intention of this country to strengthen its positions in the region, lack of real economic interests from the Saudi Arabia and closeness of both Middle East and Central Asia except Kazakhstan makes this purposes limited. Saudi investors has sponsored many infrastructural projects in Kazakhstan, including construction of the building of Kazakh Parliament (\$10 million), Cardiologic center in Almaty (\$5 million), construction of Cardiologic center in Astana (\$8 million), aid for military school Jas Otan (\$1 million).

The biggest Saudi Arabian companies that work in Kazakhstan are as follows: Zameel Construction Company, Gulf Star oil fields Development Company, Taib Bank, Lariba Bank. Gulf States like Saudi Arabia, Kuwait, Qatar, Bahrain, and Oman have sponsored construction of official state buildings,

mosques, hospitals and medical centers. Saudi Arabian Development Fund could play an important role in the economic issues. This fund issued grants and credits for realization of many projects in Kazakhstan regions. Especially, financial aids were injected into development of underground communications and municipality projects. Saudi Arabian government and private business have big interests in agriculture and cattle-breeding sectors of Kazakhstan. Kazakh investors are interested in tourism and hotel business in Saudi Arabia [7]. The main problems are that foreign policy of Kingdom is not that active as was the case in the early 90's; there are some controversies between the ruling dynasty and elites, inwardness in terms of domestic issues. Kazakhstan could create extra routes to export its raw materials and minerals to the Middle East. There are many Arab investors, who appraise the real investment possibilities in Kazakhstan like Kingdom Holding from Saudi Arabia.

As for the United Arab Emirates, there has been made very important steps to boost cooperation between Kazakhstan and UAE in the last ten years. In fact, the UAE officials consider Kazakhstan as one of the most important countries in the Central Asian region. The UAE gives all keenness to support the bilateral relations in all fields of cooperation as per the directives of the two countries to strengthen the pillars of the partnership. There is also a great desire to support this relationship in the future in the international cooperation in the framework of political, economic, commercial, investment and humanitarian partnership. There is also one similar point of view between the two countries, regarding all issues at the international level as well as their policies in a lot of regional and international levels, which provide a strong partnership as the United Arab Emirates participates in the number of international activities and conferences in Kazakhstan. As Arab media appraises, Kazakhstan is a favorable region with high economic potential. Arab businessmen can make significant progress in oil, gas and food industry, construction materials, equipment, pharmaceuticals, agriculture in Kazakhstan. Especially, partnership in UAE investments is a priority in mutual relations. Nowadays, some big investment projects in oil and gas and mortgage sector are being implemented [5].

It is well-known, that one of the favorite UAE-financed projects is the construction of the biggest and unique building of Abu Dhabi Plaza multifunctional complex in Astana. This building will be the highest one in Central Asia and 14-th in the world. The launch in Abu Dhabi Plaza is a real contribution to the development of Astana. There are several major projects under the process in the oil and gas sphere, as well as in the banking sector. For example, JSC KazMunaiGaz and public joint-stock company Mubadala Development Company for exploration and development of the Caspian Offshore.

IDB and Asian Development Bank have created Islamic Infrastructure Fund named Al-Hilal Bank with the market capitalization of, at least, \$500 million. It is the first bank in Kazakhstan that works under Sharia principles and the only Islamic bank in the post-Soviet area. Al-Hilal Bank has the plans to invest \$250 million in Kazakhstan. Corporative sectors, industry and minerals extraction has given a priority. Al-Hilal Bank has intended to invest \$1 billion in Kazakhstan.

The joint Kazakhstan-UAE Investment Fund "Al-Falah" with a registered capital of \$500 million also actively works in the market of our Republic and neighboring countries. Approximately 10000 Kazakhstan citizens are now the residents of the UAE. Most of them are working on contract in Dubai and the Northern Emirates, particularly in the trade sector and private business. UAE Etihad Airways Company has launched direct flights between Abu Dhabi, Astana and Almaty. The number of UAE companies, have registered in Kazakhstan, is 50. These firms work in the spheres of tourism, transportations, and services. Especially, UAE-located PD World Transportations Company has serious plans to enter the Kazakhstani market.

As for marketing researches, UAE-located PD World Transportations Company has serious plans to enter the Kazakhstan market. Representatives of Crown Middle East Fuel and Products (UAE, Dubai) have been conducting marketing researches and studying existing opportunities in Southern Kazakhstan's agriculture, especially, in cattle-breeding sector. Kazakh-Arab Fund of Direct Investments with the name of Falah Growth Fund finances launch of poultry farming in Almaty region. There are some investment agreements signed up with Gulf Finance House Investment Company from Bahrain, Ithamar Bank, International Oil-and-Gas Investment Companies from UAE.

In the late of 2000's the idea of construction of energy hub in Western Kazakhstan was supported by Arab companies like PFC Energy International and Gulf Finance House. It is supposed that it may be complex of scientific and industrial facilities, services and transports regional hub. International Petroleum

Investment Company (IPIC) had some plans to cooperate with Kazakhstan in gas and chemical industry. Alnair Capital Holding and Emirates Islamic Bank had some experience in working with Kazakhstani banking sectors [6, p. 70].

The Kingdom of Saudi Arabia takes an important place on the regional and world scene. The Kingdom of Saudi Arabia is one of the largest and richest states of the Middle East, one of the most influential states of the region. It is necessary to add that the Kingdom is the spiritual center of all Muslim worlds. The Kingdom of Saudi Arabia (KSA) was among the first Arab and Muslim countries, which recognized independence of Kazakhstan in December 30, 1991. The Protocol on establishment of official diplomatic relations between two states was signed on April 30, 1994 during the visit of the Minister of Foreign Affairs of Kazakhstan to the Kingdom of Saudi Arabia. During this visit were discussed the questions of bilateral relations strengthening in all areas of partnership. Work on preparation of the First President Elbasy Nursultan Nazarbayev's official visit to the Kingdom of Saudi Arabia, which took place in September, 1994 was also carried out. Visit of the President of Kazakhstan to the Kingdom of Saudi Arabia marked the beginning of an important stage of bilateral relations development and their advance forward. New important turn in development of the relations between our countries was visit to Kazakhstan of His Royal Highness of the Crown Prince Sultan bin Abdel Aziz, the Deputy prime minister of Saudi Arabia, the Minister of Defense and aircraft (at that time the Second Deputy prime minister), the General Inspector of the Kingdom. This visit took place in 2000. During the visit the strong foundation for political dialogue between two countries and cooperation in the most various areas was laid.

Position of both sides, concerning the activity in Islam, was reflected. Prospects of further cooperation between two countries, ways of strengthening of this mutually beneficial cooperation in all spheres were planned. Ministers of both countries received direct instructions to take all necessary measures for implementation of the arrangements, containing in the documents, signed between two states. The most important among them is the document, signed in the sphere of trade, providing increase of annual barter level that would correspond to the mutual importance of states and their economic weight.

Other important result of this visit were the trips of the Saudi businessmen to Kazakhstan with the purpose to examine directly opportunities of our country and search the ways for investment, and also discussion of those privileges, which the Kazakhstan government gives to the Saudi investors. There was an idea of creation joint companies, in which would work the businesspersons from both countries.

Main purpose was to provide exhaustive information on the companies and the organizations, expressing desire to take part in trade and economic cooperation between two countries. Special emphasis was put on companies' activity, strengthening in the sphere of oil production, power, petrochemical industry, as both countries have a wide experience of activity in these areas. Saudi Arabia is one of the most important producers of oil in the world. In the Kingdom of Saudi Arabia serious development was gained by the petrochemical industry, front line not only on regional, but also at world level. KSA is the founder member of the Organization of exporters of oil (OPEC). Kazakhstan also has considerable reserves of the oil developed by the petrochemical industry and educational institutions preparing shots of scientists and experts for this promising branch. That is why the President Nazarbayev met in the residence in the city of Riyadh with its Excellency the engineer Ali An-Nuaymi, the Oil Minister and mineral resources, and also held a meeting with the engineer Muhammad of Al-Mada, the head of the Saudi company «Sabik».

The Central Asian countries need finances for realization of big economic projects in energy and transportation. Saudi Arabia and Gulf States could support the region in the name of development their relations with Central Asia. They have sufficient financial resources to have more influence over the region. As for Egypt, it will develop its political strategy with some less important economic projects in the region.

Dubai, which should be regarded as a special partner in the sphere of foreign economic relations, considering the scale of its investment and financial potential in the UAE, may be of the greatest interest in the medium and long term for the creation of the House of Kazakhstan. Network of seven industrial zones, one Business Park, three special free economic zones and two world-class maritime ports effectively function in the Emirate. There are headquarters and representative offices of companies included in Global 2000. In addition, Dubai is actively preparing for the World Expo 2020, creating favorable conditions for attracting foreign direct investment [7]. These aspects will help to synchronize the issues of

building transport and logistics routes with the assistance of Kazakhstan's exporters in accessing the distribution channels in the target markets of the Middle East.

In the conclusion we would like to note, that the Republic of Kazakhstan and the United Arab Emirates (UAE) continue to build close and trusting relations within the framework of mutually-beneficial bilateral cooperation, the foundations of which were laid since Kazakhstan has gained independence. Undoubtedly, the dynamics of meetings at the highest level testifies to an unprecedented interaction from the perspective of international relations, in accordance to which the cooperation between Kazakhstan and the UAE is moving forward. Kazakhstan and the UAE effectively collaborate on multilateral platforms, including the United Nations (UN), Organization of Islamic Cooperation (OIC), Conference on Interaction and Confidence-Building Measures in Asia (CICA) and the number of other international organizations and closely coordinate their actions to resolve the pressing problems of the international agenda. This fact objectively reflects the growing political weight of our country among the Arab states of the region against the backdrop of Kazakhstan's active role as current non-permanent member of the UN Security Council in resolving complex international and regional issues, including the inter-Syrian negotiations in Astana, aimed at a peaceful settlement of the armed conflict in Syria and the stabilization of the situation in the region.

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#### **ҚАЗАҚСТАННЫҢ ОРТА ЖӘНЕ ТАЯУ ШЫҒЫС ЕЛДЕРІМЕН САЯСИ ҚАРЫМ-ҚАТЫНАСЫМЕН ДИПЛОМАТИЯСЫНЫҢ КЕЙБІР ҚЫРЛАРЫ ЖАЙЛЫ**

**Аннотация.** Мақалада Қазақстан Республикасының Орта және Таяу Шығыс елдерімен дипломатиялық және саяси ынтымақтастығына жалпы сипаттамасы берілген. Қазіргі кезеңде Орта және Таяу Шығыс қуатты елдерінің саяси, іскерлік және зияткерлік әлеуетке ие. Елдің халықаралық жүйесіндегі энергия теңдеуіші мүмкіндік берген осы аймақтың ірі орталықтары оларға елеулі ықпал ететін күштерді орналастыруды геосаясатқа арнаған қазіргі әлемдегі қаржы-экономикалық қатынаста алатын орны ерекше. Қазақстан тәуелсіздік алған кезінен бастап Орта және Таяу Шығыс елдерімен достық қарым-қатынас орнату ниетін көрсете отырып, өзіне тығыз өзара әрекет етуге тырысты. ҚР мен осы мемлекеттер арасындағы экономикалық, саяси және мәдени тұрғыдан көрініс тапты, себебі оларда Қазақстан болашағы зор әріптестерінің өзара түсіністік пен ынтымақтастық үшін шарттар осы өңірлердегі барлық қажетті алғышарттар қалыптасты. Осы елдер арасындағы дипломатиялық байланыстар мен сауда-экономикалық қатынастарды дамыту, сондай-ақ мемлекетаралық келісімдердің пакетін Астана мен осы мемлекеттер үлгі ретінде маңызды ықпал етті, оның ішінде саммиттер шеңберінде түркітілдес мемлекеттердің. Қазақстан мен осы мемлекеттер арасындағы қарым-қатынастар қарқынды дамып келе жатқан осы жобаны іске асыру жөніндегі бірлескен іс-қимыл Баку - Тбилиси - Жейхан өз көрінісін тапты.

**Түйін сөздер:** дипломатия, дипломатиялық қарым-қатынастар, ынтымақтастық, сауда, гуманитарлық келісім шарттар, халықаралық ұйымдар, бейбіт процесс, құқықтық негіз, екіжақты қатынас, көпмерзімді байланыстар.

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#### **О НЕКОТОРЫХ ГРАНЯХ ДИПЛОМАТИИ И ПОЛИТИЧЕСКОМ СОТРУДНИЧЕСТВЕ КАЗАХСТАНА СО СТРАНАМИ СРЕДНЕГО И БЛИЖНЕГО ВОСТОКА**

**Аннотация.** В статье представлена общая характеристика дипломатического и политического сотрудничества Республики Казахстан со странами Среднего и Ближнего Востока. На современном этапе страны Среднего и Ближнего Востока обладают мощным политическим, деловым и интеллектуальным потенциалом.

В международной системе энергобаланса страны этого региона занимают особое место, что позволило им создать крупнейшие финансово-экономические центры, оказывающие на геополитическую расстановку сил в современном мире значительное влияние. С момента обретения независимости Казахстан стремился установить со странами Среднего и Ближнего Востока дружественные отношения, демонстрируя намерения к самому тесному взаимодействию. Казахстан видит в них перспективных партнеров в экономическом, политическом и культурном плане, так как между РК и государствами данных регионов сформировались все необходимые предпосылки и условия для взаимопонимания и сотрудничества. Подписание Астаной и Анкарой пакета важных межгосударственных соглашений способствовало поступательному развитию как дипломатических контактов между двумя странами, так и торгово-экономических отношений, в том числе и в рамках саммитов тюркоязычных государств. Динамично развивающиеся двусторонние отношения Казахстана и Турции нашли свое отражение в совместных действиях по реализации проекта Баку – Тбилиси – Джейхан.

**Ключевые слова:** дипломатия, дипломатические отношения, сотрудничество, торговля, гуманитарные контракты, международные организации, мирный процесс, правовые основы, двусторонние отношения, долгосрочное сотрудничество.

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#### REFERENCES

- [1] Amreyev Bagdat. Kazakhstan and Saudi Arabiya. M., 2015. <http://dx.doi.org/10.18411/a-2018-008> (in Rus.).
- [2] Tayzhan Bolathan. Elshikundeliginen. 2016. <http://doi.org/10.17803/2311-5998.2017.32.4.081-090> (in Rus.).
- [3] Kazakhstan Today: monograph / Edited by K. Sultanov. Almaty: The Kazakhstan Institute for Strategic Studies under the President of the Republic of Kazakhstan, 2017. <http://doi.org/10.24411/2078-5356-2018-10004> (in Rus.).
- [4] Potential fields of cooperation of Kazakhstan and Saudi Arabia have been identified // <http://www.kaznexinvest.kz/en/press-center/releases/6077/> – 18 May, 2015 [http://doi.org/10.18611/2221-3279-2013-4-2-\(12\)-82-86](http://doi.org/10.18611/2221-3279-2013-4-2-(12)-82-86) (in Rus.).
- [5] Reference about cooperation between the Republic of Kazakhstan and Saudi Arabia (2015, August) // [http:// dep-econom.mid.gov.kz/ru/pages/spravka-o-sotrudnichestve-mezhdu-respublikoy-kazahstan-i-korolevstvom-saudovskaya-araviya-2015https://doi.org/10.32014/2018.2518-1467](http://dep-econom.mid.gov.kz/ru/pages/spravka-o-sotrudnichestve-mezhdu-respublikoy-kazahstan-i-korolevstvom-saudovskaya-araviya-2015https://doi.org/10.32014/2018.2518-1467) (in Rus.).
- [6] Ayupova Z.K., Kussainov D.U., Bekbergenova A.K., Winston Nagan. Major Ideas and Main Values of the Universal Un Declaration on Human Rights: the 70-years' Experience // Bulletin of the academy of sciences of the Republic of Kazakhstan. 2019. Vol. 1. P. 68-74. <https://doi.org/10.32014/2019.2518-1467.8> (in Eng.).
- [7] Saudi Arabia and Kazakhstan: peculiarities of the relations // <http://www.mfa.kz/index.php/ru/vneshnyaya-politika/sotrudnichestvo-kazahstana/sotrudnichestvo-so-stranami-azii-i-afriki/84-vneshnyaya-politika/sotrudnichestvo-kazahstana/sotrudnichestvo-so-stranami-azii-i-afriki/374-sotrudnichestvo-respubliki-kazahstan-s-korolevstvom-saudovskaya-araviyahttps://doi.org/10.32014/2018.2518-1467.35> (in Rus.).
- [8] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedyorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494.4(380). P. 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [9] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S., Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. (2019). Foresight and the role of innovation in the development of education // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494.4(380). 93-101. <https://doi.org/10.32014/2019.2518-1467.96>
- [10] Mamyrbayev O.Z., Othman M., Akhmediyarova A.T., Kydyrbekova A.S., Mekebayev N.O. Voice verification using I-vectors and neural networks with limited training data // Bulletin of the National academy of sciences of the Republic of Kazakhstan. 2019. N 3(379). P. 36-43. <https://doi.org/10.32014/2019.2518-1467.66>
- [11] Lavrinenko S.V., Arpentieva M.R., Kassymova G.K. (2019). The negative impact of the internet on the educational process. International youth scientific conference "Heat and mass transfer in the thermal control system of technical and technological energy equipment" (HMTTSC 2019). <https://doi.org/10.1063/1.5120671>

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## GENDER EQUALITY IN FEMINISM

**Abstract.** It is a literature review article about feminism. Authors collected information from various international databases. This study using descriptive scientific method that aims to analyze a phenomenon as thoroughly and as what it is. Feminism is a concept and its fundamentals based on placing women as victims of the patriarchal culture. Patriarchal Culture is known for the dominant figure of men, or father in wide variety of aspects. This domination of men leads to women's loss in their rights and in some case, they even treated as an object of oppression. Even though women are sharing the same purpose to struggle for their rights, in its development women are using different way and methods. This is the reason why today's feminism consisted of several groups of movement. Islam is a religion of justice and equality. Islam sees both men and women as equal in their rights although they have their different role and task according to their nature. Both men and women have an equal position below the God's will, which differs them by their attitude and behavior in their lives. There are many moslem feminist criticize the patriarchy system in the society through their writings and movements. They also criticize the interpretation of Al-Qur'an verse and misogynist hadiths, which brought up the assumption that patriarchy comes from Islam. The figures that will be mentioned in this article are Qasim Amin, Amina Wadud, and Fatima Mernissi. Feminism in modern times no longer pursue for democracation rights, but more about woman emancipation in every aspect of life.

**Keywords:** feminism, female position, Islam, Al-Qur'an, perspective, moslems, woman and man.

**Introduction.** Throughout history, feminism always interpreted close to the idea which opposing the unequal treatment towards women. The feminism movement in modern times has divided into ideological, cultural, and spiritual realms, which goes down with its pros and cons towards the society especially for women. The spirit which drives the movement concise of justice, equality, and freedom, which all this time were always obstructed due to gender issues. The groups of feminism movement have their own way to achieve their goal.

The existence of patriarchal culture is the main reason why the idea of feminism is exist aswell. Patriarchy defined as domination of man in every life aspect in the society. Some of the traditional view that are still believed is that patriarchy is close-related to Islam. Syafiq Hasyim in a short clip released by CNN Indonesia titled "*Bagaimana Islam memandang budaya patriarki*" (How Islam sees the patriarchy culture) said clearly that patriarchy is not the part of Islam because truly, Islam is a religion that dignify the existence of woman (CNN Indonesia, Wednesday, 08/05/2019). Islamic feminists may be a manifestation of transformation combining movements of secularization and Islamization. By throw their struggle against the patriarchy manifest in Islam and against the Islamophobia (prejudice against Islam or Moslems) manifest in feminism, they are connecting the political and the religious in a way that sacralizes relations between genders and traditionalizes Islam (Djelloul, 2018: 3).

**Method.** The writer using descriptive method in this study. Descriptive method is a technique used on finding the elements, characteristic and nature of a phenomenon. Descriptive study also known as a study that explain a phenomenon as original as it is, a straight fact, to explain the characteristic of various variables in a research in a certain situation. The purpose of this study is to provide a profile of a phenomenon or to explain its relevant aspects based on individual perspective, organizational, industrial, or any other perspective (Ali dan Limakrishna, 2013: 76).



**Results and discussion. Women's Position in Islam.** Al-Qur'an is the absolute guidelines for the moslems that the truth of its content is undeniable. Moslems these days can learn and understand the content of the Qur'an through interpretations of its verses. However, there are differences between the Mufasssirs on interpreting the verses of the Qur'an. This is the major factor that leads to the discussion of main issues about the position of womankind.

Al-Qur'an always emphasize its divine logic which comes from Allah, when frequently mentioning that all mankind were created from the same soul ( al- Nisa' [4]: 1, al-An'am [6]: 98, al-A'raf [7]: 189, Luqmān [31]: 28, and al-Zumar [39]: 6). Al-Qur'an does not carry an explanation – like in other Scriptures – that woman was created from material inferior compared to the one that used to create man, that woman is a seducer, or that Eve is created from the left rib of Adam. Moreover, there is no such idea in Al-Qur'an that underestimate woman based on their character and their nature. Al-Qur'an clears woman of their accusations as a source of sin and deceives that were explained in other Scriptures (Muttahari in Fikriah and Jakandar, 2018: 192).

According Shalih in Marzuki (no year: 4) Al-Qur'an verses clearly acknowledge the equality between men and women in the Qur'an. Al-Lail (92): 3-10 that stated both men and women in a pledge which become the proof that Allah make no differentiation between those two. Those verses indicating that the difference of people is just from their actions, whether its good or vile, regardless of their gender. Those verses also denote Al-Qur'an first declaration about the *taklif* (imposition of responsibility) principle for men and women, either in life or afterlife; also become the fundamental of reapraial for both of their work according to their effort and role.

The moslems have their own understanding towards the Al-Qur'an, thus leads to their various interpretation, including the verses related to women, which is also differs one and the other. In this context, the spirit of change and reformation which carried by the Islamic feminism, has to be fully understood. In the context of daily life, it is not the Qur'an that speaks about women, it the moslems who talks about women in the name of Al-Qur'an. This notion holds that Islamic ideas, which developing in Islamic traditional scientific culture, tends to be sacred both at theoretical and practical level (Rosadi, no year: 4).

Al-Qur'an does not firmly state that Eve is made from the rib of Prophet Adam as, which some people then assuming that woman comes from the part of the man, represent the woman's lower position and status compared to man. The principle of Al-Qur'an towards the rights of woman and man is that they are equal, where the wife's right is acknowledged as evenly as her husband. Al-Qur'an considered having a revolutionary vision towards the interaction of mankind, which giving the equality of rights between men and women (Fakih, 2000: 51).

In the Pre-Islamic era or known as The Jahiliyah, the position of women in society is on the lowest level and at some points they were worthless. Some stories said when a woman gives birth to a baby girl, the poor girl would be buried alive by her own father, because having a daughter is disgrace back at the time. It is also said that when a father is dead, his wife could be given as inheritance. These stories give a decent depiction on how worthless women are and considered as an object or property that can be inherited.

As a matter of fact, Islam was born with a concept of human interaction that based on fairness against men and women in their state of existence. In Islam, aside from decision-making aspect, women also possess their right in the economical aspect, which is the right to own their wealth and property, which none of their husband nor father be able to interfere. This wealth including the ones they received from legacy or the ones that they possess by their own effort. Therefore, in Islam the dowry needs to be paid for the respective woman herself, not for her parents and cannot be reclaim by her husband afterwards. And by that, Islam has torn down the unfair social system towards the woman and replaced it with a more decent system (Fakih: 2000: 52).

Al-Qur'an explain about woman position in more than 10 Surah, namely the Al-Baqarah, Al-Maidah, An-Nur, Al-Ahzab, Al-Mujadilah, Al-Mumtahanah, At-Tahrim, dan An-Nisa'. This shows that Al-Qur'an gives more delicate attention towards women (Ismail, 2000: 134). Al-Qur'an emphasize the humanitarian aspects of woman and their equality against man. This aspect was mentioned in a verse that said: "*O mankind, indeed We have created you from male and female and made you peoples and tribes that you may know one another. Indeed, the most noble of you in the sight of Allah is the most righteous of you...*"

(Surah Al-Hujuraat [49]:13). According to these matters, it could be concluded that equality between man and woman is seen as a same and fair in Islamic perspective.

Historically, women were playing a huge and strategic role in both early and advance development of Islamic era, both in domestic and public matters. This proven by the role of women in helping the Prophet's Mohammed war in the battlefield. Khadija, the loyal wife of the Prophet for example, granted her wealth and assets for the struggle of Islam; Arwa ibn Abd al-Muthalib asked her son to lend his power to help the Prophet and provide everything he need; and Ummu Syurayk who secretly persuade the women of Mecca to convert from Paganism to Islam (Fadlan, 2011: 111).

Al-Qur'an did not state anything that prohibit a woman to become a labour. The advice to stay home itself is merely a way to protect woman against bad things that may could happen and endanger the woman herself. Al-Qur'an even gave women the rights to work, either in sense of righteous deeds or even in make the living out for themselves and their family (Quraish Shihab, 2001: 267). Allah said in the Surah of An-Nisa: 32 *"And do not wish for that by which Allah has made some of you exceed others. For men is a share of what they have earned, and for women is a share of what they have earned. And ask Allah of his bounty. Indeed Allah is ever, of all things, Knowing."*

Some historical story proved this statement by showing that women in Prophet Mohammad era considered not only as a wife or companion of men, but also play their role as an equal being in both rights and responsibility towards other human being before God. For example, Aisyah (wife of prophet Muhammad) which lead the Jamal war; Ummu Hani al-Syifā, a decent writer whose sent by khalifa Umar bin Khatab to handle the market of Madina (Rohmatullah, 2017: 87).

The rise of the Islamic civilization began after the death of khulafa'ur-Rasyidin. In its first period of development, history records a fundamental change in Islamic khilafah control structure, from democratic government system to absolute monarchy. Islam was at its glorious state in this era, but at the same moment, there was degradation towards the position of the women. Right after the monarchy takes place, the kings from Islamic kingdoms all around the world adopted the non-Islamic concubine system. The worst part comes after they legitimate themselves by faking hadiths along with the swarms of fake hadiths made for political or ideological purposes. Along with it, many of the fake hadiths addressed to denigrate and despise the women (Suryorini, 2012: 3).

**Feminism.** Feminism is known as a movement of awareness that emerged from the assumption that women are suffering from discrimination, and by those reason a struggle is made to fight it back. In such definition, the feminists are not only from the female side, but also from all people who care about the gender equality and rights. Even though, this kind of awareness is uncommonly found on most of the men, some of them are choose to remain silent and doesn't even bother, or even enjoy this gender inequality in the society.

The first feminism movement was intended to face the patriarchal tradition between 1550-1700 in the England. The early feminism movement focused on declining the patriarchic stigma about the position of a woman which, considered to be such a weak human being, so emotional dan irrational (Jenainati and Groves in Suwastini, 2013: 198). On the recent period, feminism not only consists of single and integrated movement, but it has been divided into several ideas or movements. The feminists are having different ideas on analizing the causes of inequality as well as target and struggling methods, even though they shared the same awareness about the inequality towards women in family and society. (Izziyana, 2016: 144). Some of those ideas namely the Liberal Feminism, Radical Feminism, Marxis Feminism, Socialist Feminism, dan Ecofeminism. Every groups have their own method on achieving their goals.

The feminists in general are still tied to masculinity idea. Liberal feminism which standardize their work on developmentalism, modernization, and using positivistic approach, seen by the Ecofeminists as a part of the problem, not the solution. For Radical feminists, this group considered to be heavily attached to the masculinity idea itself, which its goal is to fight the domination of the men. The same pattern goes on with the Marxis feminists, aside from its rational and positivistic, their idea that industrialization would likely replace the role of women in handling the household and raising child was considered to be denigrate the principle of feminism and glorify the masculinity instead (Fakih, 2000: 44).

The conference in South Asia has defined that feminism is a form of awareness against oppression and extortion towards women in the society, workplace, and their family. This definition also including the effort from all kind of people to change the situation (Basin and Said Khan, 1999: 5). According to this

definition, someone who knows the existence of sexism or discrimination against the gender, the male domination and patriarchy system, and have the will to fight against it, is considered to be a feminist. Feminism has developed from a movement that only struggled for an approval as an equal human being compared to men, become a movement that has multiple aspirations.

**Feminism in Islamic Perspective.** The women's movement is essentially a movement for transformation, not simply a vengeful action against the men. The women's transformation movement is a process to create a good relationship between all mankind, both men and women. The type of relationships including many aspects such as in economy, politics, social, cultural, ideology, and other aspects in daily lives. Islamic Feminism began to be articulated by Iranian and Egyptian academics around 1990s. They ground their movements and ideas to the traditional interpretations of Islamic sources (the Qur'an, Sunnah, Hadith, *Tafsir* - interpretation), Islamic law and women's rights in order to raise awareness on gender equality and domestic violence Gurkan, 2018: 274).

This is an important distinction. "Islamic feminism" is not simply a feminism that is born from Muslim cultures, but one that engages Islamic theology through the text and canonical traditions. A distinctly "Islamic" feminism, at its core, draws on the Quranic concept of equality of all human beings, and insists on the application of this theology to everyday life. Islamic feminists are looking into the basic texts of Islam in context of real life situations for concrete ideas. Islamic feminists are using Islamic categories like the notion of *ijtihad* (individual interpretation with all effort, mind, knowledge). Islamic feminism is speaking for justice to women as Islam stands for. It's a tool to remind people what Islam is for women. The term Islamic feminism is an idea of awareness preaching that men and women have equal rights based on re-reading the *Quran*, re-examining the religious texts and telling people to practice it. (Ahmed M, 2014: 2-3).

Margot Badran (2006) has defined feminism as "the feminist's discourse and implementations which derived from the Qur'an, that seeks the justice and rights in gender equality for both men and women in their existence". This definition, according to the interpretation of Al-Qur'an, stated that the Islamic feminists are using multidisciplinary approach such as language, history, literatures, critics, sociology, anthropology, etcetera. Islamic feminists also using their experience and placed their viewpoint as a female.

The Islamic feminists agree that a reinterpretation of Al-Qur'an is highly necessary, especially those which related with gender issues to replace the old interpretation that considered to be less accommodating the needs of the womankind. It is also need to be understand that difference of every interpretations (as the effect of historical distortion) affects the feminists' interpretation as well. For example, the Amina Wadud's interpretation would differ from Fatima Mernissi and Mir Hosseini's interpretation model. In this category, Islamic feminism more likely to be a general concept that accommodates all diversity of Islamic feminists' ideas which based on the reinterpretation of Al-Qur'an verses and hadiths (Rosidi, no year: 5-6).

Feminism in Islam does not fully agree with any feminist concept or view that originates from the West, especially the one that put men as the opposing side against women. On the other side, Islamic feminism still holds its struggle to achieve the equality rights of women that has been forgotten among the conservative-traditionalists, whose considering women as a subordinate part of the men (Suryorini, 2012: 4). According Syafiq Hasyim, patriarchy was not originated from Islam, because in Islam there are justice and equality existed amidst men and women (CNN.Indonesia.com, 05/08/2019).

The feminist figures stated that the concept of equality between men and women is meant on their equality in rights and obligations. The feminists see that men and women are just the same. The only thing that differs them is from the biological aspect, that women may have menstruation, get pregnant, give birth and nursing, meanwhile the men do not experience such things. This called the nature of the women, which obviously different from the men. The rest of the differences only comes from socio-cultural construct. Therefore, in all means, the biological difference doesn't define the gender inequality in social aspect. Biological functions are different, and it has to be differentiated from the social functions (Suryorini, 2012: 30).

Islam commands the Muslim women, as it commands the men, to be concerned with the affairs of the community. Women are permitted and encouraged to engage in political participation as long as this does not compromise their primary roles as wives and mothers (Muhibuddin, 2019: 46). Men and women have the role and function to complete each other. Men are unable to take over the role to get pregnant, give

birth and breastfeeding. The same thing goes vice versa for women, they shouldn't be taking responsibilities to make a living for their husbands. The matter differentiated those two just like the existence of day and night. Luminous daylight is used to go out and make a living, while the shade and dark night tells that it's the time to get a rest. Even though the functions are clearly different, but they share a connection and complete each other.

**Notable Figures of Moslem Feminism.** There are several moslem figures who have shared the same idea with feminism. Among of all, the writer would only writes about three figures whose name are commonly noticeable among the feminism activists.

**1. Qasim Amin.** Qasim Amin known as the first moslem feminist that was born in Egypt, in 1865. He completed his higher education at Al-Azhar in a short time. He was one of Muhammad Abduh's apprentices, which from him, he got his critical ideas. Qasim had stood up against the tradition of Egyptian society, where women were treated as slaves and forced to satisfy the desires of men while also pinned down inside their house (Siregar, 2016: 252).

Qasim Amin was one of the feminist figures that brought up the idea about Moslem women emantipation through his writings. He based his idea from the subnormality of the Moslems which according to him was caused by the misperception and wrong treatment towards the women (Nasution, 1991: 79). The main theme of Qasim Amin renewal movement is "*Tahrir al-Mar'ah*" which later known as "women emantipation", an idea that based on the spirit of liberation and empowerment of women, which has a social goal: a transformation of women society. This idea emerged as a reflection and manifestation of Qasim Amin's intellectual concern towards the reality of Egyptian women, which he considered to be highly violated the tolerance limit (Siregar, 2016: 253).

Amin was demanding that Egyptian women should receive the same basic and proper education equal to the men. Also, he was strived for a change on the practice of polygamy and divorce which he deemed to be very detrimental to the Egyptian women. He put his idea of reform above the theories of modern science and modern Western philosophies. He said that an improvement is not only based on worship and *aqida*, but also with scientific results conducted by the mankind. It can be concluded that Qasim Amin has no longer using Islamic theorems when answering the critics thrown at him while discussing about recent women issues, but instead he used rational arguments and invited the critic to observe the progress achieved by the Western civilization (Suparto, 2017: 6).

Qasim Amin deemed that the importance of education for women is closely tied with their role as mother for their child. Kids would likely spend their entire childhood with their mother until they reached the required age for school. Therefore, a mother should be able to become a good tutor for her child, because she is the manifestation of "first school for her child, and even could determine their future as the next generation of the nation". But on the contrary, back in the day, the Egyptians were assumed that education would degrading the morality. Furthermore, people assumed that women have a low learning capability, where at some point a traditional cleric even questioning the legality for a girl to learn how to read (Suparto, 2017: 8). Amin's writing, *tahrir al-Mar'ah*, discussed about four main issues, as mentioned: education for women (*Tarbiyah al-Mar'ah*), veil (*Hijab an-Nisa'*), women and people (*al-Mar'ah wa al-Ummah*), and family matters (*al-'Ailah*) (Bahri, 2013: 22).

**2. Amina Wadud.** Amina Wadud Muhsin is a Malaysian/American Moslem feminist. She got her Doctoral Diploma Philosophy from Michigan University and learned Arabic language at Harvard University, America and Al-Azhar University in Cairo, Egypt. Her intellectual journey continued until she learned the Qur'anic interpretation at Cairo University and philosophy at Al-Azhar University. She had worked as an assistant professor at International Islamic University of Malaysia in 1989 to 1992 and published her dissertation entitled *Qur'an and Women, Rereading the Sacred Text from a Woman's Perspective* (Setyawan, 2017: 174).

This dissertation has unveiled various gender issues according to Al-Qur'an interpretation and on her other writing, *Inside The Gender Jihad, Woman's Reform in Islam*, Wadud criticize the religious comprehension that went discriminative and unequal towards the women. She used a neomodernic method that was offered by Fazlur Rahman, who stated that the Al-Qur'an verses which descended in a certain period – with all of its common and particular state – is using a relative expression towards the situation in question. Therefore, the Qur'an messages cannot be limited by the historical state when it was descended. The one who reads Qur'an has to understand the implications of Qur'an statements on its descended

period in order to determine its true meaning. On the other side, the later Islamic generation (whose generally have more different condition from the Prophet Muhammad's era) have to create a practical application of the Al-Qur'an statements with also considering the true meaning within the verse itself (Marzuki, no year: 9).

Amina's criticism about women's position was not only easy to comprehend in her book, but she also emphasizes the egalitarian spirit. She thinks that matriarchism is not the alternative answer for patriarchy, which in many cases was blamed for the cause of unequal treatment towards women. She wants equality and cooperation between both genders, not only in the macrocosmos (state, society) but also in the microcosmos (family). She had the identical idea with Fatima Mernissi, that Al-Qur'an had to be constantly reinterpreted in order to keep its relevance towards the human life.

**3. Fatima Mernissi.** Fatima Mernissi was a Moroccan muslim woman. She had published many writings, either in the form of books or articles that she wrote in French. Some of her works were published and translated into English and Indonesian. Through her book *The Veil and the Male Elite: A Feminist Interpretation of Women's Rights in Islam*, she thoroughly discussed the causes that put women in a tight position after the death of Prophet Muhammad. And through this book, she also tried to engage the Islamic society to review the hadiths that considered to be degrading and denigrate the existence of the women. She put many critics against the Prophet's hadiths which were assumed that the holy verses had deviated and manipulated (Marzuki, no year: 11).

Fatima had poured her thoughts in her works as a spirit of emerging the Muslim women and put them out of their misery. Her thoughts came from her personal experience which, according to her is disparate against her will, where her environment also drives the way she thinks about it. Fatima was once discussed about some hadiths that she found unpleasant. These hadiths were contextually denigrated the women that later it makes the term misogynist.

Mernissi had analyze the obliterated misogynist hadiths. One of the narrators that got her focus is Abu Hurairah, a famous narrator from the friends of the Prophet. Mernissi thoroughly describe the personal background of Abu Hurairah's life that made him gravely antipathic towards the women. But she was disappointed by the fact that al-Bukhari included many of the misogynist hadiths narrated by Abu Hurairah (Mernissi, 1991a: 73). She also explained Aisyah's criticism against Abu Hurairah where Aisyah assumed that Abu Hurairah was only partially comprehend the Prophet's words when he narrated the hadith. This hadith, according to Aisyah, apparently was the Prophet's words that describing about the three things that could cause a disaster among the Jews. The three things mentioned are house, woman, and horse (Marzuki, no year: 12).

Mernissi stated that the origin of hadith was dated back to the death of the Prophet. The holder of leadership after the Prophet was Abu Bakar and Umar bin al-Khattab as the first and second caliph. Utsman bin Affan became the third caliph, but his period was ended with a tragedy. After eleven years of his reign, in the end of 35 AH (Anno Hijriah, Islamic calendar) there was some insurgents blaming him for being unfair in his governing. The rebels surrounded his house, and he was killed when the rebels stabbed him while he was citing the Qur'an. His death was later become the first emergence of slander, a period full with instability which drove the Muslims into their first civil war. The slander continued to spread when Ali was elected as the fourth caliph in 656 AD. Aisyah then proceeded to take the lead and fight Ali in Bashrah with the other insurgents, in the battle known later as Camel War. Ali's troops managed to defeat Aisyah, even though in the end he was found dead, killed by his political opponent.

The events above later on brought up the fake hadiths that used to legitimate the idea of various groups of people. In other words, the hadiths were turned and be used as a highly-effective political weapon. Therefore, every hadith are needed to be reinterpreted in all of its aspects, either on its *sabab al-wurud*, the socio-cultural aspects that surrounds the personal life of the narrator, and the hidden intentions that may drive the narrator on how he would write the hadith. Especially the ones that related to the discrimination against the women, which had been mentioned before as misogynist hadith. These misogynist hadiths are the ones that the literal translations are supporting the ideas to denigrate the existence of women (Munirah, 2016: 4).

Fatima Mernissi emphasized her movement on several subject, based on her idea and her personal experience. She criticized about the hijab use, or wife status, but her main focus is on the hadiths that she considered to be degrading against women. She assumed that the words of the Prophet are need to be

reinterpreted. Her critics are on the Sanad, Matan, and Rowi. The most criticized narrator was Abu Hurairah, with his numerous misogynist hadiths.

**Today's Feminism.** In terms of world's moslem socio-cultural development, the triumph of education especially towards women have brought a new way and insight towards the social role of women in the society. At pre-modern era, the society seems to be existed just for men, while nowadays this idea is likely the opposite. Women are making their way to be the part of the society, with the help of other or by their own courage. Women are no longer considered as companion (or *konco wingking* in Indonesian term, which means that a woman only have 3 main roles: to do the cook, the chores, and sex). Women are already had a certain concept to manage the public space and life, to cooperate with men. Women nowadays are also involved in the political and leadership sphere (Hidayati, 2018: 27-29).

Until now, there are stereotypes that polarize between 'Islam' and 'feminism'. Although in many ways, there are many different interpretations in Islam, and also various interpretation of feminism (Rizky A., 2018: 3). The issues related to rights, status, and women's position in domestic and public sector would likely be the most debated and trending matter to be discussed on. Various view and arguments came from many disciplines like religion, philosophy, sociology, politics, psychology, and biology, are likely brought up the various theories about feminism and its movement as well.

The main difference between the earlier feminism and the present feminism is in their main goal. The earlier feminism movement is to regain the rights of the women, which is including rights on education and job, ownership rights, voting rights, the right to be a parliamentary member, the right on birth control, divorce, and some others. The present feminism is more likely to create the emantipation for the women. A woman is not only fighting against the discrimination, but also for the emantipation and liberty from every forms of oppression by the government, from society and from the men (Basin and Said Khan, 1999: 8).

The present feminism has substantially become the movement to gain the equality, pride, and freedom for a woman to choose on how she would manage her life and her body, either inside or outside the household. Every country has their own different directions and patterns towards the progress of the feminism. This can be seen from several feminism organization or community that exist recently.

Indonesia, which its majority consists of Islam, has also affected by the development of the feminism. For example, the Indonesian Solidarity Party (*Partai Solidaritas Indonesia/PSI*) has got the attention of the numerous amount of Indonesian people, especially the youth and the females even though they are still a newly-born political party. This because PSI has brought the new ideas and goals which considered to be relevant by the youth generations. The Policy Proposal of PSI has focused on women and youth empowerment program. The offered women empowerment program was to declining the implementation of polygamy for the public officers, fight for Bill on the Elimination os Sexual Violence, supporting for the increase in the age limit for marriage to 18 years oled, supporting on regulation that ease the women to find a job, running on courses and providing the incubator for small and medium business for the housewives on every disctrics, and organizing nutrition program for expectant mother and infant toddlers (psi.id). According to the these statements, it is clearly said that the main program of PSI is concerned with the life of women, especially in their effort to eliminate polygamy that considered to be harm to the women.

The existence of feminism is also could be found in Yogyakarta, where there is a community called the Woman March Yogyakarta, which recently had established a long march in some areas of Yogyakarta and declared some demands, the main one is to decline and eliminate the patriarchy tradition, and the other one is to enforce the Human Rights as fair as possible. This community consisted of various members, both from male and female members, and all came from different religion and believes, even including some woman in *burqa* which once joining the long march bringing up posters with some phrases reads "Stop Body Shaming", "Stop Sexual Violence", etc. (Instagram: @womenmarchykt).

These events showed us about the concern about women and the struggle itself. They carrying out a movement, to seek for equality before the rights. But women should also be aware, before they struggle about gender equality, they have to start from themselves. Which in this case means, to stop boasting about equality, but start to show with actions which implies that women can also doing things like men can, such like get a higher education, can be a leader, and give contribution towards the society to the good of mutual welfare.

**Conclusion.** The Moslem feminists shared the same idea with other feminists in general. The main issue that they pursue is the equality between men and women. Qasim Amin focused on education rights, Amina Wadud emphasized on egalitarianism in the society, and Fatima Messini criticized the misogynist hadiths. With such various ideas, they have the same objective to raise the dignity of women in general.

Feminism is an idea that emerged from the discrimination between the men and the women. This movement demands, not so that women may have a higher position than men, but more likely that men and women are treated equal to each other. According to Islamic point of view, which is included in the Al-Qur'an, both men and women are created equal by Allah. The men are not in a higher position than women, and goes vice versa. But ironically, in the later development, the religion itself was used to marginalize the women.

The Moslem feminist figures all around the world suggest that there should be another reinterpretation of the verses from Al-Qur'an and the hadiths. This suggestion based on the fact that different interpretation of the holy verses was found in many occasions. Also, there are misogynist hadiths existed, which contradicts with the verses of Al-Qur'an, which emphasized the equality between men and women. Hopefully with that, Islam would never be used to discredit the women ever again.

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### ФЕМИНИЗМДЕГІ ГЕНДЕРЛІК ТЕҢДІК

**Аннотация.** Мақала феминизм туралы әдеби шолу болып табылады. Авторлар әртүрлі халықаралық мәліметтер базасынан ақпараттар жинады. Бұл зерттеу сипаттамалық ғылыми әдісті қолдана отырып, құбылысты жан-жақты және дәл солай талдауға бағытталған. Феминизм – бұл әйелдерді патриархиялық мәдениеттің құрбанына айналдыруға негізделген түсінік және оның негіздері. Патриархалды мәдениет ерлердің немесе әкелердің басым көпшілігінде белгілі. Ерлердің бұл үстемдігі әйелдердің өз құқықтарынан айырылуына әкеледі, ал кейбір жағдайларда олар тіпті қысым көрсету нысаны ретінде қарастырылады. Әйелдер өздерінің құқықтары үшін күресудегі мақсаттарын бір мақсатта пайдаланса да, оның даму барысында әйелдер әртүрлі тәсілдер мен әдістерді қолданады. Міне, бүгінгі феминизм бірнеше қозғалыс топтарынан тұрды. Ислам – әділеттілік пен теңдік діні. Ислам ерлер мен әйелдерді өздерінің құқықтарында тең деп санайды, бірақ олардың табиғаты бойынша әр түрлі рөлдері мен міндеттері бар. Құдайдың еркімен әйелдер де тең дәрежеде, бұл олардың өмірлеріндегі көзқарастарымен және мінез-құлқымен ерекшеленеді. Көптеген мұсылман феминисттер өздерінің жазулары мен қимылдары арқылы қоғамдағы патриархиялық жүйені сынайды. Сондай-ақ олар патриархат исламнан шыққан деген болжамды тудырған Құран аятын және мсогинистік хадистерді түсіндіруді сынға алады. Бұл мақалада айтылатын сандар – Қасым Амин, Амина Вадуд және Фатима Мерниси. Қазіргі кездегі феминизм енді демократтар құқығына ұмтылмайды, бірақ өмірдің барлық саласында әйелдерге көбірек бостандық беру туралы болып табылады.

**Түйін сөздер:** феминизм, әйел ұстанымы, ислам, Құран, перспектива, мұсылмандық, әйел мен ер.

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### ГЕНДЕРНОЕ РАВЕНСТВО В ФЕМИНИЗМЕ

**Аннотация.** В обзорной статье о феминизме авторы собрали информацию из различных международных баз данных. Это исследование с использованием описательного научного метода, который направлен на то, чтобы проанализировать явление так же тщательно, как оно есть. Феминизм – это концепция, основанная

на том, что женщины становятся жертвами патриархальной культуры. Патриархальная культура известна как доминирующая фигура мужчины или отца в самых разных аспектах. Это доминирование приводит к потере прав женщин, и в некоторых случаях они даже рассматриваются как объект угнетения. Несмотря на то, что женщины преследуют одну и ту же цель – бороться за свои права, в своем развитии они используют разные способы и методы. По этой причине современный феминизм состоит из нескольких групп движения. Ислам – это религия справедливости и равенства. В исламе мужчины и женщины равны в своих правах, хотя у них разная роль и задачи в зависимости от их характера. И мужчины, и женщины имеют равное положение, которое отличается их отношением и поведением в жизни. Многие мусульманские феминистки критикуют систему патриархата в обществе посредством своих произведений и действий. Они также критикуют толкование стихов Аль-Корана и хадисов мизогинистов, которые выдвинули предположение, что патриархат исходит из ислама. Имена, которые будут упомянуты в этой статье: Касим Амин, Амина Вадуд и Фатима Мернисси. Феминизм в наше время не преследует права на демократию, а больше касается эмансипации женщин во всех аспектах жизни.

**Ключевые слова:** феминизм, женская позиция, ислам, аль-Коран, перспектива, мусульмане, женщина и мужчина.

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#### **REFERENCES**

- [1] @womenmarchykt.instagram. downloaded in May 9<sup>th</sup> 2019, 01.30.
- [2] Ahmed M.K. (2014). Feminist Discourse and Islam: A Critique // International Review of Social Science and Humanities. Vol. 6, N 2. P. 1-11. URL: <https://www.irssh.com/2248-9010> Retrieved: 11 August 2019.
- [3] Ali H., Limakrisna N. (2013). Metodologi Penelitian: Petunjuk Praktis untuk Pemecahan Masalah Bisnis, Penyusunan Skripsi, Tesis, dan Disertasi. Deepublish: Yogyakarta.
- [4] Andri Rosidi. (Without year). Feminisme Islam: Kontekstualisasi prinsip-prinsip Ajaran Islam dalam Relasi Gender // Scientific Journal on Gender Studies. 2011. <https://doi.org/10.15548/jk.v1i1.33>
- [5] Ariyana Suryorini. (2012). Menelaah Feminisme dalam Islam // SAWWA. Vol. 7, N 2. <https://dx.doi.org/10.21580/sa.v7i2.647> Retrieved: 15 January 2019.
- [6] Absattarov G.R. (2019). Political technologies of legal culture education // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494. 4(380). 110-116. <https://doi.org/10.32014/2019.2518-1467.98>
- [7] Aksarina I.Y., Dossayeveva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedyorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494. 4(380). 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [8] Badran, Margot. 2006. Islamic Feminism Revisited. Al-Qur'an weekly online, 9-15 February. Issue No. 781. URL: <http://weekly.ahram.org.eg>
- [9] Bhasin and Said Khan. (1999). Persoalan Pokok Mengenai Feminisme dan Relevansinya. Jakarta: Gramedia.
- [10] C. Edi Setyawan. (2017). Pemikiran Kesetaraan Gender dan Feminisme Amina Wadud Tentang Eksistensi Wanita dalam Kajian Hukum Keluarga // Zawiyah: Islamic Thought Journal. Vol. 3. N 1. <http://dx.doi.org/10.31332/zjpi.v3i1.710> Retrieved: 15 January 2019.
- [11] CNN. Indonesia.com. Rerieved: 08 May 2019,
- [12] Djelloul G. (2018). Islamic Feminism: A Contradiction in Terms? // Oroginal in French. Translated by Mike Routledge. First Published by La Revue Nouvelle 1/2018 (in French)/ Eurozine (English translation). URL: <https://www.eurozine.com/islamic-feminism-contradiction-terms/> Retrieved: 12 August 2019.



- [13] Eliana Siregar. (2016). Pemikiran Qasim Amin tentang Emansipasi Wanita // *Kafa'ah: Scientific Journal on Gender Studies*, Vol. VI, N 2. <http://dx.doi.org/10.15548/jk.v6i2.143> Retrieved: 28 January 2019.
- [14] Fadlan. (2011). Islam, Feminisme, dan Konsep Kesenjangan Gender dalam Al-Qur'an. *Karsa*. Vol. 19, N 2. <http://dx.doi.org/10.19105/karsa.v19i2.60> Retrieved: 26 January 2019.
- [15] Fikriah, asfa. (2019). Perkembangan Pemikiran Dan Pergerakan Wanita Dalam Pandangan Feminis Muslim. *Sophist: Social journal, politic, Islamic and exegesis studies*, 1(2). 189-209. <http://journal.uinmataram.ac.id/index.php/sophist/article/view/773> Retrieved: 11 Agustus 2019.
- [16] Gurkan S. (2018). The Junnction Point Of Islam and Feminism: SIS (Sisters In Islam), an Islamic Feminist Organization // *ZfWT*. Vol. 10, N 1. URL: <https://www.researchgate.net/publication/324532254> Retrieved: 13 August 2019.
- [17] Hidayati, Nuril. (2018). Teori Feminisme: Sejarah, Perkembangan dan Relevansinya dengan Kajian Keislaman Kontemporer // *Journal HARKAT: Gender communication media*, 14 (1). <https://doi.org/10.15408/harkatv14i1.10403> Retrieved: 13 August 2019.
- [18] Izziyana W.V. (2016). Pendekatan Feminisme dalam Studi Hukum Islam // *ISTAWA*. Vol. 2, N 1. <http://dx.doi.org/10.24269/ijpi.v2i1.366> Retrieved: 10 August 2019.
- [19] Mansour Fakih. (2000). Posisi Kaum Perempuan dalam Islam: Tinjauan dari Analisis Gender dalam Membincang Feminisme Diskursus Gender Perspektif Islam. Surabaya: Risalah Gusti.
- [20] Marzuki. (Without year). Perempuan dalam Pandangan Feminis Muslim // FISE- Yogyakarta State University.
- [21] Muhibuddin M. (2019). Feminism and Modern Islamic Politics: The Fact and the Fallacy // *International Journal of Islamic Thought*. Vol. 15. <https://doi.org/10.24035/ijit.15.2019.005> Retrieved: 13 August 2019.
- [22] Munirah. (2016). Hermeneutika Ala Fatima Mernissi. *Ilmu Ushuludin*. Vol. 15, N 1. <https://dx.doi.org/10.18592/jiu.v15i1.1069> Retrieved: 17 January 2019.
- [23] Nasution, Harun. (1991). Pembaharuan dalam Islam: Sejarah, Pemikiran. Jakarta: Bulan Bintang.
- [24] Official homepage of Partai Solidaritas Indonesia. [www.psi.id](http://www.psi.id). accessed in May 9<sup>th</sup> 2019, 01.00.
- [25] Qurash Shihab. (2001). Tafsir al-Misbah, jilid II, hal. 267.
- [26] Rizky A.M. (2018). Islam dan Patriarki. URL: <https://indoprogess.com/2018/11/islam-dan-patriarki/> Retrieved: 12 August 2019.
- [27] Rohmatullah, Yuminah. (2017). Kepemimpinan Perempuan dalam Islam: Melacak Sejarah Feminisme Melalui Pendekatan Hadits dan Hubungannya dengan Hukum Tata Negara // *Syariah Journal: The journal of law science and thought*. Vol. 17, N 1. <https://doi.org/10.18592/sy.v17i1.1491> Retrieved: 11 August 2019.
- [28] Satori Ismail. (2000). Fiqih Perempuan dan Feminisme dalam Membincang Feminisme Diskursus Gender Persoektif Islam. Surabaya: Risalah Gusti.
- [29] Suparto. (2017). Pembaharuan Pemikiran Qasim Amin. Padang: UIN Sultan Syarif Kasim.
- [30] Suwastini, K.A. (2013). Perkembangan Feminisme Barat dari Abad Kedelapan hingga Postfeminisme: Sebuah Tinjauan Teoritis // *The journal of social science and humaniora*. Vol. 2, N 1. <http://dx.doi.org/10.23887/jish-undiksha.v2i1.1408> Retrieved: 20 January 2019.
- [31] Syaiful Bahri. 2013. Kontribusi Pemikiran Qasim Amin dalam Pembaruan Hukum Keluarga Islam // *Al-Ahwal*. Vol. 6, N 1. <http://ejournal.uin-suka.ac.id/syariah/Ahwal/article/view/06102> Retrieved: 29 January 2019.

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**ABOUT SOME PROBLEMS OF STATE REGULATION  
OF THE INSTITUTE OF LAWYERS IN THE KYRGYZ REPUBLIC**

**Abstract.** The general characteristic of genesis and evolution of institute of legal profession in the Kyrgyz Republic, decentralization of the government, practice of application of conflict-of-laws rules and also humanity as principle of the law is presented in this article. The legal profession in the Kyrgyz Republic is the institute of civil society, protecting the rights and freedoms of the citizens, appeared in the framework of the criminal proceedings. Until current time this institute kept the independence of the state and law; was considered the most developed in the territory of the Post-Soviet states of Central Asia. Lawyers of the Kyrgyz Republic had considerable autonomy from executive power, were not under excessive guardianship of bodies of own self-government, possessed full legal practice, guarantees of the activity and could send their duties with relative professional and creative freedom. At the same time, the legal profession supposes the main functions, remained the organizational forms, and created in the old Soviet curves. Being the institute of official provision, the legal profession kept monopoly only for protection in criminal and administrative cases.

**Keywords:** lawyer, institute of legal profession, defender, human rights, legal procedure, professionalism, civil society, self-government, legal services, the qualified legal assistance.

The citizen of the Kyrgyz Republic, who has a higher legal education and obtained a license to practice law, who is necessarily a member of the Bar Association and provides legal assistance on a professional basis within the framework of the legal profession regulated by the Law, can be an Attorney at Law in Kyrgyz Republic. A person, who has a conviction for an intentional crime, recognized in the established order as incompetent or severely incapacitated, expelled from the Bar Association, dismissed from law enforcement bodies for committing a disciplinary offense - within one year from the date of dismissal, as well as the person, whose license is terminated in accordance with the procedure established by the Law, cannot be Attorney at Law.

In accordance with the Law of the Kyrgyz Republic “On advocacy and legal assistance”, which was adopted in July, 14, 2014, “the lawyers may have assistants and trainees. Lawyer’s assistants are entitled, under direction and responsibility of the lawyer, to carry out his instructions. A person who meets the requirements established by law and who has expressed a desire to undergo the training on probation may apply for admission to the training on probation to the Presidium of the Bar Association. A list of which is established by the regulation on the training on probation procedure for lawyer trainees, developed and approved by the Republican Bar Association in coordination with the authorized body” [1].

After consideration of the application, the Presidium of the Bar Association takes one of the following decisions: on admission to training on probation; on refusal of admission to training on probation.

The decision on the application for admission to the training on probation must be made within five working days. In accordance with the requirements of the law, the head of the training on

probation must necessarily be appointed an Attorney at Law who has been practicing law for at least five years. Trainees undergo training within a period of six months to one year.

According to the results of training on probation, a trainee's supervisor draws up an opinion and sends it to the Presidium of the Bar Association for approval. Based on the results of consideration, the Presidium is obliged to issue a reasoned decision to give an opinion on the successful completion of the training on probation or on refusal to give such an opinion. The opinion on the successful completion of the training on probation is valid for three years from the date of its approval by the Presidium of the Bar Association. The decision to refuse to approve the opinion on completion of the training on probation must be motivated. The opinion on the refusal may be appealed to the Republican Bar Association or the court.

When the Chairman of the Presidium approves an application, a contract is concluded on behalf of the Bar Association with the trainee. The form of the contract is approved by the Presidium of the Bar Association. The contract must necessarily reflect the rights and duties of both the trainee and the head of the training on probation and the Presidium of the Bar Association. At the end of the training on probation, the presentation of the trainee's supervisor and the training on probation materials should be reviewed at a meeting of the Presidium of the Bar. Based on the results of consideration, the Presidium is obliged to issue a reasoned decision to give an opinion on the successful completion of the training on probation or on refusal to give such an opinion. An obligatory criterion for giving a positive conclusion is the degree of preparedness and mastery of the skills necessary for independent advocacy.

At the same time, the Presidium of the Bar Association independently decides the method for assessing the trainee's preparedness: by conducting a written or oral exam, or by computer testing. The issue of termination of the training contract must be considered at the meeting of the Presidium of the Bar Association. Grounds for termination of the contract for the training on probation are established by the Regulations on trainees of Attorneys at Law, approved by the Presidium of the relevant Bar Association.

The Attorneys at Law provide the following legal assistance: Give consultations and references on legal issues both orally and in writing; Make statements, complaints, petitions and other documents of a legal nature; Participate as a client's representative in civil proceedings; Participate as a defender or representative of a client in criminal and administrative proceedings; Participate as a client representative in mediation, in arbitration proceedings and in other dispute resolution bodies; Represent the interests of the client in government bodies, public associations and other organizations; Represent the interests of the client in state bodies, courts and law enforcement agencies of foreign states, international judicial bodies, non-state bodies of foreign states, unless otherwise established by the legislation of foreign states, statutory documents of international judicial bodies and other international organizations or international treaties ratified by the Kyrgyz Republic; Participate as a representative of a client in enforcement proceedings, as well as in the execution of a criminal sentence; Conduct conciliation procedures. A person who applies for help is free to choose an Attorney at Law, except for cases when an Attorney at Law is appointed as a defender in criminal cases for which his participation is compulsory, if the defendant did not choose or could not choose an Attorney at Law.

Payment of legal assistance provided by lawyers [1]. The amount of payment for legal assistance rendered by lawyers and reimbursement of expenses related to the conduct of conciliation procedures shall be established by a written agreement between the lawyer and the person who requested assistance. The conclusion of a contract is mandatory and is carried out in the manner established by the civil legislation of the Kyrgyz Republic. Receipt by a lawyer or a law firm of cash as payment for legal assistance, including oral legal advice, and expenses related to the execution of an order, is not allowed without issuing a corresponding financial document.

It is proposed that these measures will lead to an increase in the number of lawyers, as amount of costs will be reduced by more than two times. In turn, the growth of the number of lawyer corps will increase competition within it and entail a decrease in the amount of fees for rendering assistance. In addition to this, competition motivates lawyers to improve their professional level. Accordingly, the quality of legal assistance and its accessibility to the public should improve.

For implementation of "Probono", it is necessary to oblige lawyers to provide legal assistance to citizens a certain number of hours per year without a budget refund. At the same time, a lawyer will have to report quarterly to the board on provision of this assistance. "Probono" covers the sphere of providing

free legal assistance to socially vulnerable groups of the population. The system is one of the important criteria when a client chooses a lawyer. Since 2015, there has been a reduction in the number of applicants for the right to engage in notarial activities. This is due to two factors. The first is stabilization of demand and supply of notary services in the market. Market mechanisms allowed achieving full coverage of population by notary services. The second - the reform of legislation, simplification of procedures and development of technologies have reduced the demand for notarial services [1].

The amount of payment for legal assistance rendered by lawyers and reimbursement of expenses related to the conduct of conciliation procedures shall be established by a written agreement between the lawyer and the person who requested assistance. The conclusion of a contract is mandatory and is carried out in the manner established by the civil legislation of the Kyrgyz Republic. Receipt by a lawyer or a law firm of cash as payment for legal assistance, including oral legal advice, and expenses related to the execution of an order, is not allowed without issuing a corresponding financial document.

Advocacy - is a qualified legal assistance provided on a professional basis by lawyers in accordance with the Law "On Advocacy", in order to protect and facilitate realization of rights, freedoms and legal interests of citizens, as well as the rights and legal interests of legal entities [1].

Citizen of Kyrgyz Republic can become an advocate if he/she: has a higher legal education; passed the probation period and attestation in college of advocates or passed the exam in Qualification Commission under Kyrgyz Republic Superior Judicial Council, successfully passed the probation period in the court, received a positive review by the plenary session of regional or equivalent court or by the judge who terminated his authority or by dismissed from the bodies of prosecutor and investigator with work experience as a prosecutor or investigator no less than 10 year except persons dismissed by negative reasons; got a license for the right to implement lawyer activity.

Getting of license for advocacy is carried out in three stages, which include probation period - to get necessary skills, attestation and getting of license. To complete a probation period for conduction an advocacy. If you have decided to become an advocacy you need to address to the territorial college of advocates with following documents: application on the admission to complete probation period; copies of identity document of Kyrgyz Republic citizen; copy of diploma on higher legal education; copy of labor book or other document, confirming work experience on legal specialty; medical references from psychiatric and substance abuse clinics; reference on criminal record.

Organization of probation period is carried out by the presidium of advocates' college in accordance with the Provision on the order of probation period completion by probationer of advocates. Therewith probation period is carried out under the guidance of advocate who has advocacy work experience no less than 5 years. Duration of probation period is from 6 month to one year. Probation is carried out for a fee, amount and terms of payment for the organization of probation period is pointed in the agreement.

In order to pass attestation for dealing with advocacy, according to the Rules of passing an attestation by persons pretending on dealing with advocacy for passing the attestation you need to send following documents to the territorial bodies of justice: application; copy of identity document of Kyrgyz Republic citizen; decision on probation (issued by advocate); copy of diploma on higher legal education (notarized copy- in case of non-provision of the original for checking); medical references from psychiatric and substance abuse clinics; reference on criminal record; decision on probation (not provided in case of formalizing of decision in electronic form).

The documents will be considered by a special Commission for certification of persons pretending on advocacy. The Commission consists of seven members, including 3 advocates, candidatures of which are identified by the presidium of Advocates College of regions, cities. According to the results of consideration of the materials the Commission makes a reasonable decision on the admission or denial of admission to the attestation. The conduction of attestation is free.

After the Commission will examine the materials and make a decision on the admission to attestation, territorial justice authorities will notify you about the place, date, time, procedure for certification no later than 10 calendar days before its conduction. In the bodies of Justice Attestation is carried out if necessary but not less than 1 time per quarter. Attestation consists of two stages - passing of computer test on Kyrgyz Republic legislation knowledge and checking of applicant's knowledge on examination cards. Attestation can be passed as in Kyrgyz language so in Russian one. The next day after passing the attestation the Commission makes a reasonable decision on passage of failure of attestation. This decision will

be valid during 6 years. In case of attestation failure you may pass it second time but not earlier than in one year. Decision of Commission can be disputed by judicial process.

Advocate license is suspended for the period: work in civil service; execution of deputy powers of the Kyrgyz Republic Parliament, deputy of Kyrgyz Republic Parliament, realizing his activity on regular or free basis, paid at the cost of budget funds; compulsory military service; exclusion of advocates from the members of college by the reason of systematic non-payment of duties and in other cases, considered by the Order of college; actual unavailability of premise realizing the professional activity individually without legal entity registration; holding of business or other paid activity by the advocate except teaching, research and creative activity; non-execution of the powers by advocate on the basis of his application in which he points the terms of suspension.

Advocacy in the Kyrgyz Republic is aimed to cooperate to realization of human rights to juridical protection of one's rights, freedoms and obtainment of competent legal assistance state-guaranteed and provided by the Constitution of the Kyrgyz Republic. Advocacy manages attorneys' activities connected with criminal defense, cases of administrative violation as well as legal representation of criminal and civil cases and administrative violation, and delivery of other types of legal assistance in order to protect and assist in realization of rights, freedoms and citizens' legitimate interests and rights and legitimate interests of legal entities as well. Legal assistance provided by attorneys in the framework of their current advocacy cannot be considered as entrepreneurial business. Lawyer activity is the qualified legal aid rendered on a professional basis by lawyers is regulated by the present Law, in order to protect and assist in the realization of the rights, freedom and legitimate interests of individuals, and also the rights and legitimate interests of legal entities.

Advocacy Legislation of the Kyrgyz Republic is based on the Constitution of the Kyrgyz Republic consists of the Law and other normative legal acts of the Kyrgyz Republic regulating advocacy. In case when international agreement ratified by the Kyrgyz Republic provides regulations variant from ones in this Law then there enforced the regulations of the international agreement. Big role now play the special officials- mediators, which help to decide all the conflicts, collisions before the court procedure.

Mediation - a procedure in which an impartial third party helps to understand and resolve the conflict of interest that has risen in between the other two opposing sides. The advantage of this method of dispute resolution is that the mediator helps the parties to develop their own terms of agreement between them.

The potential scope, purposes and practices of court-connected mediation are identified through an examination of mediation theory and particular issues that arise within the context of the formal justice system. All theoretical and practice models of mediation promote a degree of mediation's core features of responsiveness to the individual disputants, self-determination and cooperation. These features of mediation are realized when some key opportunities are extended to disputants within the mediation process. The opportunities are: to explore individual disputants' interests and preferences regarding the content of discussions, for disputants to participate directly during the mediation process and to work cooperatively to respond to the conflict. It is concluded that there is no reason why mediation cannot deliver these key opportunities within the context of the litigation system. Court-connected mediation has broad potential and may promote a variety of purposes and incorporate a range of practices.

Let say few words about decentralization of powers in Kyrgyz Republic. In the past, political centralization has become a source of tyranny. The more that power is centralized in the hands of a single individual or group of people, the more likely it becomes that those in power will make decisions that are not in the best interest of the people they govern. A decentralized political system, on the other hand, shifts power away from a governmental center so that it is closer to being in the hands of the people. For this reason, one of the many merits of decentralization is that it gives individual citizens more control over their own lives by allowing them more say in legislation and other governmental actions. An advantage of government decentralization is that it takes power out of the hands of the few and puts it in the hands of the many, thereby giving individual citizens a stronger voice [2, p.10].

When you think of government, you probably think of political systems that are centralized in some way. One immediately recognizable historical example of political centralization is the Kyrgyz Republic. A decentralized government is an organized political structure that distributes some or all of the governmental power to different points throughout a state. The purpose of a decentralized political system is to

make citizens more active in the decision-making process in their government, therefore allowing individual people to exercise more power over their own lives.

Although the concept of a decentralized political system brings to mind elections by popular vote and small-town government, many modern, functioning national governments operate under varying degrees of decentralization. Representative democratic practices can also be a part of decentralized government even if citizens send their chosen representatives to speak for their interests in centralized seats of power.

In addition to protecting citizens from governmental overreach, the numerous merits of decentralization include ease of access to citizens, a decrease in the bureaucratic burdens of centralized government and an increase in speed in policy implementation.

In decentralized governments, citizens have access to governmental offices that are closer to them. These offices can meet their individual needs. One example of this in the Kyrgyz Republic is local passport offices in major cities and the ability for post offices to act as *de facto* passport offices should the need arise.

Additionally, with greater decentralization comes a decrease in costs. Maintaining government bureaucracy requires both manpower and funding. By decentralizing power, individuals at the far ends of the web of decentralization can accomplish more with less because they have fewer citizens to manage.

One modern example of decentralized governance is the Kyrgyz Republic government. The Kyrgyz Republic delegates many of its powers to the individual cities, even though a centralized government operates in the country. The centralized government has the ability to enact laws and wage war, but in order to do so; laws must be voted on by Parliament, which is made up of people, who were elected democratically by their constituencies. The representative democracy embodied by Parliament and its powers is a form of decentralized government. The Supreme Court of the Kyrgyz Republic and the presidency are forms of centralized power. However, the power of these two central branches is greatly checked by Parliament.

The term “decentralization” embraces a variety of concepts which must be carefully analyzed in any particular country before determining if projects or programs should support reorganization of financial, administrative, or service delivery systems. Decentralization- the transfer of authority and responsibility for public functions from the central government to subordinate or quasi-independent government organizations and/or the private sector - is a complex multifaceted concept. Different types of decentralization should be distinguished because they have different characteristics, policy implications, and conditions for success.

Types of decentralization include political, administrative, fiscal, and market decentralization. Drawing distinctions between these various concepts is useful for highlighting the many dimensions to successful decentralization and the need for coordination among them. Nevertheless, there is clearly overlap in defining any of these terms and the precise definitions are not as important as the need for a comprehensive approach. Political, administrative, fiscal and market decentralization can also appear in different forms and combinations across countries, within countries and even within sectors [3].

Political decentralization aims to give citizens or their elected representatives more power in public decision-making. It is often associated with pluralistic politics and representative government, but it can also support democratization by giving citizens, or their representatives, more influence in the formulation and implementation of policies. Advocates of political decentralization assume that decisions made with greater participation will be better informed and more relevant to diverse interests in society than those made only by national political authorities. The concept implies that the selection of representatives from local electoral jurisdictions allows citizens to know better their political representatives and allows elected officials to know better the needs and desires of their constituents.

Political decentralization often requires constitutional or statutory reforms, the development of pluralistic political parties, the strengthening of legislatures, creation of local political units, and the encouragement of effective public interest groups.

Administrative decentralization seeks to redistribute authority, responsibility and financial resources for providing public services among different levels of government. It is the transfer of responsibility for the planning, financing and management of certain public functions from the central government and its agencies to field units of government agencies, subordinate units or levels of government, semi-autonomous public authorities or corporations, or area-wide, regional or functional authorities.

All the participants of public relations, regulated by law, are obliged to respect and strictly follow the instructions of legal norms, in order to observe the rights of not only entitled but obliged to specific subjects of legal relations. It is an essence of a legal order in the state. However existence of legal collisions endangers protection of legal order and public safety as the central problem of activity of the government and the state in general as the institute, urged to provide such relations in society at which its forward, progressive development is carried out.

The law enforcement bodies carry out a specific function of the state function of rule of law, promoting and protecting the rights of man and citizen. State function on protection of a law and order and the rights of citizens can be characterized as the activity of the state directed on ensuring exact and full implementation of its legislative instructions by all participants of the public relations. But how is it possible to provide an accurate and complete implementation of mandatory rules and regulations, if the regulations contradict one another. Precise and steady performance of contradictory and mutually exclusive norms someone's rights are necessarily infringed or otherwise deprived and this contradicts not only the meaning of legal regulation, but also common sense. Special danger on this way is legal collisions as the quintessence of the confrontation of legal norms.

As for the collision norms in the jurisprudence, in the encyclopedic dictionary of S.I.Ozhogov and N.Y.Shvedova the following definition is given: "A collision is conflict of any opposite forces, interests, aspirations", F.A.Brokgauz and I.A.Efron define a collision more narrowly – "Collision is a conflict of legal norms (laws or the statuses) occurring in the case when the judge should decide a case on the individuals without residence within the local law, property that is in this range, the acts or transactions made by the prisoners or in another county under the action other than the local laws". N.M.Korkunov concluded that: "conflicts are possible, as between the multi-temporal, succeeding each other in the same state laws as well as between different points the laws of different states". Conflicts between laws arise in the case; "if the fact is committed in the scope of a law, it has to be discussed under the domination of another law". In this case, one and the same fact would be subject to two different laws: one - the place or the time of its commission, the other - the place or time of their discussion. This is called conflicts of laws, multi-local and multi-temporal".

Wiener J. points out that: "between separate normative acts conflict can arise. Such contradictions called collisions"[3, P.64]. According to the author, these definitions are too narrow nature of legal conflicts, focusing on a certain criterion, showing legal collisions.

At the same time it should be stressed that the number of our scientists more broadly fit the definition of the concept and essence of legal collisions. Bruce E. Meyers on interprets the legal collision more than just a difference or conflict between the provisions of law, including the definition of all the contradictions that appear in the process of enforcement and implementation, competent subjects (authorities and officials) their powers [4]. The author, considering the types of defects in law, antinomy, unnecessary duplication and gaps in the law - comes to the conclusion that the legal conflict is the relation between the norms arising about the regulation of one of the actual situation [4]. Such understanding of legal collision includes instances of conflict of laws, and the cases of differences, their discrepancy, which allows to refuse determine the defects of the law as «textually and legal conflicts» that clutter the meaning and the essence of the phenomenon.

M.K. Suleimenov understands legal collisions as «the contradiction between the legal norms, regulations, and institutions and claims, actions for their change of violation, rejection» [2, p.17]. Later, the scientist has put forward, in our view, a more expressive and at the same abstract definition, according to which "legal collision is a contradiction between the existing legal order and the intentions and actions to change it". Proposed definition of legal collisions contains a wider and more systemic understanding of this phenomenon. Traditional interpretation of the legal conflict as a clash of norms does not disappear, but the only and universal becomes one of the aspects of the definition.

According to the scientist, a legal collision is expressed: a) in contrasting the differences of legal opinions and positions in legal thinking; b) in a clash of norms and regulations within the legal system, both in industry and in the federal aspects; c) of misconduct within the mechanism of public authority between the state and other institutions and authorities; d) in the differences between the rules of international laws; e) in disputes between states and the contradictions between the norms of national and international law. In our opinion, this definition covers almost all kinds of legal collisions, as well as an

indication of their characteristics, allowing to distinguish legal collisions from similar, similar terms (conflicts, fiction). In addition, in our opinion, this definition allows to see and recognize the conflict as a conflict at the junction of the legal field and the idea of justice, which legislating is intended to build, as the confrontation between the aspirations and interests reflected in the existing legal regulations and their real provision.

From the above it can be concluded, that concept of collision and competition law norms are not subject to identification. Of course, these concepts are similar in content, but you cannot identify them. The existence of the norm is stipulated by the nature of the legal regulation. Competition arises if necessary concretization of legal norms, which are abstract in nature to a certain type of social relations. Multidimensionality of approaches to the definition of legal conflicts, their diversity and heterogeneity necessitates their classification. This issue has been studied by scientists such as A.Kh.Saidov, P.S.Dagel, N.I.Matuzov, V.V.Smirnov, Y.A.Tikhomirov, and others. Most scientists have the same position as their vision of legal collisions is much the same.

Collisions of competence can be expressed in that certain state agencies, officials and other parties, possessing powers to implement them fully or, on the contrary, are beyond its competence, ignoring the competence of other subjects. Although it may be a deformation of status or extralegal formation of the government or public body, the organization, the official.

The reasons of occurrence of legal conflicts, the study which we will spend the next, you can select the conflicts arising due to the development of social relations, i.e. the influence of objective factors, and the conflicts arising due to low legal technique, combat tactical interests in the apparatus of state power, insufficient level of legal culture of the population and, in particular, legislators, etc.) i.e. the influence of subjective factors.

The conditional admission for the truth, as a deliberate falsity of the accepted provisions are a legal fiction only the outer form, which is vested in the creation of new legal norms. Actually, legal fiction is in its content, just the rule of law, regulating the relationship between objective reality. In spite of the legal fictions, their aims and forms they have the conditional nature. The contradiction lies between the real state of certain facts and the decision of judicial body, which is conditional on their presence or absence. However, it is difficult to agree with the statement that collisions of any fictions - in generation of confusion, where the person is wrong, has a false idea about the existence or absence of certain facts.

Since when considering the question of the definition of legal collisions, revealing their essence as a legal phenomenon, the author pointed to a narrowing of the subject of the study when looking at them from the traditional positions and tied his position with Y.A. Tikhomirov, then the classification given to these scientists, we also seem the most appropriate nature of the phenomenon.

Today speedy and stable provision of legitimacy can and should be regarded as a priority goal and primary task, because of the collision between the laws and other normative legal acts have become commonplace. They have created a fertile ground for abuse of the various authorities' deformation of economic and social relations, and violations of law and order.

It should be remembered that all the laws passed by-laws and other regulations must, among other requirements for the acts of this kind, to answer the idea of justice and humanity, respect for human rights and freedoms. And these same ideas of social justice, equality, freedom, non-moral categories, but more often included in the concept of law, were offset by a few years of endless political, economic, social and cultural reforms in the country.

The law-abiding state in the country - one of the main objectives of the government. On the one hand, the rule of law is possible only if effective laws passed by the government, and strict observance of the rule of law (in the first instance, the government institutions and persons in authority), on the other hand, the rule of law requires the observance of the laws directly by the people, and it can be achieved in two ways - the planting of fear of authority and the law, and the inevitability of cruel punishment, and the formation of a law-abiding consciousness, belief in the need to respect the law". In the Law of the Kyrgyz Republic "About mediation" of July 28, 2017 has fixed: "Court-connected mediation carries an aura of authority, particularly where it is conducted on the court premises, the mediator is an officer of the court and the disputants" legal advisors control the mediation process" [5].

Legal conflict reflects the changes in the legal system or some of its elements, objective the modernization of state institutions, serves as evidence of the natural contradictions of normal development and



functioning of the state and legal institutions, and may express a just claim to a new legal order or the protection of the constitutional system, the legitimate opposition to the arbitrary, illegal acts and actions, i.e. all sorts of violations of the law. In this connection the problem of the effectiveness of legislation, determine the effectiveness of law enforcement and currently represents one of the priorities and future directions in the Russian legal science [6, P.68]. So, in that sense, which is embedded in the concept under consideration, it can be considered a generic, basic. The collision is not just a one-time act or action, or both cross-sectional committed. This procedure and the analysis of available laws and other acts and documents contained in the evaluation of public law, public institutions, economic systems, and the confrontation of interests, as reflected in the existing legal provisions and their real security and interests of citizens, officials, government agencies, political parties, social movements, expressed in other state law claims and activities.

In this context we would like to stress about humanism. Humanism is an approach to life based on reason and our common humanity, recognizing that moral values are properly founded on human nature and experience alone. While atheism is merely the absence of belief, humanism is a positive attitude to the world, centered on human experience, thought, and hopes.

In our culture, people are so accustomed to the idea of every law having a lawmaker, every rule having an enforcer, every institution having someone in authority, and so forth, that the thought of something being otherwise has the ring of chaos to it. As a result, when one lives one's life without reference to some ultimate authority in regard to morals, one's values and aspirations are thought to be arbitrary. Furthermore, it is often argued that, if everyone tried to live in such a fashion, no agreement on morals would be possible and there would be no way to adjudicate disputes between people, no defense of a particular moral stand being possible in the absence of some absolute point of reference.

But all of this is based on certain unchallenged assumptions of the theistic moralist - assumptions that are frequently the product of faulty analogies. It will be my purpose here to take a fresh look at these assumptions. I will try to show the actual source from which values are originally derived, provide a solid foundation for a human-based (humanistic) moral system, and then place the burden on the theist to justify any proposed departure. Unthinkingly, people often assume that the universe is run in a fashion similar to human societies. They recognize that humans are able to create order by creating laws and by establishing means of enforcement. So, when they see order in the universe, they imagine that this order had a similar humanlike source.

When mediation is court-connected the influence of the external standard of legal norms also impacts on disputants' self-determination of the content of mediation. The prioritization of legal norms may reduce the importance of the individual needs and interests of the disputants regarding outcome. The focus becomes those objective standards in relation to which few disputants are experts.

When a lawmaker is said to be needed for every law, the result is an endless series, since someone must be the lawmaker of the lawmaker's laws. Because such a series is uncomfortable to moral philosophers and theologians, at some point they declare that "the buck stops here". They argue for an ultimate lawmaker, one who has no one who makes laws for him. And how is that done? The point is made that the buck has to stop somewhere, and a supernatural god is thought to be as good a stopping place as any.

Law, however, is not necessarily the same as morality; there are many moral rules that are not regulated by human legal authorities. And so the question arises as to how one can have a workable set of moral guidelines if there is no one to enforce them. Laws and rules are generally designed to regulate activities that can be publicly observed. This makes enforcement easy. But breaches of moral principles are a horse of a different color. They often involve acts that are not illegal but simply unethical and can include acts that are private and difficult to observe without invading that privacy. Enforcement, therefore, is almost totally left to the perpetrator. Others may work on the perpetrator's emotions to encourage guilt or shame, but they have no actual control over the perpetrator's conduct [7].

Humanists usually believe in the existence and importance of moral value. Humanists tend to have a particular interest and concern with moral and ethical issues. Most Humanists believe that actions can be objectively morally right or wrong. So far as knowledge of right and wrong is concerned, Humanists place strong emphasis on the role of science and/or reason. In particular, they usually suppose that our ethical framework should be strongly informed and shaped by an empirically grounded understanding of what human beings are actually like, and of what enable them to flourish. Obviously, when a Humanist offers

moral justifications, they will justifications rooted in something other than religious authority and scripture.

In the conclusion we would like to note, that concept of effective advocacy as a critical part of the culture of human rights and change. Correspondingly, such an approach gives human rights advocacy a clearer objective in terms of the nature of the violation, the strategies of advocacy, the institutions of intervention and the possibility of improving the human rights landscape. Some mediators seek to minimize reliance on professional assistance by insisting on direct disputant participation and an advisory as opposed to advocacy role for professionals. However, to understand these issues as problems, we must have better tools, that work cross-culturally, that permit us to mark and map problems in appropriate contexts for which there is a need for human rights advocacy and intervention.

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### **ҚЫРҒЫЗ РЕСПУБЛИКАСЫНДАҒЫ АДВОКАТУРА ИНСТИТУТЫНЫҢ ТУРАЛЫ МЕМЛЕКЕТТІК РЕТТЕУДІҢ ПРОБЛЕМАЛАРЫ БЕКІТУ**

**Аннотация.** Мақалада тегін коллизия нормаларды, сондай-ақ Қырғыз Республикасында, мемлекеттік билікті орталықсыздандыру адвокатура институтын дамуы жалпы сипаттамасы ұсынылған ізгілік, принципін қолдану практикасын ретінде құқығы бар. Қырғыз Республикасында – бұл азаматтық қоғам институты қалған азаматтардың құқықтары мен бостандықтарын қорғайтын. Адвокатура қылмыстық сот ісін жүргізу аясында. Бұл институт өзінің тәуелсіздігін мемлекеттен және постсоветтік мемлекеттердің аумағында соңғы кезге дейін бойы ең маңызды болып саналатын құқығы бойынша Орталық Азияда. Адвокаттар өзін-өзі басқару органдарының атқарушы биліктен, Қырғыз Республикасына айтарлықтай автономияны болған жоқ, бірақ әрқашан астында болған артық болмаса да, өзінің қызметі мен игеруді қорғаншылықта практикада мүмкін болған кезде кәсіби және өз міндеттерін толық көлемде таныған кепілдіктермен формальды түрде жіберуге салыстырмалы шығармашылық бостандықтары. Сонымен бірге, адвокатура, өзінің негізгі функцияларын толық тәуелсіздігі үшін жеткілікті болмаса да, бірақ өткен жылдар ішінде формаға орнатуды ұйымдастыру нысандары шеңберінде қалыптастырылған ескі кеңестік лекалоларға тағы да қалды. Ресми түрде қорғауды қамтамасыз ететін адвокатура қылмыстық және әкімшілік істер бойынша білікті заң көмегін алуға құқығы бола отырып, осы институт, іс жүзінде ғана сақтап қалды.

**Түйін сөздер:** адвокат, адвокатура, қорғаушы, азаматтық қоғам институты, адам құқықтарын заң қызметтерін көрсету, сот ісін, кәсібилік, өзін-өзі басқару, білікті заң көмегі.

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### **О НЕКОТОРЫХ ПРОБЛЕМАХ ГОСУДАРСТВЕННОГО РЕГУЛИРОВАНИЯ ИНСТИТУТА АДВОКАТУРЫ В КЫРГЫЗСКОЙ РЕСПУБЛИКЕ**

**Аннотация.** В статье представлена общая характеристика генезиса и эволюции института адвокатуры в Кыргызской Республике, децентрализации государственной власти, практики применения коллизионных норм, а также гуманизма, как принципа права. Адвокатура в Кыргызской Республике - это институт гражданского общества, защищающий права и свободы граждан, оказавшихся в орбите уголовного судопроизводства. До недавнего времени этот институт сохранял свою независимость от государства и по праву считался самым развитым на территории постсоветских государств Центральной Азии. Адвокаты Кыргызской Республики имели немалую автономию от исполнительной власти, не находились под излишней опекой органов собственного самоуправления, обладали пусть не всегда соблюдаемыми в полном объеме на практике, но формально признаваемыми, гарантиями своей деятельности и могли отправлять свои обязанности при наличии относительной профессиональной и творческой свободы. Вместе с тем, адвокатура, отстоявшая за

прошедшие годы свою пусть не полную, но достаточную для оправления основных функций независимость, осталась в рамках организационных форм, сформированных еще по старым советским лекалам. Будучи институтом, официально обеспечивающим право на квалифицированную юридическую помощь, фактически адвокатура сохранила монополию лишь на защиту по уголовным и административным делам.

**Ключевые слова:** адвокат, институт адвокатуры, защитник, права человека, судопроизводство, профессионализм, гражданское общество, самоуправление, юридические услуги, квалифицированная юридическая помощь.

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#### REFERENCES

- [1] Law "About advocacy in Kyrgyz Republic // July, 14, 2014. N 135 <http://dx.doi.org/10.18411/a-2018-008> (in Rus.).
- [2] Suleimenov M.K. Development of the Institute of Private Law in the Legislation of Kazakhstan // Scientific works of Adilet. 2016. Vol. 1. P. 10-22 <http://doi.org/10.17803/2311-5998.2016.32.4.081-090> (in Rus.).
- [3] Wiener J. Globalization and the harmonization of law. USA, 2015 [http://doi.org/10.24411/2078-5356-2015-10004\\_\(in Eng.\)](http://doi.org/10.24411/2078-5356-2015-10004_(in Eng.))
- [4] Bruce E. Meyerson. Mediation Should Not Be Considered the Practice of Law. 2017 [http://doi.org/10.18611/2221-3279-2017-4-2-\(12\)-82-86\\_\(in Eng.\)](http://doi.org/10.18611/2221-3279-2017-4-2-(12)-82-86_(in Eng.))
- [5] Law of the Kyrgyz Republic "About mediation" of July 28, 2017 № 161 <https://doi.org/10.32014/2018.2518-1467> (in Rus.).
- [6] Ayupova Z.K., Kussainov D.U., Bekbergenova A.K., Winston Nagan. Major ideas and main values of the universal un declaration on human rights: the 70-years' experience // Bulletin of the National academy of sciences of the Republic of Kazakhstan. 2019. Vol. 1. P. 68-74. <https://doi.org/10.32014/2019.2019-1467.8> (in Eng.).
- [7] Antsupova A.Ya. Service Of The Protection Of The Rights Of Men And Citizen. International Experience. M., 2018. <https://doi.org/10.32014/2018.2518-1467.35> (In Eng.).
- [8] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedyorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494.4(380). P. 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [9] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S., Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. (2019). Foresight and the role of innovation in the development of education // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494.4(380). 93-101. <https://doi.org/10.32014/2019.2518-1467.96>
- [10] Mamyrbayev O.Z., Othman M., Akhmediyarova A.T., Kydyrbekova A.S., Mekebayev N.O. Voice verification using I-vectors and neural networks with limited training data // Bulletin of the National academy of sciences of the Republic of Kazakhstan. 2019. N 3(379). P. 36-43. <https://doi.org/10.32014/2019.2518-1467.66>
- [11] Lavrinenko S.V., Arpentieva M.R., Kassymova G.K. (2019). The negative impact of the internet on the educational process. International youth scientific conference "Heat and mass transfer in the thermal control system of technical and technological energy equipment" (HMTTSC 2019). <https://doi.org/10.1063/1.5120671>
- [12] Atayeva M., Putro N.H.P.S., Kassymova G., Kosbay S. (2019) Impact of reading on students' writing ability // Materials of International Practical Internet Conference "Challenges of Science". ISBN 978-601-323-144-0. Issue II, 2019. P. 5-13. <https://doi.org/10.31643/2019.001>
- [13] Kassymova K.G., Tyumaseva Z.I., Valeeva G.V., Lavrinenko S.V., Arpentieva M.R., Kenzhaliyev B.K., Kosherbayeva A.N., Kosov A.V., Duvalina O.N., Dossayeva S.K. Integrative model of student and teacher stress coping: the correction of relations in educational, professional and personal interaction // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494. 2019. Vol. 3, N 379. P. 169-179. <https://doi.org/10.32014/2019.2518-1467.83>
- [14] Arpentieva M.R., Kassymova G.K., Lavrinenko S.V., Tyumaseva Z.I., Valeeva G.V., Kenzhaliyev O.B., Triyono M.B., Duvalina O.N., Kosov A.V., Dossayeva S.K. Environmental education in the system of global and additional education // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494. 2019. Vol. 3, N 379. P. 158-168. <https://doi.org/10.32014/2019.2518-1467.82>

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## **IMPLEMENTATION OF INNOVATIONS AS THE BASIS FOR IMPROVING TAX AUDIT**

**Abstract.** This scientific article analyzes research and identifies the main directions to the definition of innovation in the sphere of state tax audit and management. The research of CIS scientists in the field of innovations in the public sector is described and the directions of modernization of tax regulation according to the strategic documents of the Republic of Kazakhstan are given. The dependence of tax revenue collection on the level of innovation activity of Kazakhstan, OECD countries and neighboring countries is considered.

**Key words:** innovations, tax audit, tax burden, state program.

**Introduction.** In the context of innovative development of the economy, the use of information technologies, material and technical equipment of tax authorities and improvement of qualification of employees of the tax service are of particular importance.

A key factor in improving the efficiency of tax administration should be a high degree of information interaction between the taxpayer and the Executive. To date, such interaction should be carried out in electronic form using modern telecommunications. Improving the functioning of the tax system through the introduction of new information technologies, equipment with modern systems of technological processes and operational management tools will lead to the improvement of the system of accounting of taxpayers, providing operational control of the activities of all subjects of taxation, as well as to the creation of a unified information system of tax authorities, taking into account the security of information.

The analysis of scientific researches allowed to reveal the main directions to definition of innovations in the field of the state control and management. Consider the following approaches in the world scientific literature

Thus, according to V. Bekkers, P. Foley and X. Alfonso, in many countries in the period of transformation, efforts are being made to modernize the administration, focused on improving the efficiency of internal government operations, communication with citizens by providing information and public services available in electronic form [1, 2].

C.A. Rusaw notes in his writings that transformation in the public sector is a complex process characterized more by changes in the political and legislative sphere than by market shifts [3].

W.H. Dutton and R. Eynon argue that innovation plays a Central role in modernizing and transforming government, requiring not only the introduction of information services, but also new types of relationships between public sector actors and citizens [4].

An analysis by Joseph Feller, Patrick Finnegan, and Olof Nilson identified four types of innovation for public administration transformation: aggregation, syndication, consumption, and partnership. Thus, it is noted that the studied innovations have an impact on the revenues of the regional budgets, namely by increasing revenues as a result of joint branding of the region and the expansion of the small and medium-sized business sector [5].

F. Damanpour and M. Schneider assume that innovation can improve the quality of public services, as well as the ability of government organizations to address social problems through the creation of a well-

functioning management system. Such reforms are accompanied by the introduction and development of new public administration, e-government, and recently discussions about the transition from government to "Big society" [6].

According to J.Potts, the public sector should be guided by the economic principles of efficiency: minimize costs and maximize budget revenues. The use of innovation in the public sector contributes to the efficiency of the state like market actors. The author identifies five reasons for the need for innovation: economic growth, inefficient management structure, lack of competition in the public sector, the emergence of dysfunctional state regulators in relation to the private innovation sector, changing forms of public-private partnership [7].

PDunleavy emphasizes that the emergence of new technologies is accompanied by the entry into the new digital era of governance (DEG). DEG is characterized by the reorganization of public relations, the priority of which is the interests of citizens. The changes of the digital age inevitably affect the governments of States. The emergence of social networks, cloud technologies, application development promote advanced industrial societies in the direction of online civilization [8].

According to Ch. Pollitt, the public sector can be improved by importing business concepts and methods, focusing on the effectiveness of results, the replacement of hierarchical relationships with contractual ones and the widespread introduction of market-type mechanisms[9].

Jerry Fishenden, Mark Thompson identify three areas of innovation in the public sector: reintegration, holism and digitization of data. Reintegration, contrary to the concept of integrated management, includes outsourcing and simplified service chains. The second direction, holism, is the reorganization of services for citizens, and includes a "single" system of services supported by data storage, simplification and integration of processes, as well as audit by citizens and evaluation of services based on social networks. Third, digitization, involves a strategy of "100% online channels" in which the services are automatic processes by default, open data, public "cloud web services", the government is an open book (the maximum possible openness in providing information about the formation of the income and expenditure of the state), the sharing of services [10].

Consider the research of CIS scientists in the field of innovation in the public sector. Thus, V.F.Islamutdinov notes that management innovations should be implemented in a comprehensive manner: both in the management structure, and in technical, personnel, information support, and in other areas for the effective achievement of strategic goals [11].

According to Lobanov V. V., in the world practice there is a certain algorithm of modernization of the system of public administration in post-socialist countries, when at the first stage the main attention is paid to legal acts and legislation. Then they move on to the creation of stable functioning institutions and organizations in the system of public administration. And then they are actively working on improving the efficiency of the entire system based on the analysis of current problems and the developed "ideal" model of public service.

In the work of Ponomarev A. I., modernization model of efficiency in the administration of tax policy is implemented in the following areas: organizational and methodological improvement of the activities of the tax authorities, simplifying the process of paying taxes, the gradual replacement of paper documents, streamlining of mutual relations of tax authorities with taxpayers, creation of a more comprehensive and transparent tax management system [12, 13].

M. V. Mishustinnotes that the use of modern information technologies contributes to the transition of the tax service to a qualitatively new level of tax administration. The key effects are greater stress resistance to economic shocks, and therefore the preservation of stable budget revenues at all levels, as well as increased transparency through remote interaction between taxpayers and tax authorities.

In the studies by Y. A. Petrov, it appears that the modernization of tax administration is possible only through the implementation of a fundamentally new – innovative – approach to reform of the tax system. Its essence is that any taxes are considered as social institutions, the establishment and change of which are respectively fundamental and improving innovations, accompanied by external effects (positive and negative) and causing the effect of counter-innovation on the part of taxpayers [14, 15].

Klimova N. V. emphasizes that the innovative vector in the improvement of tax administration should simultaneously provide a stable dynamic of innovative processes, economic growth, increasing the competitiveness of business and welfare of the population[16].

**Methods.** General scientific and special methods such as: method of system analysis; method of content analysis; method of comparative analysis; method of analysis and synthesis; method of system approach are used.

**Results.** Within the framework of the study the directions of modernization of tax regulation in accordance with the strategic documents of the Republic of Kazakhstan are considered.

One of the points of the state program of industrial and innovative development of the Republic of Kazakhstan for 2015-2019 is to improve the administration of tax legislation on the principle of "one window", which is aimed at stimulating investment and innovation activity of business according to OECD standards.

The state program "100 steps for 5 institutional reforms" identifies the following objectives of modernization of tax policy: optimization of tax policy and procedures, integration of customs and tax systems, introduction of universal tax declaration of income and expenses, creation of a network of centers for receiving and processing tax returns, risk management system.

The state program "Digital Kazakhstan" provides for the following key projects in the framework of modernization of tax administration: introduction of the principle of Paper-Free (reduction of paper turnover), development of open platforms (Open API), Big Data and artificial intelligence; improvement of tax administration and transition to electronic Declaration.

In the address of the President of the Republic of Kazakhstan Nursultan Nazarbayev to the people of Kazakhstan on January 31, 2017, the key task is to bring the fiscal policy to the new economic realities. Among the priority areas of improvement of tax policy are the following: stimulation of business exit from the "shadow" and expansion of the tax base in the non-commodity sector, optimization of existing tax benefits, improvement of tax administration mechanisms.

Some researchers believe that, the innovative economy provides the world economic superiority of the country for most developed countries in the modern world [17, 18].

Consider the dependence of tax revenue collection on the level of innovation activity of Kazakhstan, OECD countries and neighboring countries. According to the global innovation index 2018, the leading countries in terms of innovation activity are Switzerland, Sweden and the Netherlands. Kazakhstan ranks 74th in this rating [19].

Data on the level of tax burden of the studied countries are selected according to the world Bank. Summary data for the analysis are presented in table 1.

Construct correlation based on effective field variable Y (the level of tax burden, %) of X to argue (global innovation index). We determine the median values of X and Y, which will indicate the quadrants of the correlation field, characterizing the nature of functional dependence (figure).

The first quadrant is represented by the developed countries of Western Europe: the Netherlands, Sweden, Great Britain, Finland, Denmark, Ireland, Luxembourg, France, Norway, Austria, Iceland, as well as the advanced OECD countries: Israel, Australia, New Zealand and Estonia. In this section of the correlation field there is a direct relationship: the higher the level of innovation, the higher the tax burden. This fact is explained by the high state participation in the creation of conditions for innovative activity in order to expand the tax base. The state accumulates tax revenues, directing them subsequently to the creation of innovative industries, thereby increasing the level of national gross product. Consequently, the innovative activity of these countries is supported by the state tax administration, redistributing high tax revenues to support high-tech business initiatives.

The second quadrant is represented by countries with advanced innovation economies: Switzerland, USA, Germany, Singapore, South Korea, Japan, Canada, China and Hong Kong. In this sector, the inverse relationship is revealed: a high level of innovation with a low tax burden. The state, by lowering tax rates, increases the net profit of companies, thereby stimulating innovation activity in a highly competitive market. The distinctive feature of these systems is the decentralized structure of innovation regulation. The state creates favorable conditions for economic activity, and business, in turn, generates advanced innovative projects. China experience in tax incentives for innovative development is noteworthy. The state provides tax incentives for companies that use their own financing to invest in innovative technologies, and offers preferential tax status for high-tech mini - and micro-enterprises.

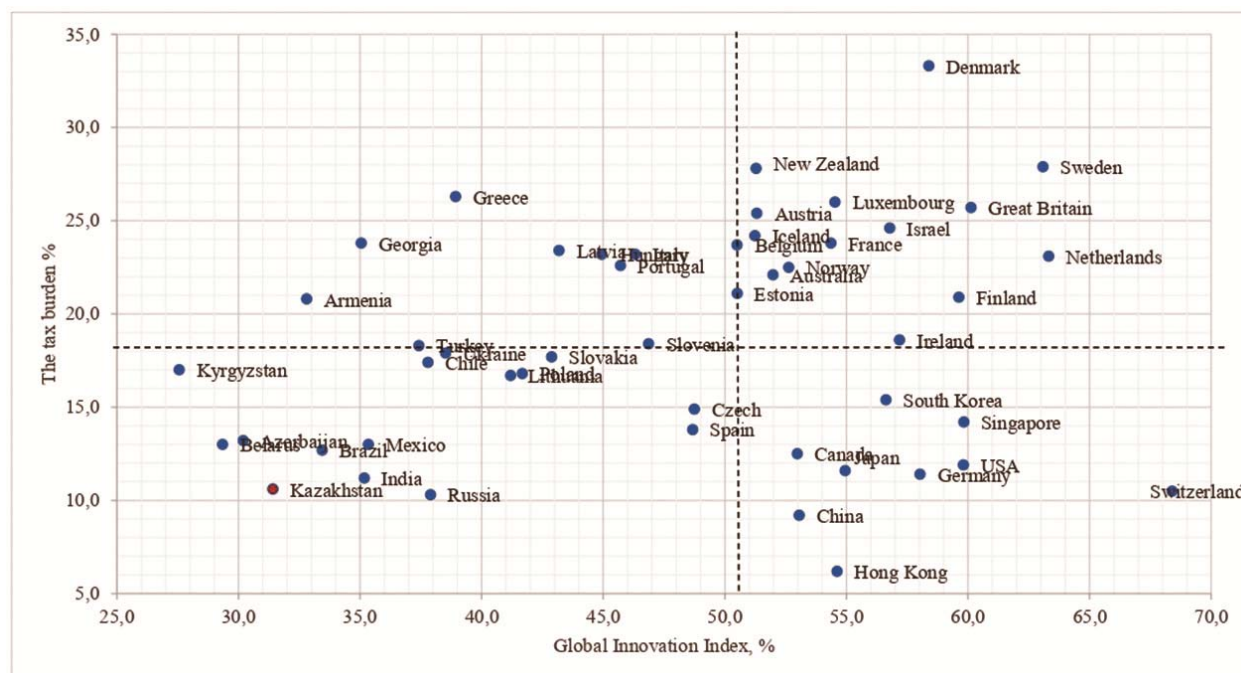
The third block includes emerging market countries: Czech Republic, Slovakia, Lithuania, Ukraine, Poland, Chile, Russia, Mexico, India, Brazil, Kazakhstan, Belarus, Azerbaijan and Kyrgyzstan, as well as

advanced economies: Spain and Turkey. This quadrant is characterized by direct dependence: low level of innovation and, therefore, low level of tax burden. The market capacity of these economies does not allow to develop innovations at a forced pace, thereby expanding the tax base. High dependence on natural resources and weak support for innovation activities lead to low levels of tax collection. According to the report on the Global innovation index, these countries will achieve a significant tax effect with the active support of innovation or the creation of a competitive business environment. It should be noted that Kazakhstan and other EAEU member States are represented in this group. This indicates a common economic and innovative development within the integration processes of the union.

The fourth quadrant is represented by the countries of Eastern Europe (Slovenia, Hungary), as well as part of the OECD countries (Belgium, Greece, Latvia, Portugal), and the near abroad (Georgia, Armenia). This block is characterized by a high level of tax burden with insufficient development of innovations. The government with a sufficiently high level of tax revenues does not contribute to the financing and implementation of innovative projects. Strengthening the policy of support for high-tech and knowledge-intensive industries will ensure a transition to a higher quality level in the likeness of the first group of countries.

Table 1 – Indicators of the global innovation and tax burden index by country for 2018

№	Country	Global innovation index	Taxburden, %	№	Country	Global innovation index	Taxburden, %
1	Australia	52,0	22,1	26	Lithuania	41,2	16,7
2	Austria	51,3	25,4	27	Luxembourg	54,5	26,0
3	Azerbaijan	30,2	13,2	28	Mexico	35,3	13,0
4	Armenia	32,8	20,8	29	Netherlands	63,3	23,1
5	Belarus	29,4	13,0	30	N. Zealand	51,3	27,8
6	Belgium	50,5	23,7	31	Norway	52,6	22,5
7	Brazil	33,4	12,7	32	Poland	41,7	16,8
8	Britain	60,1	25,7	33	Portugal	45,7	22,6
9	Hungary	44,9	23,2	34	Russia	37,9	10,3
10	Germany	58,0	11,4	35	Singapore	59,8	14,2
11	HongKong	54,6	6,2	36	Slovakia	42,9	17,7
12	Greece	38,9	26,3	37	Slovenia	46,9	18,4
13	Georgia	35,1	23,8	38	USA	59,8	11,9
14	Denmark	58,4	33,3	39	Turkey	37,4	18,3
15	Israel	56,8	24,6	40	Ukraine	38,5	17,9
16	India	35,2	11,2	41	Finland	59,6	20,9
17	Ireland	57,2	18,6	42	France	54,4	23,8
18	Iceland	51,2	24,2	43	Czechia	48,8	14,9
19	Spain	48,7	13,8	44	Chile	37,8	17,4
20	Italy	46,3	23,2	45	Switzerland	68,4	10,5
21	Kazakhstan	31,4	10,6	46	Sweden	63,1	27,9
22	Canada	53,0	12,5	47	Estonia	50,5	21,1
23	China	53,1	9,2	48	South. Korea	56,6	15,4
24	Kyrgyzstan	27,6	17,0	49	Japan	55,0	11,6
25	Latvia	43,2	23,4	50	<b>Median line</b>	50,5	18,3



Correlation plot of interdependence of the tax burden on the level of innovation activity for 2018 by country

According to Nobel prize winner John Forbes Nash's game theory, no contestant can increase winnings by changing their strategy unless other contestants change their strategies. Applying this theory to the innovative development of the regions, it can be concluded that the tax potential of the Republic can be achieved only at a uniform rate of implementation of high technologies in each individual area [20].

Increasingly, new sources of information, such as social networks and other web-based communication platforms, provide public services with sources of innovative ideas and new tools to connect with citizens and engage in discussions on social issues. The use of extensive and diverse information contained in the society as a whole can offer opportunities for creating innovative tax audit potential, including through the provision of new knowledge, creativity and feedback.

The openness of tax audit results to external users of information is also associated with new ways of information management. There are many examples from foreign practice, when citizens are given the opportunity to regularly submit ideas or feedback to government agencies. Intensive use of technologies such as crowdsourcing, BIG DATA and OPEN DATA allows tax authorities to use extended information that will contribute to obtaining better results of tax audit. Within the framework of the strategic plan of the Ministry of Finance of the Republic of Kazakhstan it is planned to introduce the technology «BIG DATA» on the basis of which modern digital solutions in the field of tax administration will be applied. The relevant system will ensure the formation of the necessary data for the transition to the universal Declaration of income.

According to Deloitte research, at the present stage, the stable functioning of the tax system requires the creation of a transparent structure, which, based on the aggregation, confirmation and analysis of data, will allow to identify deviations and avoid possible risks [21].

In accordance with the OECD recommendations, a model of tax audit transformation in terms of innovative development is proposed. The key element of the proposed model is the transition from post-audit (post-audit) to pre-audit (pre-audit). In our opinion, on the basis of the above analysis, as the state tax audit system improves, two key indicators are achieved, namely the minimum level of the tax gap and the reduction of audit costs by increasing the taxpayer's liability.

In our opinion, the described structure corresponds to the Deep Learning approach, which is one of the advanced scientific approaches in modern science in the field of process modeling. The Deep Learning method consists in recognizing the error at each stage of the process and preventing it from moving to the



next stage. The system allows you to minimize the use of human labor by analyzing input and output data and building on their basis of an analytical model of development.

The main advantage of the proposed model is the ability to: link many factors and the result in the form of the probability of obtaining the desired result in various combinations of direct and indirect factors; track changes in the resulting indicator by changing the input data online; build forecasts for future periods; automate the decision-making process; monitor the overall state of the system.

It is important that the developed model meets the requirements of the actual idea of management by key performance indicators (KPI), widely covered in the professional literature. The possibilities of the proposed model allow us to implement a multivariate approach to the preparation of the appropriate tax policy necessary to make timely and effective decisions based on the development strategy of the tax system. The complexity of decision-making in the field of tax audit is reduced, the quality and speed of their adoption are increased.

Currently, the tax audit system is based on the verification of annual tax reports, a third of which are still filed in paper form. In this regard, the function of tax audit is reduced to the identification of committed actions that are contrary to tax legislation. The process of processing and analysis of tax information leads to the formation of a time lag, which is economically inefficient, according to the concept of the time value of money.

Based on the analysis, it was revealed that the post-audit phase is presented in the form of two levels: immature audit stage (immature post-audit) and mature audit stage (mature post-audit). In our opinion, the immature audit phase can be described by the following characteristics:

- Organoleptic assessment methods for audit purposes involve the control of actual compliance, requiring the direct presence of auditors. Such methods include examination, visual observation, object examination, questioning and testing. Despite the widespread use of these methods in the practice of tax audit, this approach requires high costs of resources and time, and is subject to corruption risks.

- Internal data sources are limited in use by other public authorities, thus making it difficult to collect and analyze data for audit purposes. New Zealand's experience has shown that an enhanced and improved way of sharing data (both public and private) significantly reduces tax audit costs through easy-to-use online servers.

The mature post-audit phase is defined by the following distinctive features:

- Automatic methods of tax reporting processing for audit purposes and selective selection based on the risk management system at the post-audit stage. These methods result in saving time, costs and more accurate reflection of tax reporting data. However, the relevant types of information processing and risk management system reveal, but do not prevent, the facts of non-fulfillment of the tax obligation by the taxpayer. In Singapore, for example, the No-Filing Service (NFS) is designed to eliminate the need to file personal tax returns for taxpayers. NFS was trialled in 2007 with 45,000 taxpayers and rose to 1.39 million in 2017. Taxpayers can view their "tax liability assessment Notice" on the web portal. Using reliable data to automate the tax filing process reduces the risk of non-compliance with tax laws and the need for contact between the taxpayer and the tax authority.

- A wide range of internal and external data sources is possible through the widespread use of BIG DATA and OPEN DATA technologies. Information with varying degrees of detail from partner public services provides a full range of input data during the audit. In the practice of the Russian Federation, the assessment of property taxes is made on the basis of information that is provided in an XML file by the property register, which contains descriptions of the properties and parameters of the tax base. Tax information, regardless of their location, can be obtained by taxpayers through a personal secure account on the web portal of the tax administration.

Thus, the post-audit stage is characterized by the presence of technological tools of the audit process. However, the audit is carried out in relation to the committed facts of improper planning, control and regulation, as well as non-fulfillment of tax obligations.

The transformation phase requires not only the transformation of technical equipment, but also the corresponding legislative registration of areas of improvement of tax audit. In parallel, it is necessary to develop audit using third-party tax-related information through a broader dialogue on acceptable audit formats and standards. An important requirement, in our opinion, is the high potential of tax auditors in the field of advanced analysis.

The stage of transformation, in our opinion, can be divided into two levels: the stage of development of external tools and the stage of development of internal tools. The first stage is characterized by the introduction of external tools that can adapt existing systems and make more fundamental changes, adapt outdated systems and make more fundamental changes related to the implementation of ready-made technological solutions. The transformation process also requires political and public support, given that it will include major tax administration reform programs, including privacy and data security issues. At the same time, the implementation of the digitization process for tax audit purposes at the state level contributes to the simplification and reuse of information.

External tools at the transformation stage include:

- Legislative support and support for reducing the cost of tax audit, which contribute to the legal consolidation of the principle of efficiency.

- Support from other government agencies is accompanied by a solution to the issue of duplication of functions and powers of state authorities.

- The development of a coordinated digital government and information sharing involves the creation of a partnership information platform linking different government structures. For example, Norway has developed the portal for electronic dialogue and exchange of information between government agencies, individuals and organizations. The main advantage of this system was the harmonization of deadlines, as well as the reduction in the number of electronic forms submitted from five in 2002 to one in 2017, respectively.

- Independence and transparency imply partial autonomy of the tax authorities in matters of control, as well as publication of the audit results. In Malaysian practice, the Internal Revenue Board became a semi-autonomous revenue management Agency in 1996 and adopted corporate governance standards. Although tax policy decisions remain under the jurisdiction and control of the Treasury Department, the IRBD and its Board of Directors have increased the level of autonomy to manage their finances and human resources. In January 2015, the IRBD switched to the principle of self-financing through Agency fee, which represents some share of the annual volume of direct taxes. The similar approach is used in the number of countries in Asia, Africa and South America. IRBD can respond more quickly to changes in the business environment; and more easily implement measures to improve business and efficiency.

- the introduction of the Institute of tax mediation will reduce the time and financial resources for the settlement of tax disputes, thereby speeding up the process of collecting additional tax revenues to the state budget.

- Changes in the legal framework make it possible to expand the rights of tax auditors to access information of third parties.

- Intensive development of investments in digital services implies obtaining more reliable audit results through the introduction of high-quality innovative software products.

Internal instruments of the transformational stage of tax audit include:

- Comprehensive database of legal and physical entities and the IDs of the taxpayers for use of third-party information when conducting the audit.

- Simplified the process of filing a tax return.

- Guarantee the correctness of the tax reporting.

- High technological and qualification requirements to participants of tax audit (external and internal recipients).

- Electronic system for filing tax returns

Summarizing the above, it should be noted that the transformation phase of tax audit requires the creation of a favorable environment, both technological and legislative. Thus, these external and internal instruments increase the level of trust in tax administrations on the part of taxpayers, thereby increasing the efficiency of the entire tax system.

The pre-audit phase represents the most advanced level of the tax system functioning, as it minimizes the time lag for detecting non-fulfillment of tax obligations, as well as prevents attempts to evade taxes. The preliminary audit stage is divided into two levels: the highest level and the advanced level.

The highest level of development of the preliminary audit is the formation of stable information flows of data from third parties, external and internal mechanisms for changing the structure of the tax administration system. These tools will allow the tax authorities to check taxable income directly at the time of their occurrence, pre-fill in tax returns and, subsequently, to abandon the use of this form of control.

The main mechanism of an effective system at this stage is the pre-filling of tax returns on the basis of advanced Analytics. A number of tax administrations in advanced countries have already moved to pre-fill in taxpayer declarations, which the taxpayer must then either agree to (by reasonable agreement) or provide additional information that may lead to an adjustment of accrued tax liabilities.

The effective functioning of the relevant system requires the introduction of taxpayer identification, the creation of its tax history, as well as information of financial institutions related to the reflection of operating flows.

For example, the tax practice in Australia could demonstrate a successful pre-audit system. The Australian taxation office (ATO) provides taxpayers with the opportunity to pre-fill in the tax base directly on individual tax returns, including data on wages, remuneration percentages and private health insurance received from employers, banks and insurance organizations. The information provided by this system improves the activity of ATO, thus facilitating the process of fulfillment of tax obligations. The extended database of transactions created in cooperation with taxpayers allows data Analytics and risk modeling. Advanced level of development of the preliminary audit is to:

- standardization of rules for the provision of tax services and their strict compliance, which is the establishment of uniform rules for the implementation of state tax audit, aimed at ensuring the quality of audits.

- mutually agreed and irrevocable approach of the tax reporting and information implies the limit on the accuracy and transparency of accrual of tax liabilities.

This approach is most important for the Republic of Kazakhstan, because, according to the report of the Accounts Committee «The execution of the state budget for 2017», the amount of VAT refund for previous years increased by 113.7 billion tenge compared to 2016.

Thus, effective transformation of tax audit in innovative development of economy provides achievement of two main indicators: minimization of tax gap at high level of responsibility of taxpayers that leads to increase of efficiency of activity of tax authorities. In our opinion, the relevant key guidelines should be used in the strategic planning and legislative regulation of the state tax audit.

In order to predict the value of tax revenues in the short term, three scenarios of further development of the state tax audit and its impact on the economic situation are considered (table 2).

Based on the research of doctor of economic sciences E. G. Yasin in the field of economic development, three scenarios for the development of tax audit are outlined:

1. Inertial-continuation of the policy of previous years and maintenance of the achieved level of development of tax audit without implementation of key priorities.

2. Decisive modernization - rapid and radical actions to introduce innovations into the system of state tax audit.

3. Gradual development – systematic and comprehensive implementation of tax audit transformation tools.

The probability of occurrence of each of the scenarios on the basis of an expert survey conducted by the HSE University for two forecast periods is determined (2019-2021). The sum of probabilities for each period is 100%. The analysis shows that the most likely scenario is gradual development (48 %, 48.7% and 49.4%, respectively, for each forecast period), while the least possible scenario is "Decisive modernization" (6.7%, 7.3% and 8%, respectively, for each forecast period). The probability of maintaining the current model of tax audit development is still high (45.3 %, 44 % and 42.7%, respectively).

The preference for the development of these scenarios is estimated by experts as a percentage and in total is 100%. The results of the survey show that the most preferred option is gradual development (45,2 %, 49,5% and 54,2% respectively for each forecast period), while the least preferred scenario is inertial development (14,7%, 9,5% and 6,1% respectively for each forecast period). The level of preference for the model of decisive modernization is also quite high and is 40.1 %, 41 % and 41.9 % for each period.

Table 2 – Scenario analysis of tax audit development and implications for the economy of the Republic of Kazakhstan for 2019-2021

№	Choosing the direction of tax audit development	Year	Option		
			Inertial	Decisive modernization	Gradual development
1	Probability, %	2019	45,3	6,7	48,0
		2020	44,0	7,3	48,7
		2021	42,7	8,0	49,4
2	Preference, inpoints	2019	14,7	40,1	45,2
		2020	9,5	41,0	49,5
		2021	6,1	41,9	54,2
Impact on the economy, probability (%)					
3	Rise	2019	11,2	52,9	47,3
	Stagnation		53,6	22,7	37,0
	Recession		35,2	24,4	15,7
	Rise	2020	11,8	59,1	46,1
	Stagnation		51,2	20,8	33,8
	Recession		37,0	20,1	20,4
	Rise	2021	12,4	66,0	44,9
	Stagnation		48,9	17,5	28,6
	Recession		38,7	16,6	26,5
4	The value of tax revenues, billion tenge	2019	7795,4	8002,5	8014,7
		2020	6891,2	8158,5	8141,7
		2021	6802,9	8363,9	8217,9
Note. Developed by the authors on the basis of research.					

**Discussions.** Thus, on the basis of the conducted analysis it is revealed that the preferred option of tax audit development through decisive modernization is the least likely due to the scale of the necessary measures and insufficient resources for their implementation. At the same time, the inertial path of development is most likely due to the short-term planning period, but the corresponding scenario is the least preferable, as it can lead to the preservation and subsequent increase of barriers to the development of the economic system as a whole. In our opinion, the third scenario of gradual development of tax audit is the most balanced, as the probability of its implementation is the highest and most appropriate.

We calculate the variants of the consequences of each of the scenarios for the economy in the form of the probabilities of the onset of recovery, stagnation and recession. As can be seen from the table, in case of preservation of the inertial path of development, the most possible option is economic stagnation (53.6 %, 51.2 % and 48.9% for each of the periods). The implementation of a decisive modernization is likely to lead to a rise in the economy (52.9 %, 59.1% and 66%, respectively), but the probability of recession and stagnation remains at a high level. For the scenario of gradual development, the economic recovery is more likely (47.3%, 46.1 % and 44.9%, respectively), the probability of stagnation remains quite significant, but the economic downturn can be neglected due to low indicators.

At the final stage of scenario analysis we calculate the amount of tax revenues at the onset of each of the scenarios of the state tax audit according to the formula (10):

$$T_t^i = T_{t-1} * ((1 + g) * p_u^i + 1 * p_s^i + (1 - g) * p_d^i), \quad (10)$$

where T – value of tax revenues, billion tenge; i – appropriate scenario of tax audit development; t – the corresponding forecast period; g – short-term growth rate of tax revenues, %;  $p_u^i$  – the probability of economic recovery in the event of an appropriate scenario, %;  $p_s^i$  – the probability of economic stagnation in the event of an appropriate scenario, %;  $p_d^i$  – probability of economic downturn in case of the corresponding scenario, %.

Having calculated the amount of tax revenues for the respective forecast periods, it can be concluded that unfavorable options occur in the implementation of the inertial path of development. Under this scenario, there is a decrease in the simulated indicator from the actual level of 2018, which is 7 890 billion tenge., to 7,795. 4 billion tenge. in 2019, 6 891,2 billion tenge. in 2020 and 802,9 6 7 billion tenge. in 2021, respectively.

With the adoption of the model of resolute modernization, values increased tax revenues will amount to 8 billion tenge 002,5. in 2019, 8 158.5 billion tenge. in 2020 and 8 363.9 billion tenge. in 2021, respectively. These indicators indicate an acceptable level of tax revenues, however, taking into account the preference for the adoption of the studied scenario, the achievement of these indicators is unlikely.

If the path of gradual development of the state tax audit is chosen, tax revenues in the forecast periods will amount to 8,014. 7 billion tenge. in 2019, 8 141.7 billion tenge. in 2020 and 8 217.9 billion tenge. in 2021, respectively. Since the probability of occurrence of the corresponding scenario is high enough, the achievement of the identified indicators is possible and acceptable. The development of this model of state tax audit has a cumulative effect, and in the long term will serve as a key factor in achieving an advanced level at the designated strategic guidelines.

Thus, summarizing the above, we can draw the following conclusions:

Analyzing the place of Kazakhstan in the world innovative development, it should be noted that there is a dependence between the level of modernization and the volume of tax revenues. Thus, the Republic belongs to the group of countries with a low level of taxation and innovation activity. Taking into account this fact, it is proposed to accelerate the development of innovative technologies and their implementation in all areas of state regulation, in particular, in the field of state tax audit.

The transformation of the Institute of state tax audit in the framework of innovative development requires the creation of an effective system of tax control, which consists in the intensification of modern tools to increase the transparency of the economy and accelerate the information exchange of data. We have identified three phases of transformational development of the state tax audit, the final result of which is to minimize the tax gap, strengthen confidence in the national tax system and reduce the dialogue between taxpayers and tax administrations.

The implementation of the proposed way of transformation of the state tax audit can take one of three forms: inertial, decisive modernization and gradual development. In our opinion, the choice of a strategy for the gradual development of tax audit is the most rational in terms of criteria of economic effect (maximizing the result while minimizing costs) and avoiding adverse consequences of its implementation.

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#### **САЛЫҚТЫҚ АУДИТТИ ЖЕТІЛДІРУДІҢ НЕГІЗІ РЕТІНДЕ ИННОВАЦИЯЛАРДЫ ЕҢГІЗУ**

**Аннотация.** Ғылыми мақала ғылыми зерттеулерге талдау жасалынып мемлекеттік бақылаумен басқару саласындағы инновацияны анықтайтын негізгі бағыттары анықталды. ТМД елдерінің ғалымдарының мемлекеттік сектордағы инновациялар саласындағы зерттеулері сипатталған және Қазақстан Республикасының стратегиялық құжаттарына сәйкес салықтық реттеуді модернизациялау бағыттары келтірілген. Салық түсімдерін жинаудың Қазақстан, ЭБДҰ және көрші елдердің инновациялық белсенділік деңгейіне тәуелділігі қарастырылған.

**Түйін сөздер:** инновация, салықтық аудит, салық ауыртпалығы, мемлекеттік бағдарлама.

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#### **ВНЕДРЕНИЕ ИННОВАЦИЙ КАК ОСНОВА СОВЕРШЕНСТВОВАНИЯ НАЛОГОВОГО АУДИТА**

**Аннотация.** В научной статье проанализированы научные исследования и выявлены основные направления к определению инноваций в области государственного контроля и управления. Описаны исследования ученых стран СНГ в области инноваций в государственном секторе и приведены направления модернизации

налогового регулирования согласно стратегическим документам Республики Казахстан. Рассмотрены зависимость собираемости налоговых поступлений от уровня инновационной активности Казахстана, стран ОЭСР и ближнего зарубежья.

**Ключевые слова:** инновации, налоговый аудит, налоговая нагрузка, государственная программа.

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**REFERENCES**

- [1] Bekkers V. (2007) Modernization, public innovation and information and communication technologies: the emperor's new clothes? // *Information Polity*. 12: 103-107.
- [2] Foley P., Alfonso X. (2009) Government and the transformation agenda // *Public Administration*. 87(2), 371-396.
- [3] Rusaw C.A. (2007) Changing public organizations: four approaches // *International Journal of Public Administration*. 30, 347-361.
- [4] Dutton W.H., Eynon R. (2009) Networked individuals and institutions: a cross-sector comparative perspective on patterns and strategies in government and research // *Information Society*. 25(3), 198-207.
- [5] Feller J., Finnegan P., Nilsson O. (2011) Open innovation and public administration: transformational typologies and business model impacts // *European Journal of Information Systems*. 20: 358-374.
- [6] Damanpour F., Schneider M. (2009) Characteristics of Innovation and Innovation Adoption in Public Organizations: Assessing the Role of Managers' // *Journal of Public Administration Research and Theory*. 19(3): 495-522.
- [7] Potts J., Kastle T. (2010) Public sector innovation research: what's next? // *Innovation: Management, Policy & Practice*. 12(2): 122-137.
- [8] Dunleavy P., Margetts H. (2010) The second wave of digital era governance // Paper presented at the American Political Science Association Conference. Washington, DC at Seton Hall on March 28, 2015.
- [9] Pollitt Chr. (2009) Bureaucracies remember post-bureaucratic organizations // *Public Administration*. 87: 198-218.
- [10] Fishenden J., Thompson M. (2012) Digital Government, Open Architecture, and Innovation: Why public sector it will never be the same again // *Journal of public administration research and theory*. 23(4): 977-1004.
- [11] Islamutdinov V.F. (2008) Innovation and taxation: common ground // *Tax Policy and Practice*. 4: 20-23 (in Rus.).
- [12] Lobanov V.V. (2010) Modernization of public administration: problems and solutions // *State and municipal government issues*. 2:136-145 (in Rus.).
- [13] Ponomareva A.I. (2013) Modernization of tax administration // Lap Lambert Academic Publishing. 309 p. (In Rus.).
- [14] Mishustin M.V. (2014) Improving tax administration tools to ensure stable state budget revenues // *Economy. Taxes. Right*. 4: 4-8 (in Rus.).
- [15] Petrov Yu.A. (2010) The innovative approach to the development of the Russian tax system (conceptual justification, taking into account the results of the analysis of its reform in the ten-year and in the whole post-Soviet retrospective) // *Russian economic journal*. 6: 14-21 (in Rus.).
- [16] Klimova N.V. (2011) Innovation vector of modernization of the tax system of Russia // *National interests: priorities and security*. 14: 9-11 (in Rus.).
- [17] Rakhimova G.A., Esenova G.Zh., Nazhmidenov B.T., Kabiev A.A. (2019) The essence, content and role of state audit in the system of state financial control // *Reports of NAS RK*. 3: 193-199 (in Rus.).
- [18] Berstambaeva R.K., Zhanybaeva Z.K., Isaeva A.T. The innovative approach in the financial sector in the context of the globalization of the economy // *Reports of NAS RK*. 3: 140-145 (in Rus.).
- [19] Global innovation index 2018 Energizing the World with Innovation 11<sup>th</sup> edition.
- [20] Nash, John (1951) Non-Cooperative Games // *The Annals of Mathematics*. 54(2): 286-295.
- [21] Artificial intelligence entering the world of tax. Deloitte. 2017.
- [22] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedyorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494. 4(380), 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [23] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S., Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. (2019). Foresight and the role of innovation in the development of education // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494. 4(380). 93-101. <https://doi.org/10.32014/2019.2518-1467.96>

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## **INFLUENCE OF TAXES ON STIMULATION OF INVESTMENT ACTIVITY**

**Abstract.** The search for ways and methods of stimulation of investment activity of business entities of Ukraine is one of the burning issues, especially in agriculture.

From this perspective, special attention should be paid to tax tools to stimulate investment activities, which include tax preferences, tax rates, special tax regimes and temporary means of influence.

After considering each of the mentioned ways of optimization, it was investigated that providing tax preferences in order to stimulate investment activity has to be direct in nature, however, tax preferences in Ukraine do not give the expected result since the efficiency of their functioning is rather low in spite of their significant number.

Tax rates constitute an active and efficient element in the increase of investment activity. However, their misuse provokes an increase of the level of the tax burden that slows the increase of the volumes of the technological production. A similar characteristic can be also applied to an investment credit, the use of which, in combination with tax rates, gives a good result, provided that the progressive scale of rates but not linear or low-progressive (as in Ukraine) is used. Therefore, the analysis of the results of the activities of enterprises of Ukraine showed, firstly, a low level of growth in the volume of commissioning of capital assets, which in 2017 amounted to only 2.6% of the level of 2016, and an overall reduction of 8.3 percentage points compared to 2012, and, secondly, a reduction in the volume and pace of investment activity.

It should also be noted that the low level of general and investment activity of enterprises, in particular, agricultural ones, also provokes a decrease in the social standard of living. Consequently, the negative trends in the economic environment, which provoked a decrease in the social standards, resulted in a total reduction of the budget revenues and a high level of the budget deficit at all levels.

That is why, a harmony of the tools of influence and social aims is necessary to activate the investment activity of business entities, especially in the agricultural sector.

**Keywords:** tax preference, tax rate, simplified tax system, investment activity, agricultural enterprise, social sector.

**Introduction.** The market environment has significantly changed the content, value, and strategic aim of the functioning and state regulation of the national economy. The socio-economic processes taking place in the economy of Ukraine largely depend on the scientific-based state investment policy, which is able to influence the pace of economic growth and filling the budgets of all levels.

Considering the aforementioned, it should be noted that the investment processes taking place in the country are largely related to the current financial and economic conditions, formed in the macro- and micro-levels. The tax system for the participants of investment activity takes the lead among them.

To ensure the development of strategic investments the state support for the investment process is needed at all levels of the national economic management. For that to happen, the state has at its disposal numerous tools to stimulate the investment process, and taxes occupy an important place among them. With the help of tax tools, the state influences the amount of money remaining at the disposal of economic entities, as well as their use. At the same time, the level of investment activity depends on both micro-economic and macroeconomic factors, in particular, such as profitability, cost, and availability of bank

borrowings, the level of the tax burden, institutional risks of investments, monetary and budgetary policy, etc.

This idea is supported by the team of authors headed by D. Myrzakhanova that emphasizes the need to create "...favorable tax conditions for entrepreneurs and producers, ...stimulation to invest wages in investment programs that provides an attractive tax regime for Kazakhstan" [9].

The properly organized tax system, which determines the level and structure of the tax burden, can improve the investment climate. At the same time, the current tax system of Ukraine has a pronounced fiscal orientation and is a serious obstacle to the growth of investment activity of economic entities.

Of course, the prerogative of the state is the formation of an appropriate amount of budget revenues at different levels, in particular, through the intensification of investment activity. As you know, the optimal balance of income and expenditure is the basis of stability and well-being of society. This issue was in focus of Shuptybaeva, D. Kh., Rakhimbekova, A. E., Makhatova, A. B., who considered the impact of efficiency and effectiveness of budget revenues, in particular, the Republican, on the level of achievement of socio-economic goals of the state [10].

Consequently, the improvement of the investment climate is one of the key factors that allow to implement the task and contribute to the growth of budget revenues. Therefore, there is a need to study the current tax system in the field of investment activity in Ukraine and identify priority directions for its development in order to improve the investment climate in the state.

However, in the context of the instability of the domestic economy, the issues of attracting investment in the national economy at large and especially in the agricultural sector are becoming particularly acute and important, indicating the relevance of the study.

**Methods.** This study was conducted using a number of scientific methods. Thus, the method of analysis was used in the initiation and consideration of the components of the tax regulation of investment activity. The impact of taxes on investment stimulation of the economy of Ukraine was clarified with the help of the method of comparison. The monographic method has become relevant while studying the foreign experience of stimulating investment activity by tax tools. The abstract-logical one was used to formulate the essence of the studied definitions.

**Results.** In the current investment environment of Ukraine, the key task of tax regulation is to create a favorable climate for growth and increase of the efficiency of real investments [1]. Therefore, the methods and tools of tax incentives for investment activity, which are used by domestic tax legislation, can be grouped according to the most significant features (figure).

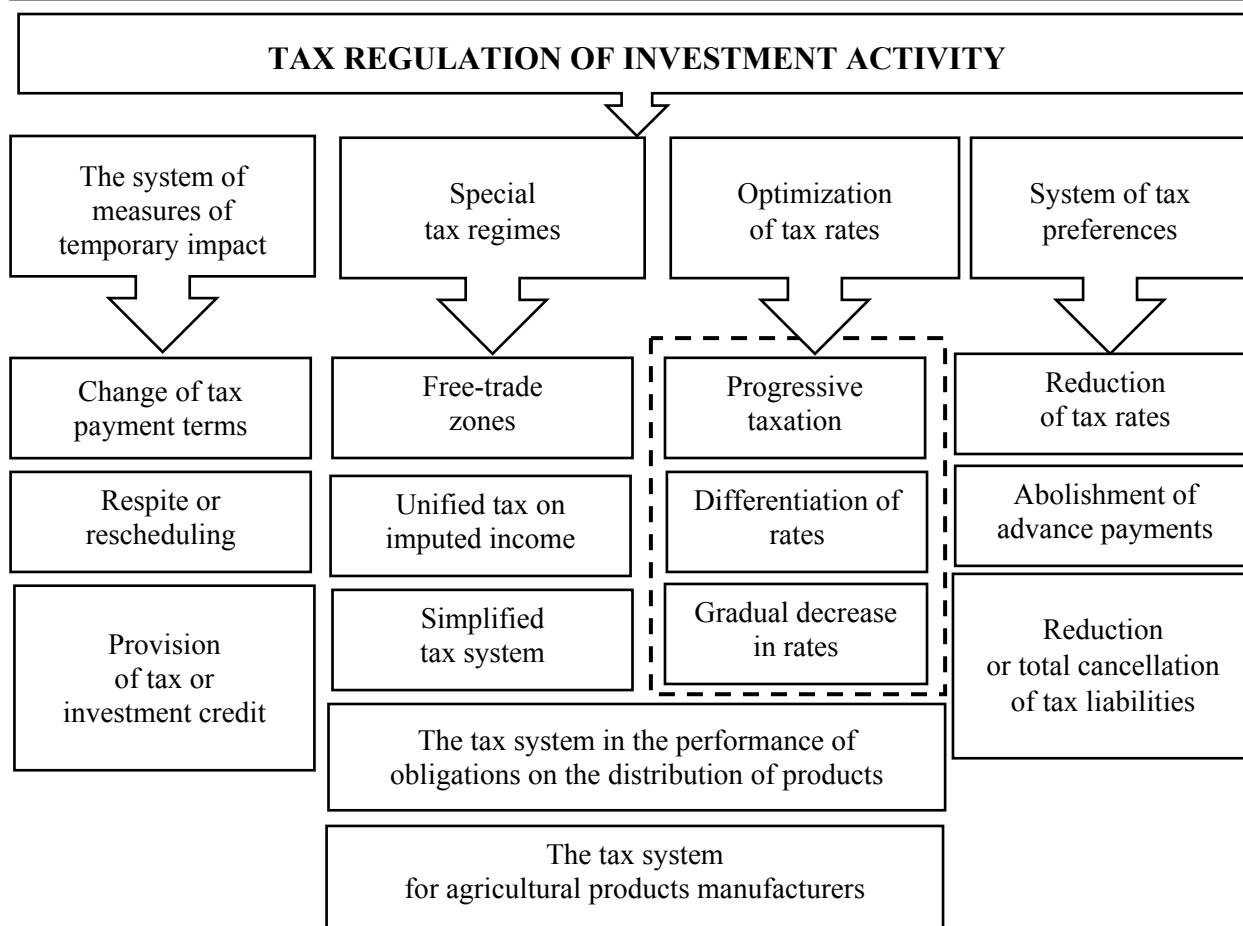
The main methods of tax incentives for investment activity used by the domestic tax legislation include a system of measures of temporary impact; special tax regimes; optimization of tax rates; a system of tax preferences. They are closely interrelated with the functions of taxes, which are enshrined in the domestic Tax Code of Ukraine, in particular, fiscal, regulatory, and incentive. Tax mechanisms influence various state and social processes.

In socially-oriented economies, taxes are designed to eliminate inequality in the distribution of national wealth. They serve as a tool that actively affects all sorts of processes, through economic methods. In practice, the stimulating function of taxes, as the most important method of tax regulation of investment activity, is implemented through a system of tax benefits and preferences, as well as through a system of tax sanction, meaning the reduction of tax liabilities for a certain category of taxpayers.

Providing certain tax preferences, the state aims at attracting investment into the relevant sectors of the economy, or vice versa, at limiting the consumption of certain types of goods. Tax preferences are characterized by a direct tax impact on taxpayers. It should be noted that such benefits are established in accordance with the peculiarities of individual taxes, their purpose, and use. At the same time, the goals of tax preferences change in accordance with changes in the priorities of the socio-economic policy of the state. Taking the above mentioned into account, this is the most important direction of the tax system transformation. Tax preferences also allow individual business entities to be fully or partially exempted from a certain tax or fee that, in turn, always leads to a decrease in tax exemptions.

According to the current Tax Code of Ukraine, tax preference is a prescribed by the tax legislation total exemption of the taxpayer from the obligation to pay any taxes and fees or a possibility to pay them in smaller amounts. This is possible in the presence of certain grounds and peculiarities characterizing a particular group of taxpayers, type of their activity, the object of taxation or the nature and public importance of their expenditure [2].





Classification of the methods of tax incentives, investment activity used by the domestic tax legislation

In our opinion, the economic content of tax preferences is most fully disclosed in a such definition: "Tax preference is a change in any element of the tax provided in accordance with the laws and other regulations on taxes that reduce the amount of tax payment or change the payment term in favor of the taxpayer."

Fundamentally, the application of tax preferences is the creation of tax advantages for certain groups of taxpayers. When it comes to tax incentives for investment activity, the state uses tax preferences in those areas of the national economy, which at a particular stage of their activity require investments most of all.

On the other hand, tax preferences can be considered as a mechanism for international tax competition, which is not always fair. Applying tax preferences, governments of different countries aim at either reducing the tax burden in order to increase the inflow of foreign investment or countering the outflow of capital from the state.

Foreign investment and the significant cost of labor due to the minimization of taxation or granting special tax preferences enable the state to be competitive. Under such conditions, the preferences are a powerful incentive for the development of scientific and technological progress, environmental protection measures, expansion of production of scarce products, business development, creation of production capacities in economically complex regions.

Preferences serve a significant purpose in solving social problems (increasing employment of the working-age population, reducing unemployment and tax evasion).

Therefore, it should be noted that tax preferences are diverse, and their use allows the state to influence certain categories of taxpayers. And despite the fact that the preferences are one of the most stable elements of the tax system, their composition is constantly being transformed, and the mechanism and procedure of application are being revised. As of now, in the tax system of Ukraine operates a

significant number of tax preferences that take part in the mechanism of functioning of the relevant taxes and fees.

Another important tax tool to stimulate investment activity is tax rates. The state can regulate the level of the tax burden through the transformation of their size. And it is the tax rates that have a direct and apparent effect on both economic and investment activities of business entities. After all, the increase in tax rates leads to a loss of incentives for a producer, provokes it to avoid or evade taxation and, as a result, reduces tax revenues to budgets of different levels.

With the growth of the tax burden, the manufacturer prefers one of the options with the help of which it is possible to achieve the lowest level of expenses of available capital resources but to increase their volume by attracting investment. As a result, a manufacturer reduces the volume of products but through the use of technical and other innovations increases their quality.

The increase in tax rates and its consequence – the increase in the tax burden – lead to a reduction in the use of capital-intensive production processes that slows down the growth rate of the technical level of production. Such a choice leads to a change in the structure of social production and a decrease in its technical level.

No less complex processes occur in the economy and investment activity of economic entities with a decrease in tax rates. The consequence of this phenomenon is an increase in the level of business activity, which is marked by an increase in the level of tax payment to the budgets of different levels. However, the achievement of this effect is not instantaneous, because we need a certain time lag to compensate budget losses from reducing the tax rate due to the growth of such an element as the tax base. Therefore, the increase in the level of investment activity of economic entities should not be due to a general and comprehensive reduction of tax rates but through the use of a system of rates that will be aimed at the circle of taxpayers who can accumulate financial resources in order to use them in the investment activity.

Investment tax discounts, which, according to the current tax legislation of Ukraine, are called "investment tax credit", play an important role in stimulating the investment process. Tax discounts, in their essence, should encourage economic entities to invest in production capacities or replace technically and morally obsolete capital assets. The amount of tax credit, in most countries with developed market relations, is set as a percentage of the cost of equipment and is excluded from the total amount of profit tax or taxable income. Such a tax credit allows taking into account the actual property and financial situation of the taxpayer better than other tax preferences.

When providing a preference in the form of a discount (deductions from the tax base), an economic entity whose income is taxed at a higher rate receives a greater benefit. At the same time, the investment tax credit is calculated as a part of the amount of tax, saving the low-income taxpayer a significant share of them.

In foreign countries, tax discounts are widely used to stimulate capital investments in energy and material saving technologies, equipment, etc. [3].

An investment tax credit is a significant tax tool with serious economic weight. From an economic point of view, the effect of its use is not immediate. That is why business entities, according to the law of Ukraine "On Amendments to the Tax Code of Ukraine (Regarding the Establishment of Investment Preferences in the Form of the Investment Tax Credit", are provided with it for a period from one to five years in terms of enterprises profit taxation, as well as charging local taxes and fees [4].

Providing an investment tax credit, the state enables the taxpayer not to divert funds for the payment of the tax for a certain period of time but to direct them for development purposes, while ensuring expanded reproduction. For the state, investment tax lending makes it possible, first of all, to solve the problems of state investment policy while reducing the investment of state and local governments.

An investment tax credit is mainly provided to business entities to implement new equipment, technologies, and other things by reducing the amount of profit subject to taxation. In the United States and Canada, where this preference is widespread, an investment tax credit is usually considered as a right to reduce the amount of the accrued profit tax by the amount of the investment expenses actually incurred. Types of these expenses are usually indicated in detail in the terms of this type of tax credit. Another important area of investment credit abroad is the provision of long-term loans in the field of advanced research.

According to the Tax Code of Ukraine, the basic rate of profit tax is fixed and amounts to 18%. However, the practice of profit taxation in countries with developed market relations, particularly in the United States, provides for differentiated rates depending on the amount of profit to be taxed, in particular:

- 15% of taxable income not exceeding \$ 50 thousand;
- 25% of taxable income that is more than \$ 50 thousand but not more than \$ 75 thousand;
- 34% of the tax base that is more than \$ 75 thousand but not more than \$ 10 million;
- 35% of the tax base exceeding \$ 10 million [5].

Small business has particular importance in taxation in developed foreign countries. Temporary exemption from profit tax or its partial reduction (tax holidays for 10 years) is valid for newly established small business enterprises in Canada [6].

Taking into account the domestic legislation on the impact of taxes on the investment stimulation of the economy, at the end of 2017, the total volume of investments into fixed assets increased by 89.3 billion UAH, or 122.1%, compared to 2016 (table).

Capital investments in the economy of Ukraine\*

Indicator	2012	2013	2014	2015	2016	2017
Capital investments, billion UAH	293.7	267.7	219.4	273.1	359.2	448.5
As a percentage over the previous year	108.5	88	75.9	98.3	118.0	122.1
Capital assets (in actual prices at the end of the year)	9148.4	10401.1	13752.3	7641.8	8177.4	8392.6
As a percentage over the previous year	108.9	113.7	132.2	55.6	107.0	102.6
Gross domestic product, billion UAH	1459.1	1522.7	1586.9	1988.5	2385.4	2982.9
As a percentage over the previous year	112.1	104.4	104.2	125.3	119.9	125.0
The share of investment in GDP, %	20.1	17.6	13.8	13.7	15.1	15.0
Tax revenues to the consolidated budget of Ukraine, billion UAH	196.9	186.3	204.2	299.2	362.1	488.3
As a percentage over the previous year	107.8	94.6	109.6	146.5	121.0	134.9
*Grouped by the authors on the basis of [7].						

Compared to 2012, investment growth amounted to UAH 154.8 billion, or 52.7%. At the same time, the instability of the national currency and high-interest rates for bank loans prevent the inflow of investment into the domestic economy, reduce the rate of accumulation and contribute to the degradation of the production apparatus. As a result, in 2017, the volume of commissioning of capital assets in Ukraine amounted to only 2.6% of the value of this indicator in 2016 and decreased by 8.3 percentage points compared to 2012. This fact illustrates the constant aging of capital assets that can be stopped only by accelerating their introduction on the basis of intensification of investment processes.

Despite the positive dynamics of investment growth in the national economy, investment processes in Ukraine are characterized by certain problems, concerning the maintenance of the accumulation rate at the achieved level. The current rules of financial and monetary policy make it impossible to maintain investment growth and high rates of economic development. The main problem that needs to be urgently solved is the preservation of trends in the growth of investment in the economy, and the preservation of the proportions between the level and structure of investment activity, as well as the size and structure of the tax burden on the economy.

Since 2015, amendments to the Tax Code of Ukraine abolished the taxation of farmers with a fixed agricultural tax and instead introduced a flat-rate tax (fourth group) with a significant increase in the base and tax rates. In 2017, upon the request of the IMF, the special regime of VAT for agricultural products manufacturers was abolished. Taking this into account, the growth of tax revenues to the consolidated budget significantly exceeds the growth of capital investments and the cost of capital assets in actual prices at the end of the year.

In 2017, compared to 2012, the share of investments in GDP decreased by 5.1 percentage points. That indicates a direct relationship between the change in the level of investment activity and the tax burden. Based on conventional thinking, such a trend appears: with the growth of the tax burden, there is a

decrease in investment and vice versa. In the leading EU countries, there is a similar picture: both indicators have undergone minor changes since 1995, and the directions of their transformation did not depend on each other. At the same time, gross measures of investment activity and tax burden are meaningful for interstate comparisons and determination of general trends [8].

Dynamics of tax incentives for investment attractiveness is interrelated with the rate and efficiency of savings. They include private (internal and external) and public investment. The latter, despite their importance in the sphere of production and non-production infrastructure, cannot be implemented in the military-industrial sector, ensure the growth of efficiency and competitiveness of the national economy; in total, they face a strict budget constraint.

Private investments are impossible without financial attractiveness. The latter requires cost improvements, an increase in sales, and the presentation of products with considerable intellectual rent that requires investment and time.

The level of sectoral financial efficiency, formed in Ukraine, actually determines the low rate of economic growth and preservation of the structure of the domestic economy as related to raw material. As of today, there are only 2 ways to end the cycle “low efficiency – lack of investment – low efficiency”. The first one consists in extensive investment into the modernization of inefficient production units through the budget costs, preferential loans, and foreign investments. The second one consists in the significant reduction of the tax burden for business entities that work in the manufacturing sector, in the field of creation of know-how, represent small and medium-sized businesses. As of now, the possibilities of using the first method are limited both due to budgetary constraints and due to the actual lack of efficient business plans for their modernization. Consequently, a significant reduction of taxes in these sectors is untenable, if the task of economic development is set at a rate exceeding the world average.

**Discussion.** Taking into account the presented problem and considered aspects of its solution, it is necessary to highlight a number of issues that still remain controversial and require more detailed consideration.

In particular, the determination of prospects for the application of reduced tax rates for taxpayers, who have financial resources to carry on investment activity, in order to strengthen and increase their investment opportunities raises the question on the reasonability of their implementation. The reason for this is the inequality of the business environment of agricultural products manufacturers due to differences in climatic zones, type of activities, etc. Therefore, perhaps this method to stimulate investment activity will be more appropriate for those agricultural enterprises that are engaged in the activities, which are now experiencing stagnation.

Following a similar approach, you can consider the possibility of granting an investment loan by the state to agricultural enterprises, although in this case, it would be worthwhile to focus on those business entities that join the state program for the formation of an appropriate level of food security of the country.

And perhaps the most controversial of the outlined issues is the return of the simplified tax system for agricultural enterprises. According to the state executive bodies, this system is unpromising, because it gives agricultural products manufacturers a wide field for evasion and tax fraud that reduces the level of budget revenues at different levels. However, according to the results of the activity of such payers, it is the funds saved on taxation that were the source of financial resources allowing to create and expand the social component of rural life.

Taking into account the highlighted controversial aspects of the impact of taxes on the stimulation of investment activity, this issue can not be considered exhausted, because there are still many unclear conditions and undeclared prospects that can become a starting point for the successful activation of investment activity of enterprises in Ukraine, particularly agricultural ones.

**Conclusion.** The impact of taxes on the stimulation of investment activity is closely related to such factors as the availability of effective business projects, external competitiveness, the level of competition in the domestic market, the institutional structure of the economy, transaction costs, etc. At the same time, tax instruments should be used in conjunction with other measures designed to create a favorable investment climate. However, investors are attracted not only by low taxes but also by a high level of workforce productivity, reliability of capital investment, economic and political stability. To implement these goals, it is necessary to develop specific measures of tax impact and, above all, abandon the idea of

increasing the tax burden. As a result of this, competitiveness will deteriorate, the market position and investment activity of the taxpayer will decrease.

Taking this into consideration, there is a need to introduce effective tax administration that can increase tax revenues by minimizing various methods of illegal tax optimization and aggressive tax planning. At the same time, it is obvious that it is impossible to "revive" the economy without the use of tax incentives. Therefore, using the system of tax preferences and benefits, it is possible to stimulate certain forms of business activity, promote the development of certain regions and territories. Moreover, achieving economic growth rates that ensure the international competitiveness of Ukraine, requires a significant reduction in the level of the tax burden that increases the level of sectoral profitability, because it is it that will create the appropriate conditions for private investment in non-resource sectors of the domestic economy.

An important measure for the application of non-tax methods of improving the national economy is the introduction of a number of direct investment preferences that can reduce the tax burden on individual taxpayers in case they invest into a priority direction.

Also, from the perspective of the optimization of taxation of legal entities, it is necessary to pay attention to its impact on the social component of the population, particularly rural. In particular, it is necessary to revise the profitable taxation of income of individuals that should be carried out using a progressive scale of income taxation, as well as introduce a non-taxable minimum, the value of which would not go beyond poverty.

Thus, the optimization and choice of tax tools of influence on the stimulation of investment activity of Ukrainian enterprises, particularly agricultural enterprises, should go along with the improvement of the system of taxation of personal income. After all, it is a harmonious combination of economic and social components that will make it possible to increase budget revenues and provide taxpayers with greater opportunities to carry out all types of activities, particularly investment activity.

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### **ВЛИЯНИЕ НАЛОГОВ НА СТИМУЛИРОВАНИЕ ИНВЕСТИЦИОННОЙ ДЕЯТЕЛЬНОСТИ**

**Аннотация.** Поиск путей и методов стимулирования инвестиционной активности субъектов хозяйствования Украины является одной из актуальных проблем, особенно в сельском хозяйстве.

С этой точки зрения особое внимание следует уделить налоговым инструментам для стимулирования инвестиционной деятельности, которые включают налоговые преференции, налоговые ставки, специальные налоговые режимы и временные средства воздействия.

После рассмотрения каждого из упомянутых способов оптимизации выяснилось, что предоставление налоговых льгот для стимулирования инвестиционной деятельности должно носить прямой характер, однако налоговые льготы в Украине не дают ожидаемого результата, поскольку эффективность их функционирования довольно низкий, несмотря на их значительное количество.

Налоговые ставки являются активным и эффективным элементом повышения инвестиционной активности. Однако их неправильное использование провоцирует повышение уровня налоговой нагрузки, что замедляет рост объемов технологического производства. Аналогичная характеристика может также применяться к инвестиционному кредиту, использование которого в сочетании с налоговыми ставками дает хороший результат при условии использования прогрессивной шкалы ставок, но не линейной или низкопрогрессивной (как в Украине). Поэтому анализ результатов деятельности предприятий Украины показал, во-первых, низкий уровень роста объема ввода основных фондов, который в 2017 году составил всего 2,6% от уровня 2016 года, и общее снижение 8,3 процентных пункта по сравнению с 2012 годом, и, во-вторых, сокращение объема и темпов инвестиционной активности.

Следует также отметить, что низкий уровень общей и инвестиционной активности предприятий, в частности, сельскохозяйственных, также провоцирует снижение социального уровня жизни. Следовательно, негативные тенденции в экономической среде, которые спровоцировали снижение социальных стандартов, привели к общему сокращению доходов бюджета и высокому уровню дефицита бюджета на всех уровнях.

Вот почему гармония инструментов влияния и социальных целей необходима для активизации инвестиционной деятельности хозяйствующих субъектов, особенно в аграрном секторе.

**Ключевые слова:** налоговые преференции, налоговая ставка, упрощенная налоговая система, инвестиционная деятельность, сельскохозяйственное предприятие, социальный сектор.

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**REFERENCES**

- [1] Nahorniak V., Vovk Y. (2010). The Problems of Tax Regulation in Ukraine and Ways to Solve Them // *Galician Economic Bulletin*. N 2 (27). P. 140-152 (in Ukr.).
- [2] Tax Code of Ukraine. Retrieved from <https://i.factor.ua/ukr/law-24/section-119/article-582/> (in Ukr.).
- [3] Budnikeych I.M., Shkola I.M. (2002). Stanovlennia rehionalnoho rynku v Ukraini. Chernivtsi: Ruta (in Ukr.).
- [4] Law of Ukraine. On Amendments to the Tax Code of Ukraine (Regarding the Establishment of Investment Preferences in the Form of the Investment Tax Credit)" (in Ukr.).
- [5] Klassen K.J., Pittman J.A., Reed M.P. (2003). A Cross-National Comparison of R&D Expenditure Decisions: Tax Incentives and Financial Constraints (in Eng.).
- [6] Warda J. (1999). Measuring the Attractiveness of R&D Tax Incentives: Canada and Major Industrial Countries (in Eng.).
- [7] Statistical Yearbook of Ukraine. (2017). State Statistics Service of Ukraine under the guidance of Verner, I. S. Retrieved from [http://www.ukrstat.gov.ua/druk/publicat/kat\\_u/publ1\\_u.htm](http://www.ukrstat.gov.ua/druk/publicat/kat_u/publ1_u.htm) (in Ukr.).
- [8] European Commission. VAR Rates Applied in the Member States of the European Union. Retrieved from [http://ec.europa.eu/taxation\\_customs/](http://ec.europa.eu/taxation_customs/) (in Eng.).
- [9] Myrzakhanova D.Zh., Smagulova R.U., Taspenova G.A., Nesvetailova A. (2018). Trends of Development of the Management System of the Tax Sphere of RK in Modern Conditions // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. Vol. 6. P. 158-164 (in Eng.). <https://doi.org/10.32014/2018.2518-1467.40>
- [10] Shuptybaeva D.Kh., Rakhimbekova A.E., Makhatova A.B. (2016). The Efficiency and Effectiveness of the Revenue out Part of the Republican Budget // *Bulletin of National Academy of Sciences of the Republic of Kazakhstan*. N 6. P. 145-153 (in Eng.).
- [11] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494.4(380). P. 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [12] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S., Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. (2019). Foresight and the role of innovation in the development of education // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494.4(380). 93-101. <https://doi.org/10.32014/2019.2518-1467.96>
- [13] Mamrybayev O.Z., Othman M., Akhmediyarova A.T., Kydyrbekova A.S., Mekebayev N.O. Voice verification using I-vectors and neural networks with limited training data // *Bulletin of the National academy of sciences of the Republic of Kazakhstan*. 2019. N 3(379). P. 36-43. <https://doi.org/10.32014/2019.2518-1467.66>
- [14] Lavrinenko S.V., Arpentieva M.R., Kassymova G.K. (2019). The negative impact of the internet on the educational process. International youth scientific conference "Heat and mass transfer in the thermal control system of technical and technological energy equipment" (HMTTSC 2019). <https://doi.org/10.1063/1.5120671>
- [15] Atayeva M., Putro N.H.P.S., Kassymova G., Kosbay S. (2019) Impact of reading on students' writing ability // *Materials of International Practical Internet Conference "Challenges of Science"*. ISBN 978-601-323-144-0. Issue II, 2019. P. 5-13. <https://doi.org/10.31643/2019.001>

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## **SEED TREATMENT IS AN ECOLOGICALLY SAFETY AND EFFECTIVE WAY OF PROTECTING SUGAR BEET SEEDLINGS**

**Abstract.** Weevils (*Bothynoderes punctiventris* Germ.) and wireworms (genus *Elateridae*) cause the greatest damage to the beet growing sector in Ukraine. These pests, with ineffective protection of seedlings, can partially or completely to destroy beet crops. Density and uniformity of plant location decreases with their death and, respectively, sugar beet yield decreases too. Damaged, but living plants lag behind in growth and development which also leads to a decrease in crop productivity.

Studies of the effectiveness of protection of shoots from pests in the subzones of sufficient wetting of the beetroot belt in Vinnytsia region (Archi LLC) and in the subzone of unstable moistening Cherkassy region (Verkhnyatsky ESS of the Institute of Bioenergetic crops and sugar beet of the National Academy of Agrarian Sciences (IBCSB NAAS) and Cherkasy SARNSC "Institute of Agriculture"NAAS)) were conducted.

The most effective way to protect shoots of sugar beet from pests and diseases is to create tolerant hybrids, as well as tillage, observance of crop rotations, spraying of shoots with insecticides and fungicides during the vegetation period and application of granular protective preparations to the soil. But the most environmentally safe and effective way - plant toxification when insecticides and fungicides are included in dragees and incrustation mixtures in the process of presowing seed preparation.

Research has shown that plant protection chemicals which are less in contact with the soil when seeded with dragee seeds encrusted with protective preparations. The total contact area, depending on the seeding rate, is about 7.03-8.04 m<sup>2</sup> per hectare of sugar beet sowing, when applying granular protection product into the soil is 444 m<sup>2</sup>, and when spraying the crops is 10000 m<sup>2</sup>. That is, the most ecological way to protect the emergence of sugar beet is sowing seeds treated with protective products.

**Keywords:** sugar beet, dragee, incrustation, weevils, wireworms.

**Introduction.** One of the main tasks of agricultural production is to provide the population with food, the use of which in physiologically necessary norms contributes to the normal functioning of the organism and its efficiency. From the large set and assortment included in the list of foodstuffs, one should emphasize only on individual root crops, the processing products of which occupy a prominent place in the diet of people, and many processing industries in Ukraine and the world. Such plant is sugar beet (Doronin et al., 2015).

Ukraine is in fairly favorable soil and climatic conditions and is one of the leading beet-growing countries in the world. However, the economic crisis caused a sharp decline in the production of this crop increased the cost of sugar beet cultivation and low competitiveness in the world market. In connection with this, the state has set a task before the beet growers to increase sugar beet production not only by increasing the yield of root crops, but also an increase in sugar content and a significant reduction in their cost price.

Sugar beet in our country is the only source of sugar, which is necessary to maintain the life of the human body, resistance to diseases, restoration of working capacity in case of physical fatigue and in extreme situations. It should be noted that this culture is high-tech and highly profitable. Traditionally sugar beet was a technical crop, profit from which constitutes a significant share of the profit of all crop production in Ukraine. Soil-climatic conditions of the beet-belt of Ukraine correspond to the biological

properties of beets thus, for centuries our country has occupied a prominent place among the beet-growing countries of the world in terms of the production of sugar raw materials and sugar (Doronin, 2012, Polishuk et al., 2015).

Modern technologies of growing sugar beets are impossible without using high-performance single-seed hybrids created on the basis of cytoplasmic male sterility and their seeds with high seeding qualities. Currently, more than 100 FM-hybrids of sugar beet have been created and registered, which are characterized by a high potential for productivity. Accelerated introduction of them into production will significantly increase the sugar assembly from one hectare. In connection with the new technologies of growing sugar beet the requirements to the quality of the seed material have significantly increased. Seeds should not only be characterized by high purity, germination energy, germination, but uniformity in size, single-flow and germination capacity at low temperatures (Tomaszewska-Sowa, 2012, Tefyk & Mytrophanova, 2012).

**Material and methods.** The investigations were carried out in the Verkhnyatsk experimental-selection station IBCSB NAAS, Cherkassy State Agricultural Experimental Station NSC "Institute of Agriculture" NAAS, Archi LLC Kozyatinsky district of Vinnytsia region in 2010-2017. For dragee, the seeds of the triploid hybrid Alexandria and diploid - Uladovo-Verhnyatsky CM 37 and Ukrainian CM 72 was used.

The weight of the dragee shell from the mass of the seeds, %	The name of the dragee mixtures	Country supplier mixtures
Uncontaminated seeds-control		
60–100–200–300	«Vorskla»	Germany
	«Aurora»	Italy
	WM 213	Austria
	WM 214	Austria
	B 100	Austria
	P 1	England
	P 2	England
	G 1	Netherlands

The area of contact between the dragee shell and the ground was calculated from the formula  $S = sd \times N \times n \times 106$ ,

where S - area of contact, m<sup>2</sup>,

sd - area of one dragee, mm<sup>2</sup>,

N - number of sowing units per hectare, pt,

n - amount of dragee in one seed unit, pt,

106 - conversion factor mm<sup>2</sup> per m<sup>2</sup>.

**Results and discussion.** The productivity of sugar beets depends on many factors: soil and climatic conditions, introduction of highly productive hybrids, quality preseedling seed treatment, the use of modern technology and technology, fertilizer, reliable plant protection, high-technology recycling at sugar factories, etc. Lack of reliable plant protection during the vegetation period or ineffective protection of shoots from pests can partially or completely destroy beet crops.

The most effective way to protect seedlings of sugar beet from pests and diseases is to create tolerant hybrids. The most common methods are the agro-technological methods of growing a crop: soil cultivation, observance of crop rotations, spraying of shoots with insecticides and fungicides during the growing season and the introduction of granular protective preparations into the soil. But the most environmentally safe and effective way is plant toxicity when insecticides and fungicides are included in dragees and incrustation mixtures in the process of presowing seed preparation.

Our investigations have established that chemical plant protection agents with soil are less in contact when sowing dragee seeds inlaid with protective preparations. The total contact area, depending on the rate of seed sowing, is about 7,03-8,04 m<sup>2</sup> per hectare of sugar beet, when applying granular protection in



the soil 444 m<sup>2</sup> and when spraying crops 10000 m<sup>2</sup>. That is, the most environmentally friendly way to protect the sprouts of sugar beet is seeding with seeds treated with protective preparations.

Species composition of pests in different zones of the beet belt is different. Wireworm (genus *Elateridae*), beet fleas (*Chaetocnema* Spp.), gray beet weevil (*Tanymecus palliatus* Fabr.) occur in all areas of beet-growing and ordinary beet weevil (*Bothynoderes punctiventris* Germ.), beet crumbs (*Atomaria linearis* Steph.), scale insects (*Cassida* Spp.), undermines fly (*Pegomyia hyoscyami* Panz.) and root aphid (*Pemphigus fuscicornis* Koch.) - only in certain zones (Doronin, 2011). Taking this into consideration, studies on the effectiveness of pest protection against pests were conducted in the subzones where the wireworm and weevils, which annually cause a significant harm to sugar beet are widespread. In the subzone of sufficient moisture of the beetroot belt - the Vinnytsia region (Archi LLC) and in the subzone of unstable moistening - Cherkassy region (Verkhnyatsky ESS, Cherkasy GOSS).

The account of pests prior to sowing confirmed the results of the IBCSB NAAS on their number. So, the greatest number of pests was in the experimental field Archi LLC, where the number of the beet regular weevils was 0,35 ind./m<sup>2</sup>, wireworm – 5,5 ind./m<sup>2</sup>, at the Verkhnyatsk Experimental Selection Station and the Cherkasy State Experimental Selection Station they were fewer, although their numbers exceeded the permissible damage threshold (table 1).

Table 1 – Pest density before sowing of sugar beet in experiments, average for 2010-2017

Place of experiments	Density of pests, ind./m <sup>2</sup>	
	wireworms	weevils
Verkhnyatsky ESS (Cherkassy region)	7,3	0
Cherkasy GOSS (Cherkassy region)	2,2	0,45
Archi LLC (Vinnytsia region)	5,5	0,35
Damage threshold	2	0,2–0,3

It should be noted that before the sowing of sugar beet (the second decade of April), when the average daily air temperature was still low and weevils did not fly, their numbers were not large. It has been established that, with a small number of pests, the composition of preparations Force Magna (15+ 6 g.v./p.e.) and Cruiser 600 FS + Force 20 CS (60 + 8 g.v./p.e.) provided reliable protection of sprouts of sugar beet.

There is only a slight damage to plants with weevils and a wireworm (table 2, figure 1).

Table 2 – Damage to plants by pests, depending on the composition of seed treatment with protective preparations (phase - forks - the first pair of leaves), the average for 2010-2017

Place of experiments	№ of variant	Damage to plants		
		weevils		wireworms
		%	бал	%
Verkhnyatsky ESS, Cherkassy region	1	12,1	1,2	0
	2	6,3	1	0
	3	7,8	1	0
Cherkasy GOSS, Cherkassy region	1	80	3	70
	2	40	0,5	30
	3	20	0,25	10
Archi LLC, Vinnytsia region	1	30	1	32
	2	0	0	5
	3	0	0	0



Figure 1 – Minor damage to plants by weevils and wireworms

Thus, at the Cherkasy Experimental Agricultural Station when sown with dragee seeds treated with Force Magna, weighed 40% of the plants with weevils, and a mixture of preparations of the Cruiser (60 bp/p.e.) + Force (8 bd/p.e.) - 20% of the plants with a damage score of less than 1 (about 5% destroyed leaf surface), while 80% of the plants were damaged in the control and the damage score was 3, that is, up to 25% of the leaf surface was destroyed.

There was no significant damage to plants and by wireworm. Only single lesions of shoots were observed - one - two bites, did not reach the middle of the underground part of the stem and the spine. Similar results were obtained in the experiments of the Verkhnyak Experimental and Selection Station, although the number of pests was higher.

The registration of soil pests on the Verkhnyatsky ESS from sowing and 30 days after it showed that both compositions of the preparations provide reliable protection of seedlings, controlling the number of wireworms. If to the sowing of sugar beet in all variants of the wireworm there were 7 pieces, which is 3.5 times the permissible threshold of damage, then 10 days after sowing, their number decreased significantly, although it exceeded the permissible threshold of damage (figure 2). There was no significant difference in this indicator, depending on the protective composition used.

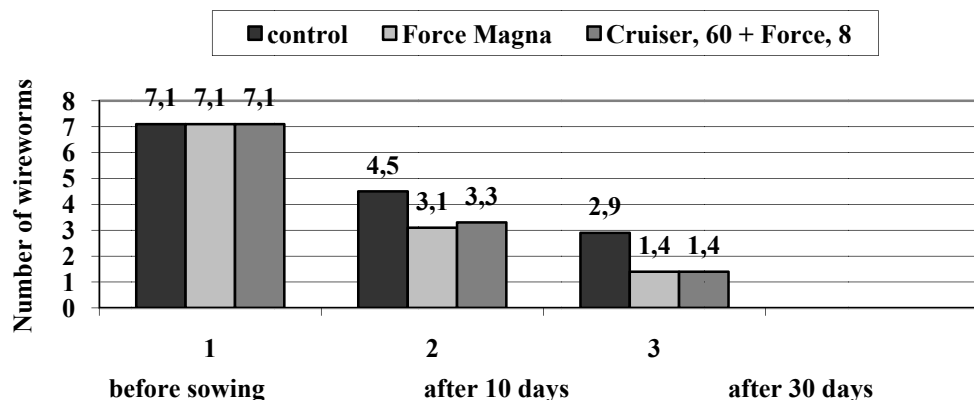


Figure 2 – The number of wireworms for the period of their accounting (Verhnyatsky ESS, average for 2010-2017)

In the experiments conducted in Archi LLC, about 30% of the plants were injured by weevils, 32% by wireworms and 24.1% of plants died. In variants with the treatment of seeds by the composition of Force Magna, the damage by these pests was insignificant. When sowing with seeds treated with the composition Cruiser + Force (60 + 8 g.v./p.e.) Plants were practically not damaged by weevils or wireworms (figure 3).



Figure 3 – General condition of crops

Upper row - Verkhnyatskaya ESS, 2010; lower – Archi LLC, 2011.

From left to right: variant 1 - control; variant 2; variant 3.

Thus, in the variants where the treated seeds were seeded with insecticides, the number of pests significantly decreased and, accordingly, - the number of damaged plants decreased and the degree of their damage both in the phase of the fork and in the phase of the first pair of real leaves. So, if 12.1% of plants were damaged in the phase of the fork in the control in the conditions of the Verkhnyatsky ESS, and in variants where seeded, treated seeds with protective compositions - 6.3% and 7.8%, then in the phase of the first pair of real leaves the number of damaged plants in the control increased to 13.8%, and in cases where the treated seeds were sown increase in the number of damaged plants was not observed, but, on the contrary, the number of damaged plants decreased (table 3).

Table 3 – Damage of plants with weevil, depending on the composition of seed treatment with protective preparations, 2010-2017

Variant - seed treatment		VESS		CGOSS		Archi LLC	
name of the preparations	norm, g.v./p.e.	%	point	%	point	%	point
Fork phase							
Control	–	10,4	1,11	55	4,0	19,3	1,0
Force Magna	15 + 6	5,2	1,0	22	1,0	2,0	1,0
Cruiser 600 FS + Force 20 CS	60 + 8	5,9	1,0	11,8	1,0	0,8	1,0
The phase of the first pair of real leaves							
Control	–	10,8	1,0	35,3	3,5	15	4,8
Force Magna	15 + 6	4,5	1,0	3,5	0,8	0	0
Cruiser 600 FS + Force 20 CS	60 + 8	4,2	1,2	2,5	0,6	0	0

In this case, there is a certain risk of losing a certain number of shoots from phytophages. However, if we take into account that a small number of pests remain alive in the field during this period and the mass of a plant in a phase of 2-3 pairs of leaves is 5-10 times greater than in the initial phases of development, even if they damage plants, the probability of maintaining a sufficient density of plants is increased in comparison with the control.

Similar results were obtained in experiments of Verkhnyatskaya ESS and Archi LLC. It should be noted that there is no significant difference in the number and extent of damaged plants, depending on the composition of the protective preparations for seed treatment that have been used.

In Ukraine weevils and wireworms cause the greatest damage to the beet industry. These pests, with ineffective protection of seedlings, can partially or completely destroy beet crops. With the death of plants, the density and uniformity of their distribution decreases and respectively, and sugar beet yield decreases too, and damaged, but living plants lag behind in growth and development, and this also leads to a decline in crop productivity.

**Conclusion.** Seed treatment with protective preparations is an ecologically safe and effective way to protect the emergence of sugar beet. When sowing with dragee seeds encrusted with chemical plant protection products they are less in contact with the soil, compared with the introduction of granular plant protection products and spraying crops. The total contact area, depending on the seeding rate, is about 7.03-8.04 m<sup>2</sup> per hectare of sugar beet, when applying granulated protective tools - 444 m<sup>2</sup>, and when spraying crops 10000 m<sup>2</sup>.

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#### **ТУҚЫМДАРДЫ ӨНДЕУ – ҚОРШАҒАН ОРТАНЫ ЖӘНЕ ҚЫЗЫЛША ТУҚЫМДАРЫН ҚОРҒАУДЫҢ ТИІМДІ ӘДІСІ**

**Аннотация.** Арамшөптер (*bothynoderes punctiventris* Germ.) және құрттар (*Elateridae* тұқымдасы) Украинада қызылша өсіретін өнеркәсіпке үлкен зиян келтіреді. Көшеттердің тиімсіз қорғанысы бар бұл зиянкестер қызылша дақылдарын жартылай немесе толықтай жоя алады. Өсімдіктердің орналасу тығыздығы мен біркелкілігі олардың өліміне байланысты азаяды және сәйкесінше қант қызылшасының өнімділігі төмендейді. Зақымдалған, бірақ тірі өсімдіктер өсу мен дамудан артта қалады, бұл дақылдардың шығымдылығына әкеледі.

Винница облысының қызылша белдеуіндегі жеткілікті ылғалдылықтың суб-аймақтарындағы және Черкассы аймағындағы тұрақсыз ылғалдылықтың суб-аймағындағы (Ұлттық ауылшаруашылық академиясының Биоэнергетикалық дақылдар институтының Верхняцкий ЕС және қант қызылшасы) және зиянкестерден өсімдікті зиянкестерден қорғаудың тиімділігі бойынша зерттеулер жүргізілді.).

Қант қызылшасының көшеттерін зиянкестер мен аурулардан қорғаудың тиімді әдісі – бұл төзімді будандарды құру, сонымен қатар топырақты өңдеу, ауыспалы егісті бақылау, вегетациялық кезеңде көшеттерді инсектицидтер мен фунгицидтермен бүрку және топыраққа түйіршікті қорғаныш препараттарын енгізу. Қоршаған ортаға қауіпсіз және тиімді әдіс – бұл инсектицидтер мен фунгицидтер драже және қабық қоспаларына тұқым даярлау процесінде енгізілген кезде, өсімдіктердің интоксикациясы.

Зерттеулер көрсеткендей, драже тұқымын себу кезінде өсімдіктермен топырақпен аз байланысатын химиялық қорғаныс құралдары қорғаныш препараттарымен қорбасыды. Тұқым себу жылдамдығына байланысты жанасудың жалпы ауданы топыраққа түйіршіктелген қорғаныс агентін қолданған кезде шамамен 7,03-8,04 м<sup>2</sup>, ал дақылдарды бүрку кезінде – 10 000 м<sup>2</sup> құрайды. Яғни, қант қызылшасының көшеттерін қорғаудың ең экологиялық таза әдісі – қорғаныс агенттерімен өңделген тұқым себу.

**Түйін сөздер:** қант қызылшасы, драже, қабық, арамшөптер, құрт.

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#### **ОБРАБОТКА СЕМЯН – ЭКОЛОГИЧЕСКИ БЕЗОПАСНЫЙ И ЭФФЕКТИВНЫЙ СПОСОБ ЗАЩИТЫ САЖЕНЦЕВ САХАРНОЙ СВЕКЛЫ**

**Аннотация.** Долгоносики (*Bothynoderes punctiventris* Germ.) и проволочники (род *Elateridae*) наносят наибольший ущерб свеклосеющей отрасли Украины. Эти вредители при неэффективной защите рассады могут частично или полностью уничтожить посевы свеклы. Плотность и равномерность расположения расте-



ний уменьшается с их гибелью и, соответственно, снижается урожайность сахарной свеклы. Поврежденные, но живые растения отстают в росте и развитии, что также приводит к снижению урожайности сельскохозяйственных культур.

Проведены исследования эффективности защиты побегов от вредителей в подзонах достаточного увлажнения свекловичного пояса Винницкой области (ООО "Арчи") и в подзоне неустойчивого увлажнения Черкасской области (Верхняцкий ЭСС Института биоэнергетических культур и сахарной свеклы Национальной академии аграрных наук (ИБЦ НААН) и Черкасский САРСНЦ "Институт сельского хозяйства" НААН).

Наиболее эффективным способом защиты всходов сахарной свеклы от вредителей и болезней является создание толерантных гибридов, а также обработка почвы, соблюдение севооборотов, опрыскивание всходов инсектицидами и фунгицидами в период вегетации и внесение в почву гранулированных защитных препаратов. Но самый экологически безопасный и эффективный способ – интоксикация растений, когда инсектициды и фунгициды включаются в драже и инкрустационные смеси в процессе предпосевной подготовки семян.

Исследования показали, что химические средства защиты растений, которые меньше контактируют с почвой при посеве семян драже, инкрустированы защитными препаратами. Общая площадь контакта, в зависимости от нормы высева, составляет около 7,03-8,04 м<sup>2</sup> на гектар посева сахарной свеклы при внесении гранулированного защитного средства в почву - 444 м<sup>2</sup>, а при опрыскивании посевов – 10 000 м<sup>2</sup>. То есть, наиболее экологичным способом защиты всходов сахарной свеклы является посев семян, обработанных защитными средствами.

**Ключевые слова:** сахарная свекла, драже, инкрустация, долгоносики, проволочники.

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#### REFERENCES

- [1] Doronin V.A. The quality of sugar beet seeds and the ways of its increase / Volodymyr Ar. Doronin, Yaroslav V. Byelyk, Valentin V. Polishchuk, and Lesya M. Karpuk // *Ecological Consequences of Increasing Crop Productivity: Plant Breeding and Biotic Diversity* [Eds. Anatoly I. Opalko et al.]. Toronto New Jersey: Apple Academic Press, 2015. P. 141-154.
- [2] Polishchuk V.V. Sterilizatsiya roslinnogo materialu beetle tsukrovogo in zalezhnosti v\_d type sterilizator, concentrates i i exposition steriziiatsatsi in vitro / V.V. Polishchuk, L.M. Karpuk, I.M. Gun, O.P. Serzhuk, T.V. Polishchuk // *The Bulletin of Uman National National University Garden*. 2015. Vip. 1. P. 71-75.
- [3] Doronin V.A., Karpuk L.M. (2012). Productivity of sugar beet depending on seed quality // *Sugar*. 5. 59-62 (in Ukr.).
- [4] Balan V.M., Oberemchuk D.V. (2005). Agroecological causes of different quality of hybrid seeds of sugar beet // *Zb sciences Ave. Institute of Sugar Beet UAAS*. 8. 250-255 (in Ukr.).
- [5] Matsebera A.G., Melnik A.I. (1987). High-quality seeds of the intensive technology // *Sugar*. 6. 26 (in Ukr.).
- [6] Musiienko A.A., Korniienko V.L., Kuznechikova V.M., Busol M.V. (1992). On the issue of the number and size of fractions of calibrated sugar beet seeds. Improving methods of sugar beet seed production. Kyiv: ITsB. 128-135 (in Ukr.).
- [7] Balan V.M., Poiekhalo M.B. (1996). Different quality seeds of modern varieties of populations and FS-hybrids of sugar beets and its significance. Main conclusions of research works for 1994. Kyiv: ITsB. 60-63 (in Ukr.).
- [8] Doronin V.A. (2011). Materials of the Global Forum on the Vigor Effect of Gruiser, Vietnam, Syngenta. 156-178 (in Ukr.).
- [9] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494.4(380). P. 123-131. <https://doi.org/10.32014/2019.2518-1467.100>

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## **INNOVATION IN EDUCATION: PREVENTION AND CORRECTION OF THE PEDIOTENIAS AND MATOTENIAS IN STUDENTS AND TEACHERS**

**Abstract.** This paper deals with stress, which is one of the major problem for students and teachers throughout the innovation in education. The focus of this investigation is the prevention and correction of the pediogenesis and matogenesis in students and teachers. These didactogenesis take part information of the personal, interpersonal and organizational stress disorders and crisis. Stress is a significant problem in our times and affects the physical, mental, social and moral health of people. The main objectives are to ascertain the extent to which innovations in university and schools stress affects students' academic and professional success, and their personal, interpersonal and organizational health/ The authors is suggest some techniques and practices to cope with stress for students and teachers. Stress coping methods are the moral, social, physiological, and psychological. Authors outline and suggest the different methods to deal with stress (to its prevention and coping). There are many effective and productive stress management techniques. These stress management techniques students and teachers are need to practice during the lessons and in special activities in the schools and universities and in other situations. In addition to educational and professional stress, it is important to take into account the stresses of personal development and interpersonal relations, which are associated with the "private" or "intimate-personal" as well as social aspects and layers of relationships in human life. The authors introduce the concept of stress innovation. The stress of innovation is the stress that occurs in the process and result of the introduction of innovation. For students and teachers, innovation is both a situation that generates stresses and crises of the personal, interpersonal and organizational levels, and a way to overcome such stresses, problems, and development crises. It is important to note the relationship of causes and consequences, as well as the manifestations of stress of teachers and students at the personal, interactive, educational and organizational levels.

**Keywords:** stress, innovation, pediogenesis, matogenesis, didactogenesis, stress coping, stress of the innovation, students, teachers, crisis management, psychological assistance.

**Introduction.** Stress is a one of the major problem for students and teachers throughout the modern world. There are international statistics for all types of school fears: 10-15% of all children. In Russia, this percentage is much higher - up to 40%, according to the latest data, and the collection data was carried out only for large cities. Studies in schools show that about 30% of children have an unbalanced psyche and need special psychological assistance. Up to 70% of teachers suffer from neurotic disorders. Stress is a significant problem of our times, affects the physical, psychological, social and spiritual health of people. Stress management techniques are easy to practice for students and teachers even during the lesson and in special activities (Kassymova, 2018b; Kassymova, 2018c; Kassymova, Kosherbayeva, Sangilbayev, Schachl, Cox, 2018; Kassymova, Arpentieva, Kosherbayeva, Triyono, Sangilbayev Kenzhaliyev, 2019). For students and teachers, innovation is both a situation that generates stresses and crises at the personal, interpersonal and organizational levels, and a way to overcome such stresses, problems, crises and

didactopathies. It is important to note the relationship of causes and consequences, as well as the manifestations of stress of teachers and students at the personal, interactive, educational and organizational levels. In addition, we consider it important to note that didactogenia (didactogeny, didactogenic neuroses), in which different researchers highlight pediogenia (pediogeny, violations that arise because of pedagogical errors or intentional violence by teachers) and matetogenia (matetogeny, violations that arise from teachers because of intentionally or unintentionally incorrect and / or violent behavior from students), also form a single system (Arpentieva, 2016; Medvedeva, 2010; Minigalieva, 2012; Sukhomlinskiy, 1973; Postalyuk, 1989; Verbitskiy, 1991; Zimnyaya, 2006). Only in theoretical terms can one divide the single process of a disturbed, pathologizing man as a person, as a partner and as a (future) professional, didactic communication in practice, these processes are closely related.

**The main objectives of our study** are to find out how innovation in education affects the professional and academic success of teachers and students, their satisfaction with themselves and life, and their health.

**The main method of our research** was a theoretical analyze of the problems of comprehension of innovations by students and teachers. The obtained results show that pupils (students) and teachers need not only training in productive and effective methods of preventing and correcting stress in situations of organizational and didactic stagnation and innovation, not only comprehensive anti-stress care (Kassymova, 2018a; Kassymova, Kosherbaeva, Sangilbaev, Schachl, Cox, 2018). so that they can cope with stresses while studying and working, but they need a new understanding of themselves and the world, including an awareness of the goals and values of their lives. In addition to educational and professional stress, it is also important to take into account the stresses of personal development and interpersonal relationships that are associated with the personal, interpersonal, as well as social aspects of their life. To successfully overcome and prevent stress, including in the context of the problem of introducing or refusing to introduce innovations in an educational organization and / or didactic interaction, students and teachers need systematic help.

**Results and its discussion.** A number of researchers consider didactogenia as a historical phenomenon and interpret it as a relic of authoritarian pedagogy, as a callous and callous attitude towards children. In at the state, school or university level and a specific teacher. K.I. Platonov introduced the concept of «didactogenia» (Platonov, 1961). Many researchers nevertheless consider didactogenic neurosis in a broad and narrow sense. In the narrow, proper psychiatric sense, school neuroses understood as a special case of a neurosis of fear, associated either with a feeling of alienation and hostility of the school environment (school phobia), or with a fear of learning difficulties (school fear). In a broader - psychopedagogical aspect, school neuroses are understood as special, caused the very process of teaching mental disorders - didactogenia and psychogenic disorders associated with the teacher's incorrect attitude - dialect dialogue. Reducing the manifestations of school maladaptation to school neurosis is unlawful, i.e. the concept of "school neurosis" does not cover the whole problem. "School phobia", "school neurosis", "didactogenic neurosis" are close terms to the concept of "school maladaptation". School maladaptation is lagging the child from his own abilities. As criteria for classifying children as maladaptive, two indicator: poor performance and lack of discipline.

According to I. Bozhanov, three aspects are found in the relationship between the educational process and the development of neurosis (ibid. Arpentieva, 2016). The first aspect is the neurotizing effect of the educational process on the student. The second aspect is the neurotizing effect of academic work on the teacher. In addition, the third aspect is the neurotizing effect that occurs during educational process of communication student and teacher. The neurosis effect of the teacher on the student is indicated, as we have said, by the term pediogenia, student to teacher - referred to as matetogenia. Matetogenia and pediogenia are two components of the didactogenia.

Pediogenias is the negative behavior of a teacher, teacher, mentor, parent, trainer, etc. related to the violation of the principles of pedagogy and other value and technological principles and rules of education and training. This violation may be intentional or unintentional. As a result, the student experiences anxiety, disappointment, performance decreases, stress disorder and a crisis of personal, interpersonal and organizational levels may occur. Similarly, matetogenia can be described as the negative behavior of a student (schoolchild, student, guardian, etc.) associated with conscious or unconscious aggression against

a teacher (mentor). Disappointments, anxiety and distress of failure lead to the fact that the work of the teacher becomes ineffective, and relations with the student are destroyed.

As we early note, prevention and correction of stress in education is associated with the prevention and correction of *pediogenias* (harm caused by incorrect, destructive, and pathologizing attitudes of teachers towards students), as well as correction and prevention of *matetogenias* (harm caused by incorrect, devastating, and pathologizing attitudes of students towards teachers).

Modern schools and universities institutions often mark not only the “common” types of conflicts and barriers confrontation between teachers and students (in the form of misunderstanding, unpickiness, situational harms and conflicts, etc.) but also types that are close to directional, group bullying and other forms of harassment (different forms and levels of the bullying, and tec.).

Also typical are psychosomatic and mental disorders in students and teachers. In general, a psychosomatic and mental type disorder refers to a clinically defined group of symptoms or behavioral signs that, in most cases, cause suffering and interfere with personal, interpersonal and organizational functioning. The severity and nature of the disorder are determined by the degree of deviation in the field of basic criteria of human health (insocial, psychological and other spheres and in whole) (Stepanova, Tashcheva, Stepanova, Menshikov, Kassymova, Arpentieva, Tokar, 2018; Stepanova, Gridneva, Menshikov, Kassymova, Tokar, Merezchnikov, Arpentieva, 2018):

- barrier or block of the personal, interpersonal or professional interaction;
- barrier or block of the personal, interpersonal or professional development;
- part or total stress and distress;
- personal, interpersonal or organizational crisis; personal, interpersonal or organizational deformations and disorders and other didactopathies;
- personal, interpersonal or organizational collapse and dies.

For health, understanding is important as awareness and a sense of continuity, constancy, and identity of different parts of yourself and world: physical, mental, social and spiritual. For health, the poly-componential and poly-level understanding of yourself and of the world is also important as an experience and an idea of the constancy and variability of the world, identity, and difference of experiences in situations of the same type. Self-reflection and other-reflection is very necessary as acceptance and criticality to oneself and other people. Reflection of the mental production (activity) and its results is very necessary to one's and other's people. The most important point is the confirmation and “self-affirmation” as the correspondence (adequacy) of mental reactions to the strength and frequency of environmental influences, social circumstances, and situations. A healthy person needs self-government as the ability to control oneself in accordance with one's own, internal with them, and with external, social norms, rules and laws. A healthy person implements self-design as the ability to plan one's own livelihoods and implement plans of the social world. A person needs flexibility as the ability to change the way of behavior, depending on the change of life situations and circumstances. Mental disorders appear when a person persists in his mistakes, not wanting to “suffer” bodily and socially, does not admit that he did wrong, that his behavior violated moral values and was life-denying. At the same time, from the point of view of medical psychological and spiritual aspects of violations are secondary or background, however, from the point of view of a psychologist, as well as a healer and a priest, they are primary. The causes consequences of diseases and different stress disorders are considered solely destructive: the purpose and value diseases as a destructive and undesirable phenomenon is denied.

However, a person is a productive and effective being: this means that in addition to reproduction, comfort and superiority (including compensatory), he is interested in creativity, and for him risk and a relationship of love are significant. When a person cannot realize himself, refuses creativity and the risk of self-development (the Jonah complex), refuses love (resentment and accusation, envy and pride, betrayal and ignorance, etc.), he, of course, reduces his life only to instincts and defenses. However, in the norm (a fully functioning person) is guided by goals and values. He has an idea of his own essence, of himself as a person, partner and student / teacher (future or current) professional. He has an idea of his own destiny, how to realize it, based on the idea of the purpose and essence of man and humanity as a whole, as well as based on the characteristics of the social situation.

Any violation has not only reasons, but also goals. Therefore, it is important to work with violations in the development of a person as a person, partner and student / professional, not only within the frame-



work of the concept of their causal conditionality, but also within the framework of ideas about their teleological (target) conditionality. Health and success (personal, partner, organizational) are functions of the harmony of intrapersonal, interpersonal and educational-professional relations. Asymmetry, disharmony, errors and incompleteness of educational and professional relations often denote problems of interpersonal and intrapersonal relations. These asymmetries are manifested in intrapersonal and interpersonal pedagogical and administrative conflicts, overwork and depression, psychological burnout, deviant behavior and deformations (personal and professional type), diseases and injuries, accidents, deaths, including murders and suicides. Recently, they often write that many schoolchildren and students, as well as schoolteachers and university teachers cannot cope with stress and have been asking if every disease, every crisis, every barrier has a goal - to improve a person as an individual, partner and student / professional. Therefore, it is not surprising that an optimistic attitude and an active lifestyle are important indicators of somatic health and / or full recovery. At the same time, the moments of remorse, despair, and other "negative" states are important so that a person can recognize and correct the mistake, so that he understands and separates "his" and "someone else's." It is also important that a person does not deceive himself and others with imaginary harmony and "individuality": harmony is true when it is based on the true needs and essence of a person. In addition, individuality is individual when it reflects the essence of a person and allows him as a person, partner and professional to be in a state of congruence (matching oneself and the world) and transparency (transparency for oneself and the world). The result is existential fulfillment, satisfaction with oneself and the world, happiness, overcoming ignorance due to extensive reflection and due to the ability to understand the world in its given (as a manifestation of transparency). The data of many pedagogical, psychological, medical, sociological and other studies "allow us to assert the existence of close ties with the state of the body with such characteristics as:

- a system of attitude towards yourself and your life, including your health, awareness of their value, including reverence for life and life affirmation,
- an active attitude towards diseases and other disorders as markers of mistakes and changes (innovations),
- a developed understanding of the world and self-understanding, optimism and efficiency (self-efficacy),
- a very rich palette of ways to prevention and coping with stress.
- Scientists and practitioners, on the contrary, often describe such psychological characteristics of patients as:
  - a feeling of dependence on the social environment and inability to act independently in life (they tend to transfer responsibility to other people and circumstances);
  - the tendency to reproduce is the reproduction of previously acquired strategies and stereotypes,
  - the lack of desire to change them, even if they are ineffective,
  - the desire to act "like everyone else", "as it should be", consumerism and laziness, procrastination and ignorance, life denial and negativity.

In the process of psychological support of the subjects of the educational process, therefore, in addition to working to prevent and eliminate didactogenia and other (extra-educational) stresses, it is important to develop the knowledge and skills of students and teachers in overcoming negative attitudes towards life and themselves. Students and teachers need correction and support for their personal and educational / professional development and interpersonal relationships. In general, the ability to cope with stress is reduced:

- if they are deprived of faith in themselves and their lives, the support of their family, friends, comrades and colleagues,
- if they are weakened by illnesses and other injuries, if they do not have knowledge and skills about dialogical, joint development,
- or if they are not familiar with the mechanisms of productive and effective transformation of stress and distress, their causes and consequences in the form of diseases and injuries in personal, inter-personal and organizational functioning and development.

After a thorough review of available research in the main databases, the main aspects of the response of students and teachers to innovations in education were identified.

Since the mid-twentieth century, the science of innovations in education and other fields in the West has become a complex, ramified industry, but in the USSR (Russia and Kazakhstan) innovative research has only just begun to take shape in an independent direction of scientific activity. According to researchers O.G. Khomeriki, M.M. Potashnik, A. V. Lorensov, pedagogical innovative processes have become the subject special study in the USSR and post-Soviet countries only in the last decades of the XX century (Khomeiriki, Potashnik, and Lorensov, 1994). Of course, Soviet psychology and pedagogy of the 60-90s of the XX century did not stand aside from the global innovative search. It is enough to recall the innovative search for teachers of the Minsk and Rostov regions, Tatarstan, the experience of experimental teachers (S.I. Lysenkov, V.F. Shatalov, E.N. Ilyin, I.P. Volkov, L.V. Zankov, M.P. Kashin et al.), and ethno-pedagogical research and development by teachers of Kazakhstan, etc. However, in general, the experience of reflective scientific research of innovations and their “living” by schoolchildren and students, as well as university professors and schools, was small (Jonker, 1995; Clarin, 1995; Rogers, 2003; Zagashev, 2008; Zagashev, 2010).

In general, innovation is understood as a deliberate change in the system of relations in an organization in order to improve the quality of a person’s activity or organization / society. Scientists distinguish two types of training: “supportive learning” and “innovative learning”. “Maintenance learning” - process and result such educational (and, as a result, educational) activity, which is aimed at maintaining and reproducing the existing culture, social experience, and social system. This type of training (and education) ensures the continuity of sociocultural experience, and it is it that is traditionally inherent in both school and university education. “Innovative learning” (innovative learning) - the process and result of such training and educational activities, which stimulates to make innovative changes to the existing culture, social environment.

This type of training (and education), in addition to maintaining existing traditions, stimulates an active response to problem situations that arise both for the individual and for society. Abroad, the educational process is often considered as an independent search of new knowledge, new cognitive landmarks of a high level of complexity (E. de Bono, D. Bruner, E. de Corte, D. Mezirow, M. Knowles, H. Taba, D. Schwab etc.). The process of educational research becomes crucial for the construction of training (“process-oriented” training) (Bruner, 1971; Bruner, 1966; Clark, 2011; Mezirov J. et al., 1991; Schwab and Brandwein, 1962; Taba, 1962). It is important to note that the first one is related to relaying, reproduction of social experience, the second - with a creative search based on existing experience and thereby with its enrichment. However, it is impossible to find such forms of education in which the practice of teaching was reduced only to the organization of pure reproduction, it is even more unrealistic to imagine education on a purely research basis. Rather, the point is the orientation of training, and, therefore, in its moral-ideological, social, psychological and other conditions and results. The reproductive and problematic orientations of the educational process are embodied in two main innovative approaches to the transformation of education in modern pedagogy, technology and search. The technological approach modernizes traditional learning based on the prevailing reproductive activity of students, defines the development of learning models as the organization of achievement by students of clearly fixed learning standards. In the framework of this approach, the educational process is focused on the traditional didactic tasks of reproductive education, is built as a “technological”, conveyor process with clearly fixed, described in detail expected results. The search approach transforms traditional learning based on the productive activities of students, defines the development of learning models as students initiated new learning experiences. As part of this approach to learning, the goal is to develop the students' ability to independently learn new experiences; a guideline for the activities of the teacher and students is the generation of new knowledge, methods of action, personal meanings.

Problems of education, including because of innovations or their absence, their causes and consequences also affect the subjects of education. Destructive moments in education can form well-known post-traumatic stress, which, in essence, is an accumulation of injuries and stresses. Such injuries are becoming more common in relations between subjects of education. Didactopathy (pediogeny and matetogeny), psychological exhaustion, as well as professional, interpersonal and personal disorientation are typical results of relations of violence / intimidation, etc., ignorant retention of rigid boundaries in the content and form of education, lack of love and respect between students, between teachers, and also between teachers and students.

Scientists, practitioners and the very subjects of education in Russia and Kazakhstan, innovations and other transformations in the system of higher and secondary education are considered ambiguously and contradictory. Both the faculty and students, as well as the public as a whole, note that innovations and other changes in education often carry exclusively destructive meaning, fictitious relations between subjects and education itself. The planned and ongoing changes, according to direct participants in the reform and innovation processes of secondary and higher education, range from sharply negative to partially approving and indifferent. This confirms the need for a thorough scientific and theoretical understanding of the ongoing transformations and the attitude of the subjects of the educational process as actors - active stakeholders of innovation and education in general. The degree of awareness and understanding by students and teachers of innovative transformations in the life of Russian and, especially, higher education institutions also varies. Based on the secondary analysis of research materials, one can assess the attitude and typical reactions of students and teachers to individual innovative transformations in higher education and to transformations in education in general. At the same time, the influence of the attitude of students and teachers towards innovative transformations on the process of modernizing the system of higher and secondary education in modern Russia and Kazakhstan is obvious. Many students and teachers, in varying degrees, understanding the need for modernization and other changes, at the same time, understand very little the essence of the transformations themselves (Angelovski, 1991; Arpentieva, Kassymova, Lavrinenko, Tyumaseva, Valeeva, Kenzhaliyev, Triyono, Duvalina, Kosov, 2019; Arpentieva, 2016; Aryn, 2006; Clarin, 1995; Clark, 2011; Kassymova, Tyumaseva, Valeeva, Lavrinenko, Arpentieva, Kenzhaliyev, Kosherbayeva, Kosov, Duvalina, 2019). A general decline in the level of education of the population of Russia, for example, indicates the collapse of education, however, the measure of this collapse is not realistic enough. It is radically underestimated due to fear of the need for wider changes, including the need for total changes in relations in society as a whole, as well as society and the state. In general, students and teachers are contradictory to the content and forms of innovation in their practical implementation (Kassymova, Stepanova, Stepanova, Menshikov, Arpentieva, Merezchnikov, Kunakovskaya, 2018; Kassymova, Tokar, Tashcheva Slepukhina, Gridneva, Bazhenova, Shpakovskaya, Arpentieva, 2019). The introduction of truly productive innovations and the return of approaches and technologies that have proved their effectiveness and productivity (made the USSR in the middle of the twentieth century, and Kazakhstan and Russia as a world education leader in it) in the system of Russian and Kazakh higher and secondary education faces a whole series of obstacles. These are obstacles of a socio-psychological, organizational-methodological, informational-content, material-technical, state-ideological nature, without the elimination of which actions aimed at modernizing higher, and secondary schools cannot be successful (Starygina, 2017 p. 200-207).

So, J.-F. Lyotard recorded the transformation of the global educational paradigm: "In a postmodern society, the educational system from an elite reproducer turns into a supplier of specialists who are able to qualitatively apply the acquired knowledge in practice" (Lyotard, 1998, p. 18). On the other hand, another global trend defines transformation processes in the system of secondary and higher education. These are primitivization and individualization, the growth of the importance of individual self-determination of personality and the growth of tendencies of the utilitarian-pragmatic orientation of education, the "death" of the university and its replacement with "lifelong education" and a return to forgotten practices of personality-developing education. These are attempts at inclusive-integrative education and a multicultural orientation of a "liberal-democratic sense and a return to a differentiated and high-quality education that does not allow the transformation of mass education into an institution of maintaining ignorance, violence and alienation of the masses. This is the introduction of digital and other distance technologies and the increasing role of the live participation of teachers and students in the life of a school / university, each other and society, etc. (Sinay, Nahornick, & Graikinis, 2017).

S.I. Samygin and V.N. Nechipurenko emphasizes that in the modern world the concepts of a clear professional (and other social, partner and social) identity are eroded. This leads to a frequent change of occupation and implies a constant readiness to forget or even abandon the profession and the knowledge and skills acquired to master it within the framework of professional reorientation (Samygin S.I., Nechipurenko, 2015, p. 24-39). Professionalization ends with such rapid deprofessionalization that a person does not have time to achieve any more or less serious level of professional skill. Similarly, intimate-personal ties are quickly being built and destroyed: friendship and family unions are created and

destroyed, in which a person is not initially oriented towards self-improvement labor. Similarly, personal development itself: even declarations of the importance of the formation and development of a “comprehensively developed personality” will not turn a “robotproof” and “competitive” consumer into a fully functioning, mature personality.

Thus, modern education in most countries of capitalism and "developing" countries, including countries with a transition economy, etc. (countries of the former USSR), is aimed at preventing a person from reaching maturity as an individual, partner and professional. Education defects are masked by a frantic search and introduction of new forms: in addition to the stress of novelty, such innovations bring deep disorientation that because of it distress turns into such a normal state that we can talk about the very possibility of education subjects to understand what is happening to them and with education, impossible. However, the general growth of dissatisfaction and deformations in the education system (as a whole and in the relations and personality) of subjects of education in particular is very large. It is so large that there is a need for further escalation of the speed and scale of change. This is done by states, ostensibly in order to match education with the “challenges of the time”, increase the flexibility of secondary and higher education systems in accordance with the goals and values of modern society. At the same time, in fact, the point is to completely disorient and put under the complete control of citizens as many countries as possible, which the states of these countries are preparing for mondialization and an electronic concentration camp. Non-slavery relations in Russia and other countries have already become the norm, which does not cause serious protests precisely because of the disorientation of the population. In other countries, such as China and Japan, systems of business, educational and social management are being introduced, which allow filtering out possible protests against legalized state violence at the earliest stages. In addition, as it was developed back in the days of the first known concentration camps in modern history, the citizens themselves are the leading agents for suppressing protests against such reforms and innovations. Thanks to the formative and developing passivity, ignorance and readiness for violence (including submission to violence) to education, due to the person's orientation to instincts and desires of the animal level (reproduction, well-being, superiority), most of the population initially refuses and is deprived of the very possibility of development and self-improvement. This part of the population is deprived of readiness and the ability of creativity and understanding of themselves and the world, freedom and individuality. The unrealized, “gray man”, overwhelmed with anxieties and traumas of everyday life, does not react to changes in any way: learned helplessness (M. Seligman) blocks any internal and external attempts and situations of development. The goals of continuous reforms, as the researchers emphasize, are not obvious to the population, including schoolchildren and students and their families, nor to professional teachers. They nevertheless evaluate its consequences rather negatively (Seligman, 2002; Vereshchagina, Nechipurenko, Samygin, 2016). In general, it is obvious to them that the decline in the standards of secondary and higher education since the middle of the last century in Russia and Kazakhstan has led educational institutions to adapt to the most ordinary representatives of schoolchildren and students, which is far from the best effect on the general condition of the educational process. Computerization and Internetization in no way affect the quality of education, since the common framework - the goals and values of education - is not theirs. It is determined by the ideology of education, and that one - being exclusively pragmatic and destructive - cannot bring anything productive except the experience of unintentional mistakes and intentional destructions. As a result, even students of the generation of “digital natives” note a reluctance to participate in the processes of innovation: they demonstrate a commitment to the “old”, traditional methods of organizing the educational process (Lukina, Tarasova, 2013, p. 82-86; Sinay, Nahornick, & Graikinis, 2017).

The disadvantages of the rating system for assessing the performance of students and students, as well as the assessment of the work of teachers are also obvious. In addition to stimulating, largely, stimulate the processes of their simulation, that is, the deformation of educational and pedagogical work. Moreover, as a result, scientists and practitioners, the community there is a surge of matetogenias and pediogenias, up to the most severe forms of confrontation (bullying, killings, etc.) between all groups and representatives of groups of subjects of education. According to the opinions of teachers from all over Russia, A.A. Ostapenko and T.A. Khagurov, up to 80% of them assess the state of education in the country as crisis and post-crisis - “complete collapse” (Ostapenko, Khagurov, 2013, p. 221-226).

In general, the transition to a two-tier system of organizing higher education, to a point-rating system for assessing the level of knowledge, to the Unified State Examination, to introducing some of the so-called "innovative" methods of education has not been substantiated. Students, schoolchildren and teachers were challenged to adapt to change, none of which was productive. These changes effectively led only to the collapse of education. A similar, although more optimistic, system of attitude to innovation has developed in Kazakhstan. Attempts are also being made here to "achieve the level of world education". However, thanks to the policy of preserving the ethno-pedagogical foundations of national education, as well as a greater centering of the state on the interests of the population, many negative effects are smoothed out. The national education of Kazakhstan in this context provides both students and teachers with much more opportunities for self-realization and development.

**Conclusion.** We consider it important to introduce the concept of stress of innovation. The stress of innovation is the stress that occurs in the process and result of the introduction of innovation. The ability and ready to prevent and cope with stress of the innovations and other changes is a function of the harmony of intrapersonal, interpersonal and organizational relations. In developing an integrative prevention and coping model for students and teachers (in matetogeniases and pediogeniases), it is important to consider the prevention and correction of stress in the context of the development of the actors of education in different contexts: in the context of educational, professional, personal and interactional development. Prevention and correction of stress in innovative education (and in stress of the innovation) is associated with the prevention and correction of pediogenias (harm caused by incorrect, destructive, and pathologizing attitudes of teachers towards students), as well as correction and prevention of "matetogenias" (harm caused by incorrect, devastating, and pathologizing attitudes of students towards teachers).

For students and teachers, innovation is both a situation that generates stresses and crises at the personal, interpersonal and organizational levels, and a way to overcome such stresses, problems, and development crises. It is important to note the relationship of causes and consequences, as well as the manifestations of stress of teachers and students at the personal, interactive, educational and organizational levels. In addition, we consider it important to note that didactogeny, in which different researchers highlight pediogeny (violations that arise because of pedagogical errors or intentional violence by teachers) and matetogeny (violations that arise from teachers because of intentionally or unintentionally incorrect and / or violent behavior from students), also form a single system. Only in theoretical terms can one divide the single process of a disturbed, pathologizing person as a person, as a partner and as a (future) professional, didactic communication in practice, these processes are closely related. Many high school and elementary school teachers, university / college teachers, and students need psychological help and counseling on educational stress, including innovation stress (Valeeva, 2019; Tyumaseva, Orekhova, Valeeva, Salamatov, Kalugina, 2018; Tyumaseva, Valeeva, 2018; Valeeva, 2013; Valeeva, 2017). Such assistance should be aimed at systemic, integrative prevention and correction of stress in education, including the stress of innovation.

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#### БІЛІМІНДЕГІ ИННОВАЦИЯЛАР: СТУДЕНТТЕР МЕН ОҚЫТУШЫЛАРДАҒЫ ДИАКТОГЕНДІК СТРЕСТІ АЛДЫН АЛУ ЖӘНЕ ТҮЗЕТУ

**Аннотация.** Педиогения – оқушының мұғалім, тәрбиеші, ата-ана, жаттықтырушы т.б. тарапынан педагогикалық тактиканың бұзылуына байланысты негативтік психикалық жағдайы. Қорқынышпен, фрустрациямен керінетін т.б. педиогения оқушының қызметіне және оның қоршаған ортамен қарым-қатынасына кері әсерін тигізеді. Матетогения – бұл мұғалімнің (тәлімгердің) саналы немесе санасыз агрессиясымен байла-

нысты оқушының (мектеп оқушысы, студент, қамқоршы және т.б.) теріс әрекеті. Көңілге келмеу, сәтсіздікке алаңдаушылық және мазасыздық мұғалімнің жұмысы тиімсіз болып, оқушымен қарым-қатынас бұзылатындығына әкеледі. Бұл мақала студенттерге және оқытушыларға білім берудегі жаңашылдықтың басты проблемаларының бірі болып табылатын стресске арналған. Бұл зерттеудің негізгі бағыты студенттер мен оқытушылардағы педиогенез бен матетогенияның алдын-алу және түзету. Бұл дидактогендер жеке тұлғаны қалыптастыруға, тұлға аралық және ұйымдық стресстік бұзылулар мен дағдарыстарға қатысады. Стресс - қазіргі уақыттағы маңызды мәселе және адамдардың физикалық, психикалық, әлеуметтік және рухани және моральдық денсаулығына әсер етеді. Жұмыстың негізгі міндеттері – университеттер мен мектептердегі стресстегі жаңашылдық студенттердің академиялық және кәсіби жетістіктеріне, сондай-ақ олардың тұлғалық, тұлғааралық және ұйымдық денсаулығына қаншалықты әсер ететіндігін анықтау. Стресті басқару әдістері моральдық, әлеуметтік, физиологиялық және психологиялық болып табылады. Авторлар күйзеліске қарсы тұрудың әртүрлі (оны болдырмауға және жеңуге) әдістерін сипаттайды және ұсынады. Сабақтарда да, ерекше іс-шараларда да студенттер мен оқытушыларға тәжірибе жасау керек, өйткені көптеген тиімді және өнімді стресстер бар. Тәрбиелік және кәсіби стресстен басқа, жеке тұлғаның дамуындағы және тұлға аралық қатынастардағы стресті, сондай-ақ адам өміріндегі әлеуметтік аспектілер мен қатынастар деңгейлерін ескеру қажет. Студенттер мен оқытушылар үшін инновация дегеніміз - бұл жеке, тұлғааралық және ұйымдастырушылық деңгейлердегі күйзелістер мен дағдарыстарды тудыратын жағдай, сондай-ақ осындай күйзелістер, проблемалар мен даму дағдарыстарын жеңудің жолы. Мұның себептері мен салдарының байланысын, сонымен қатар мұғалімдер мен студенттердің жеке, интерактивті, білім беру және ұйымдастырушылық деңгейлеріндегі стрестің көріністерін атап өткен жөн.

**Түйін сөздер:** стресс, инновация, педиогения, матетогения, стресті басқару, студенттер, оқытушылар, дағдарысты басқару, психологиялық көмек.

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### **ИННОВАЦИИ В ОБРАЗОВАНИИ: ПРОФИЛАКТИКА И КОРРЕКЦИЯ ДИДАКТОГЕННЫХ СТРЕССОВ У СТУДЕНТОВ И ПРЕПОДАВАТЕЛЕЙ**

**Аннотация.** Эта статья посвящена теме стресса, который является одной из основных проблем для студентов и преподавателей в процессе инноваций в образовании. Основное внимание в этом исследовании уделяется профилактике и коррекции педиогении и матетогении у студентов и преподавателей. Эти дидактогении принимают участие в формировании личностных, межличностных и организационных стрессовых расстройств и кризисов. Стресс является серьезной проблемой в наше время и влияет на физическое, психическое, социальное и духовно-нравственное здоровье людей. Основными целями работы являются выяснение того, в какой степени инновации в стрессе в университетах и школах влияют на академические и профессиональные успехи студентов, а также на их личное, межличностное и организационное здоровье. Методы преодоления стресса являются моральными, социальными, физиологическими и психологическими. Авторы обрисовывают в общих чертах и предлагают различные методы борьбы со стрессом (для его предотвращения и преодоления). Есть много эффективных и продуктивных методов управления стрессом, которые необходимо практиковать для студентов и преподавателей даже во время урока и в специальных мероприятиях. Помимо образовательного и профессионального стресса, важно принимать во внимание стрессы личностного развития и межличностных отношений, которые связаны с «личным» или «интимно-личным», а также социальными аспектами и уровнями взаимоотношений в жизни человека. Авторы вводят понятие стресса инноваций. Стресс инноваций – это стресс, который возникает в процессе и результате введения инноваций. Для студентов и преподавателей инновации являются как ситуацией, порождающей стрессы и кризисы персонального, интерперсонального и организационного уровней, так и способом преодоления таких стрессов, проблем, и кризисов развития. Важно отметить взаимосвязь причин и последствий, а

также проявлений стрессов преподавателей и студентов на личностном, интерактивно-учебном и организационном уровнях.

**Ключевые слова:** стресс, инновация, педигогия, матетогия, преодоление стресса, студенты, учителя, антикризисное управление, психологическая помощь.

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#### REFERENCES

- [1] Angelovski K. Teachers and innovations: book for teacher. M.: Prosveshchenie Publ., 1991. 159 p. (in Rus.).
- [2] Arpentieva M.R., Kassymova G.K., Lavrinenko S.V., Tyumaseva Z.I., Valeeva G.V., Kenzhaliyev O.B., Triyono M.B., Duvalina O.N., Kosov A.V., Dossayeva S.K. Environmental education in the system of global and additional education // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494. 2019. Vol. 3, N 379. P. 158-168. <https://doi.org/10.32014/2019.2518-1467.82>
- [3] Arpentieva M.R. Academic socio-psychological counseling and teaching of psychology. Kaluga: K.E. Tsiolkovskiy KSU publ., 2016. 670 p. (in Rus.).
- [4] Aryn E. (ed.) Russian-Kazakh Explanatory Dictionary: Pedagogics. Pavlodar: ECO NFP. 2006. 482 p. (in Kaz.).
- [5] Bruner J.S. Process of education reconsidered // Phi Delta Kappan. 1971. Vol. 53, N 1. P. 18-21.
- [6] Bruner J.S. Toward a Theory of Instruction. Cambridge: Cambridge University Press, 1966. 156 p.
- [7] Clarin M.V. Innovations in world pedagogy: training based on research, games, discussions: (Analysis of foreign experience). SPC "Experiment", 1995. 176 p. (in Rus.).
- [8] Clark B.R. Maintaining change at universities. The succession of case studies and concepts. M.: Publ. House of the Higher School of Economics, 2011. 312 p. (in Rus.).
- [9] Jonker J. Toolbook for Organizational Change. A Practical Approach for Managers. London: Van Gorcum and Comp BV, 1995. 260 p.
- [10] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S. Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. Foresight and the role of innovation in the development of education // Bulletin of National academy of sciences of the Republic of Kazakhstan. 2019. ISSN 1991-3494. Vol. 4, N 380. P. 93-101. <https://doi.org/10.32014/2019.2518-1467.96>
- [11] Kassymova G.K., Stepanova G.A., Stepanova O.P., Menshikov P.V., Arpentieva M.R., Merezhnikov A.P., Kunakovskaya L.A. Self-development management in educational globalization // International journal of education and information technologies. 2018. Vol. 12(12). P. 171-176.
- [12] Kassymova G.K., Tokar O.V., Tashcheva A.I., Slepukhina G.V., Gridneva S.V., Bazhenova N.G., Shpakovskaya E.Yu., Arpentieva M.R. Impact of stress on creative human resources and psychological counseling in crises // International journal of education and information technologies. 2019. Vol. 13(1). P. 26-32.
- [13] Kassymova K.G., Tyumaseva Z.I., Valeeva G.V., Lavrinenko S.V., Arpentieva M.R., Kenzhaliyev B.K., Kosherbayeva A.N., Kosov A.V., Duvalina O.N., Dossayeva S.K. Integrative model of student and teacher stress coping: the correction of relations in educational, professional and personal interaction // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494. 2019. Vol. 3, N 379. P. 169-179. <https://doi.org/10.32014/2019.2518-1467.83>
- [14] Kassymova G. Competence and its implications. Challenges of Science. 2018a. <https://doi.org/10.31643/2018.063>
- [15] Kassymova G.K., Arpentieva M.R., Kosherbayeva A.N., Triyono M.B., Sangilbayev S.O., Kenzhaliyev B.K. (2019). Science, education & cognitive competence based on e-learning // Bulletin of the National academy of sciences of the Republic of Kazakhstan. 2019. Vol. 1. P. 269-278. <https://doi.org/10.32014/2019.2518-1467.31>
- [16] Kassymova G.K., Kosherbayeva A.N., Sangilbayev S.O., Schachl H., Cox N. (2018). Stress management techniques for students // Advances in Social Science Education and Humanities Research или European Proceedings of Social and Behavioural Sciences (ASSEHR). Paris, France, Amsterdam, Netherlands: Atlantis Press, 2018. Vol. 198. Proceedings of the International Conference on the Theory and Practice of Personality Formation in Modern Society (ICTPPFMS 2018). <https://doi.org/10.2991/ictppfms-18.2018.10>



- [17] Kassymova G. Stress management techniques recommended for students. *Challenges of Science*. 2018b. <https://doi.org/10.31643/2018.008>
- [18] Khomeriki O.G., Potashnik M.M., Lorensov A.V. School development as an innovative process: Method. manual for educate. Institutions / Ed. M.M. Potashnik; Grew up. Acad. Education, Institute of Education Management. M.: New School, 1994. 61 p. (in Rus.).
- [19] Lukina A.A., Tarasova I.I. Innovations in education through the eyes of students of the NArFU: problems of the transition period // *Arctic and North*. 2013. Vol. 11. P. 82-86 (in Rus.).
- [20] Lyotard J.F. The postmodern condition. M.: Institute of Experimental Sociology; St. Petersburg: Aleteya, 1998. 160 p. (in Rus.).
- [21] Medvedeva A. About the question of didactogenic neurosis. *Scientific Notes of Taurida National V.I. Vernadsky University. Series: Philosophy. Culturology. Political sciences. Sociology*. 2010. Vol. 23 (62), N 1. P. 167-171 (in Rus.).
- [22] Mezirov J. et al. *Fostering Critical Reflection in Adulthood: A Guide to Transformative and Emancipator Learning*. San Francisco: Oxford, 1991. 221 p.
- [23] Minigalieva M.R. The study of psychology and self-knowledge of students. *Psychotherapeutic model of pedagogical communication* L.A. Petrovskaya. Saarbrücken: LAP, Lambert Academic Publishing, 2012. 632 p. (in Rus.).
- [24] Ostapenko A.A., Khagurov T.A. Educational innovations and reforms through the eyes of teachers and teachers: a brief survey of sociological research // *International Journal of Experimental Education*. 2013. N 4. P. 221-226 (in Rus.).
- [25] Platonov K.I. Word, as a physiological and therapeutic factor // In: K.I. Platonov (ed.), *Psychotherapy. Digest of articles. Proceedings of the State Psychoneurological Institute of the People's Commissariat of Health of the Ukrainian SSR*. Kharkov: State Publishing House of Ukraine, 1961. 381 p. (in Rus.).
- [26] Postalyuk N.Yu. *Creative style of activity: pedagogical aspect*. Kazan: Publishing house of Kazan University, 1989. 205 p. (in Rus.).
- [27] Rogers E.M. *Diffusion of innovations*. New York: Free Press, 2003. 380 p.
- [28] Samygin S.I., Nechipurenko V.N. Philosophical and methodological foundations of higher school pedagogy // In: *Context and reflection: the philosophy of peace and man*. 2015. Vol. 4-5. P. 24-39 (in Rus.).
- [29] Schwab J.J. Brandwein P.P. *The teaching of science*. Mass., Cambridge. Harvard University Press, 1962. 152 p.
- [30] Seligman A. *The problem of trust*. M.: Idea Press, 2002. 256 p. (in Rus.).
- [31] Sinay E., Nahornick A., Graikinis D. Fostering global competencies and deeper learning with digital technologies research series: Creativity and innovation in teaching and learning: A focus on innovative intelligence (I<sup>2</sup>Q) pilot program (Research Report No. 17/18-11). Toronto, Ontario, Canada: Toronto District School Board, 2017. 92p. Available at: [https://www.researchgate.net/publication/322700360\\_CREATIVITY\\_AND\\_INNOVATION\\_IN\\_TEACHING\\_AND\\_LEARNING\\_A\\_FOCUS\\_ON\\_INNOVATIVE\\_INTELLIGENCE\\_I2Q\\_PILOT\\_PROGRAM](https://www.researchgate.net/publication/322700360_CREATIVITY_AND_INNOVATION_IN_TEACHING_AND_LEARNING_A_FOCUS_ON_INNOVATIVE_INTELLIGENCE_I2Q_PILOT_PROGRAM)
- [32] Starygina A.M. Innovative transformations in the perception of students and lecturers in Russian universities // *Historical and Social Educational Idea*. 2017. Vol. 9(2). Part. 2. P. 200-207. <https://doi.org/10.17748/2075-9908-2017-9-2/2-200-207> (in Rus.).
- [33] Stepanova G.A., Tashcheva A.I., Stepanova O.P., Menshikov P.V., Kassymova G.K., Arpentieva M.R., Tokar O.V. The problem of management and implementation of innovative models of network interaction in inclusive education of persons with disabilities // *International journal of education and information technologies*. 2018. Vol. 12. P. 156-162.
- [34] Stepanova O.P., Gridneva S.V., Menshikov P.V., Kassymova G.K., Tokar O.V., Merezhnikov A.P., Arpentieva M.R. Value-motivational sphere and prospects of the deviant behavior // *International journal of education and information technologies*. 2018. Vol. 12. P. 142-148.
- [35] Sukhomlinskiy A.V. *I give my heart to children*. Kiev: Publishing house "Radyanska shkola", 1973. 287 p. (in Rus.).
- [36] Taba H. *Curriculum Development: Theory and Practice*/ Ed. of B. Spaulding. New-York: Burlingame, 1962. 124 p.
- [37] Verbitskiy A.A. *Active education in higher education*. M.: Higher school, 1991. 228 p. (in Rus.); Vereshchagina A.V., Nechipurenko V.N., Samygin S.I. Value crisis of modern education in the historical projection and dynamics of modernization of its paradigmatic bases in the conditions of challenges of information age // *Context and Reflection: Philosophy of Peace and Man*. 2016. Vol. 2. P. 74-91 (in Rus.).
- [38] Zagashev I.O. Psychological aspects of readiness for higher education innovation and quality innovation management // *Bulletin of Sankt-Petersburg I.I. Mechnikov medical state academy*. 2008. N 2(9). P. 105-107 (in Rus.).
- [39] Zagashev I.O. Psychological readiness for innovation as a condition of effectiveness of implementation quality management systems // *Bulletin of the Samara Scientific Center of the Russian Academy of Sciences*. 2010. Vol. 12, N 5(2). P. 418-420 (in Rus.).
- [40] Zimnyaya I.A., Adequacy approach. What is its place in the system of the modern approaches and problems of education. (Theoretic-methodological aspect) // *Today's higher education*. 2006. Vol. 4. P. 20-27 (in Rus.).
- [41] Tyumaseva Z.I., Orekhova I.L., Valeeva G.V., Salamatov A.A., Kalugina E.V. Phenomenon of tutorism in health saving: risk factors and sustainability // *Education and science*. 2018. Vol. 20, N 9. P. 139-157 (in Rus.).
- [42] Tyumaseva Z.I., Valeeva G.V. Technology of advisory activities on issues of the subjective component of health of training // *Bulletin of VEGU (Eastern Economic and Law Humanitarian Academy)*. Ufa: VELHA Publ., 2018. N 5(97). P. 128-135 (in Rus.).
- [43] Valeeva G.V. Psychological counselling as a technology for the development of psychological readiness of future teachers for health activities // *Bulletin of the Chelyabinsk State Pedagogical University*. 2013. N 11. P. 26-37 (in Rus.).
- [44] Valeeva G.V. Features of application of design in consulting. In the collection: *Design and Expertise in Modern Education // Methodology, Methods, Practices Materials of the 1st All-Russian Scientific and Practical Conference*. Kaluga: K.E. Tsiolkovskiy Kaluga State University publ., 2019. P. 11-17 (in Rus.).
- [45] Valeeva G.V. Features of consulting teachers of a pedagogical university. In: *Psychological service of the university: reality and prospects // Materials of the I All-Russian scientific-practical conference with international participation*. M.: National Research University Higher School of Economics Publ., 2017. P. 241-247 (in Rus.).



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## **CLINICAL IMPORTANCE OF DEFINITION OF SINGLE NUCLEOTIC POLYMORPHISMS IN PATIENTS WITH BREAST CANCER (LITERATURE REVIEW)**

**Abstract.** Purpose of the review: The study of literature data relating to the replacement of nucleotides in DNA with the risk of development, course and prognosis of breast cancer.

Materials and methods. A literature review was conducted in electronic databases included in PubMed/Medline, The Cochrane Library. The depth of search was 10 years.

Results. The data on the role of single nucleotide polymorphisms in the development, course, prognosis and response to treatment for breast cancer in individual populations was studied. The research results show that the replacement of nucleotides in DNA underlies the differences in susceptibility to the development of diseases, the effectiveness of the action of medicines.

Conclusion. The determination of single nucleotide polymorphisms can reveal a hereditary predisposition to various multifactorial diseases (including cancer), and to predict individual sensitivity to pharmacological medicines. This can help physicians choose the most effective treatment for breast cancer patients.

**Keywords:** breast cancer, single nucleotide polymorphism, prognosis of the course, risk of development.

**Introduction.** Breast cancer affects up to 12% of women worldwide. According to statistics, in the United States, in 2015, nearly 3 million cases of breast cancer were registered [1]. Risk factors for breast cancer include lifestyle, other pathological conditions, and genetic predisposition [2]. Epidemiological studies show that women with a family history of breast cancer have a higher risk of developing than those who do not have it [3].

Numerous recent studies have reported on the association between single nucleotide polymorphisms (SNP) in genes and the risk of developing breast cancer. Determining the interactions of genetic factors and environmental risk factors has the potential to understand the processes leading to the development of the disease, identify women for whom these risk factors are most relevant, and improve the accuracy of epidemiological risk models.

SNP is a variation of the DNA sequence that occurs when one nucleotide (A, T, C, or G) in the genome is different from the normally expected nucleotide. These SNPs are known to be at the core of the differences in our susceptibility to developing diseases. The definition of SNP is technically not difficult and is carried out only once, which makes them relevant in quality of use as biomarkers. The number of SNPs in the human genome is about 10 million. Their changes can lead to impaired expression and regulation of genes and the appearance of proteins with altered functional properties. The corresponding germinogenic mutations alter the structure of the enzymes metabolizing medicines and transporting them, which affect the efficiency of medicine use. Knowledge of these mutations provides a rationale for individualized treatment [4, 5].

In this regard, much attention is paid to the role of SNPs in the development and progression of breast cancer, as well as their role in diagnosing and predicting the course of the disease.

The increasing interest of the role of SNP in the development and progression of breast cancer is confirmed by the number of studies and publications in the study of SNP in patients with breast cancer, but there are no clear recommendations on the application of these results.

**Materials and methods.** A literature review was conducted in electronic databases included in PubMed/Medline, The Cochrane Library. The depth of search was 10 years. The following search terms were used for the search: breast cancer, single nucleotide polymorphism, prognosis of the course, risk of development. Received 3192 publications on the requested terms.

**Results and discussion.** Environmental factors and metabolic disorders are the main causes of DNA damage [6].

Excision repair is one of the ways to restore DNA, when an exact enzymatic replacement of damaged or altered bases on one strand of the damaged two-stranded DNA molecule. Mutations that occur in related genes can lead to changes in the functions of recovery, and then significantly increase the likelihood of developing malignant tumors [7].

A number of researchers have studied the association between susceptibility to breast cancer and single SNPs in the excision repair genes. In these studies, human apurinic/apyrimidinic endonuclease (APE1), X-ray repair cross-complementing protein 1 (XRCC1), 8-oxoguanine DNA glycosylase (OGG1, also known as hOGG1) and poly (ADP-ribose) polymerase-1 (ADPAT1, also known as PARP1) were studied. Among these polymorphisms studied, the association was found between the risk of developing breast cancer and the rs25487 and rs1799782 mutations in the XRCC1 gene. A positive association between the rs25487 mutation [8–11] and the risk of breast cancer was registered in the study of one race, and was not obtained in the study of other races [12]. Most studies have shown that the rs1799782 mutation is not associated with the development of breast cancer, while in other studies, a positive correlation has been obtained [8 - 12]. Contradictory results were also presented in papers that explored populations consisting of mixed races. In 2001, Duell et al. (2001) reported that a positive association for rs25487 with breast cancer was found among African Americans, but not Caucasian Americans [13]. Vieira et al. (2015) demonstrates that the genetic background can influence the development of breast cancer and even has a reverse association [14].

A clinical study of NSABP B-31, in conjunction with the study of NCCTG N9831, established the advantage of adding trastuzumab, a monoclonal antibody targeting ERBB2/HER2 protein, to standard chemotherapy in patients with early-stage ERBB2/HER2-positive breast cancer. However, only 30 to 50% of patients use this therapy in early or adjuvant conditions [15]. Although this treatment is generally well tolerated, its cost and cardiotoxic effects and the availability of promising alternatives require research aimed at identifying patients who will not benefit from this treatment.

In the original patent of trastuzumab, two mechanisms of action are described.

First, by binding to ERBB2/HER2 on the cancer cell membrane, it prevents the dimerization of ERBB2/HER2, blocking the signaling pathway and proliferation. Secondly, it triggers the host immune system to attack and destroy the trastuzumab-associated tumor cells. This immune response, known as antibody-dependent cell-mediated cytotoxic effect (ADCC), is initiated when the FC $\gamma$  receptor on natural killer cells (NK) binds to the Fc portion of trastuzumab. As a result, NK cells secrete factors, including IFN- $\gamma$ , perforins and granzymes, which cause tumor cell death through the mechanism of apoptosis. A similar process, known as antibody-dependent cellular phagocytosis (ADCP).

In studies on ERBB2/HER2 breast cancer cell lines, we demonstrated potent ADCC caused by trastuzumab in vitro. Experiments in mice demonstrated a decrease in the efficacy of trastuzumab if the Fc fragment is removed from the antibody or if the mouse lacks the FC $\gamma$  receptor. In addition, an increase in lymphoid cell infiltration in tumor samples was observed after treatment with trastuzumab compared with samples after neoadjuvant treatment. Taken together, these results confirm the important role of ADCC or ADCP in the mechanism of action of trastuzumab.

Additional preclinical studies have demonstrated the association of SNPs in genes encoding FC $\gamma$  receptors with the strength of the immune response. Many studies have focused on the position 158 FCGR3A, which encodes valine or phenylalanine and the position 131 FCGR2A, which encodes histidine or arginine [16, 17]. In vitro ADCC assays demonstrated a large trastuzumab-mediated ADCC with the Val VGR (V)/V genotype and a tendency to associate with the histidine (H)/H genotype FCGR2A-131

[16]. Analysis of peripheral blood mononuclear cells (PBMCs), after neoadjuvant and adjuvant therapy, demonstrated more differentiated changes in gene expression in patients with V/V or H/H genotypes than in patients with phenylalanine (F)/F or arginine (R)/R genotypes, which indicates a difference in the molecular response to trastuzumab according to genotype [17]. These observations are consistent with the data that FCγRIIA-131H and FCγRIIA-158V have a higher affinity for immunoglobulin (IgG) than proteins encoded by alternative alleles. Cells containing high affinity alleles more effectively mediate ADCC [18].

Clinical studies using therapeutic monoclonal antibodies, such as rituximab for the treatment of lymphoma and cetuximab for the treatment of colon cancer, have shown the association between the genotypes FCGR3A and FCGR2A with the effectiveness of treatment. However, clinical studies that study the association of these SNPs with the effect of trastuzumab for patients with breast cancer are not unambiguous. Tamura et al. [19] demonstrated improved response rates to trastuzumab in patients with the FCGR2A -131 H/H genotype in the neoadjuvant mode and an increase in the frequency of the objective response in the treatment of the metastatic process. Musolino A. and his colleagues [20] observed an improvement in the objective response and an increase in progression-free survival for patients with the FCGR3A -158 V/V genotype. However, when analyzing the results of the study of patients included in NCCTG-N9831 [21] and BCIRG-006 [22], no association of these loci with the efficacy of trastuzumab in the adjuvant treatment of ERBB2/HER2-positive breast cancer was found.

Fluoropyrimidines are the most common and effective chemotherapeutic agents used for the systemic treatment of various malignant tumors, including the gastrointestinal tract, breast, pancreas, head and neck cancers [23 - 25].

DPD (dihydropyrimidine dehydrogenase), encoded by the DPYD gene, is the initial and rate-limiting enzyme in the metabolic pathway of fluoropyrimidines, such as 5-Fu, capecitabine and tegafur.

The clinical significance of DPD was initially determined in connection with severe or lethal toxicity in patients receiving fluoropyrimidines who did not have or had low levels of DPD activity [26]. More than 50 DPYD polymorphisms that cause fluoropyrimidine - associated toxicity in the treatment of malignant tumors, such as breast cancer, colon carcinomas, gastroesophageal cancer and lymphoblastic leukemia have been identified [27-30].

According to a number of authors, DPYD polymorphisms can contribute to tumor progression and affect sensitivity to chemotherapy, as well as the clinical outcome of cancer patients. DPYD SNPs have been reported to lead to an increased risk of developing ovarian and gastrointestinal cancers with the DPYD genotype c.1627A> G AG / GG, resulting in low sensitivity to fluorouracil-based adjuvant therapy [29-31]. However, the prognostic value of DPYD polymorphisms in breast cancer has been little studied. Fengxia Qin et al. in their work considered the association between SNP DPYD and the effect of therapy based on regimens containing taxanes and anthracyclines (TA) [32]. The authors found that patients with non-wild type DPYD carriers treated with the TA regimen had a longer overall survival compared with "wild type" carriers who did not receive this treatment regimen.

To date, more than 160 polymorphisms have been identified in the DPYD gene, but the number of publications on their study in Asian patients with breast cancer is very limited [33]. DPYD genetic polymorphisms can provide direct, valuable prognostic information. It is possible that for patients with breast cancer with the presence of DPYD c.1627A> G AG/GG polymorphism, chemotherapy based on fluoropyrimidines is not recommended for use.

**Conclusion.** The determination of SNPs can reveal a hereditary predisposition to various multifactorial diseases (including cancer), as well as predict individual sensitivity to pharmacological medicines. Considering the presence of numerous studies suggesting the possibility of developing personalized approaches in the management of breast cancer using the assessment of SNP mutations, further research is needed in individual populations. Applying this strategy can help physicians choose the most effective treatment for breast cancer patients.

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### СҮТ БЕЗІ ҚАТЕРЛІ ІСІГІ БАР НАУҚАСТАРДА БІР НУКЛЕОТИДТІ ПОЛИМОРФИЗМДІ АНЫҚТАУДЫҢ КЛИНИКАЛЫҚ МАҢЫЗДЫЛЫҒЫ (ӘДЕБИ ШОЛУ)

**Аннотация.** Мақсаты: Сүт безі обырының болжамы, ағымы, даму қаупімен ДНК-де нуклеотидтерді ауыстыруға қатысты әдебиеттегі деректерді зерделеу.

Материалдар мен әдістер. PubMed/Medline, Кокран кітапханасына кіретін электрондық дерекқорларында әдебиетке шолу жасалды. Әдебиеттерді іздеу тереңдігі 10 жыл болды.

Нәтижесі. Жеке популяцияларда сүт безі обыры кезінде емдеуге жауап беру, болжам мен ағымы, дамуындағы бір нуклеотидтік полиморфизмдердің рөлі туралы деректер зерделенді. Зерттеу нәтижелері, ДНК-дегі нуклеотидтерді ауыстыру дәрілік препараттар әсерінің тиімділігі, аурудың дамуына шалдығушылықтың түрлілігі негізінде жатқанынан хабар береді.

Қорытынды. Бір нуклеотидтік полиморфизмдер түрлі мультифакторлық ауруларға тұқым қуалаудан болатын бейімділікті (оның ішінде онкологиялық) анықтайды, сонымен бірге фармакологиялық препараттарға жеке сезімталдықты болжамдайды. Бұл дәрігерлерге сүт безі обырымен ауыратын науқастарға анағұрлым тиімді емді таңдауға көмектеседі.

**Түйін сөздер:** сүт безі обыры, бір нуклеотидті полиморфизм, ағымды болжау, даму қаупі.

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### КЛИНИЧЕСКОЕ ЗНАЧЕНИЕ ОПРЕДЕЛЕНИЯ ОДНОНУКЛЕОТИДНЫХ ПОЛИМОРФИЗМОВ У БОЛЬНЫХ РАКОМ МОЛОЧНОЙ ЖЕЛЕЗЫ (ОБЗОР ЛИТЕРАТУРЫ)

**Аннотация.** Цель обзора: Изучение данных литературы касающихся замены нуклеотидов в ДНК с риском развития, течения и прогноза рака молочной железы.

Материалы и методы. Проведен поиск литературы в электронных базах данных, вошедших в PubMed/Medline, The Cochrane Library. Глубина поиска составляла 10 лет.

Результаты. Изучены данные о роли однонуклеотидных полиморфизмов в развитии, течении, прогнозе и ответе на лечение при раке молочной железы в отдельных популяциях. Результаты исследований свидетельствуют, что замена нуклеотидов в ДНК, лежит в основе различий восприимчивости к развитию заболеваний, эффективности действия лекарственных препаратов.

Заключение. Определение однонуклеотидных полиморфизмов может выявить наследственную предрасположенность к различным мультифакторным заболеваниям (в том числе и онкологическим), а также прогнозировать индивидуальную чувствительность к фармакологическим препаратам. Это может помочь врачам, выбрать наиболее эффективное лечение для больных раком молочной железы.

**Ключевые слова:** рак молочной железы, однонуклеотидные полиморфизмы, прогноз течения, риск развития.

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## REFERENCES

- [1] McGuire A., Brown J.A., Malone C., McLaughlin R., Kerin M.J. Effects of age on the detection and management of breast cancer // *Cancers (Basel)*. 2015. 7: 908-929.
- [2] Anothaisintawee T., Wiratkapun C., Lertsittichai P., Kasamesup V., Wongwaisayawan S., Srinakarin J., Hirunpat S., Woodtichartpreecha P., Boonlikit S., Teerawattananon Y., Thakkestian A. Risk factors of breast cancer: a systematic review and meta-analysis // *Asia Pac J Public Health*. 2013. 25: 368-387.
- [3] Colditz G.A., Kaphingst K.A., Hankinson S.E., Rosner B. Family history and risk of breast cancer: nurses' health study // *Breast Cancer Res Treat*. 2012. 133: 1097-1104.
- [4] Schmidt K.T., Chau C.H., Price D.K., Figg W.D. Precision Oncology Medicine: The Clinical Relevance of Patient-Specific Biomarkers Used to Optimize Cancer Treatment // *J Clin Pharmacol*. 2016. 56: 1484-99.
- [5] Benberin B.B., Vochshenkova T.A., Yermakhanova G.A., et al. (2018) Metabolic syndrome and cerebral stroke in Kazakhstan: some management factors // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. 2018. Vol. 5, N 375. P. 55-59. ISSN 2518-1467 (Online), ISSN 1991-3494 (Print). <https://doi.org/10.32014/2018.2518-1467.7>
- [6] Shevtsov M.A., Nikolaev B.P., Ryzhov V.A., Yakovleva L.Y., Marchenko Y.Y., Parr M.A., Rolich V.I., Mikhrina A.L., Dobrodumov A.V., Pitkin E., Multhoff G. Ionizing radiation improves glioma-specific targeting of superparamagnetic iron oxide nanoparticles conjugated with cmHsp70.1 monoclonal antibodies (SPION-cmHsp70.1) // *Nanoscale*. 2015 Dec 28. 7(48): 20652-64.
- [7] Zhu G., Wang L., Guo H., Lu L., Yang S., Wang T., Guo H., Wang H., Min J., Yang K., Chen X., Liu Y., Wang Z., Su H. DNA repair genes XRCC1 and ERCC1 polymorphisms and the risk of sporadic breast cancer in Han women in the Gansu Province of China // *Genet Test Mol Biomarkers*. 2015. 19: 387-393.
- [8] Shadrina A.S., Ermolenko N.A., Boyarskikh U.A., Sinkina T.V., Lazarev A.F., Petrova V.D., Filipenko M.L. Polymorphisms in DNA repair genes and breast cancer risk in Russian population: a case-control study // *Clin Exp Med*. 2016. 16: 21-28.
- [9] Ramadan R.A., Desouky L.M., Elnaggar M.A., Moaaz M., Elsherif A.M. Association of DNA Repair Genes XRCC1 (Arg399Gln), (Arg194Trp) and XRCC3 (Thr241Met) Polymorphisms with the Risk of Breast Cancer: A Case-Control Study in Egypt // *Genet Test Mol Biomarkers*. 2014. 18: 754-760.
- [10] Ding P., Yang Y., Cheng L., Zhang X., Cheng L., Li C., Cai J. The relationship between seven common polymorphisms from five DNA repair genes and the risk for breast cancer in northern Chinese women // *PLoS One*. 2014. 9: e92083.
- [11] Luo H., Li Z., Qing Y., Zhang S.H., Peng Y., Li Q., Wang D. Single nucleotide polymorphisms of DNA base-excision repair genes (APE1, OGG1 and XRCC1) associated with breast cancer risk in a Chinese population // *Asian Pac J Cancer Prev*. 2014. 15: 1133-1140.
- [12] Al Zoubi M.S. X-ray repair cross-complementing protein 1 and 3 polymorphisms and susceptibility of breast cancer in a Jordanian population // *Saudi Med J*. 2015. 36: 1163-1167.
- [13] Duell E.J., Millikan R.C., Pittman G.S., Winkel S., Lunn R.M., Tse C.K., Eaton A., Mohrenweiser H.W., Newman B., Bell D.A. Polymorphisms in the DNA repair gene XRCC1 and breast cancer // *Cancer Epidemiol Biomarkers Prev*. 2001. 10: 217-222.
- [14] Vieira P.C., Burbano R.M., Fernandes D.C., Montenegro R.C., Dos Santos S.E., Sortica V.A., Assumpcao P.P., Ribeiro-Dos-Santos A.K., Carvalho A.A., Dos Santos N.P. Population stratification effect on cancer susceptibility in an admixed population from Brazilian Amazon // *Anticancer Res*. 2015. 35: 2009-2014.
- [15] Mellor J.D., Brown M.P., Irving H.R., Zalcberg J.R., Dobrovic A. A critical review of the role of Fc gamma receptor polymorphisms in the response to monoclonal antibodies in cancer // *J Hematol Oncol*. 2013. 6:1.
- [16] Musolino A., Naldi N., Bortesi B., et al. Immunoglobulin G fragment C receptor polymorphisms and clinical efficacy of trastuzumab-based therapy in patients with HER-2/neu-positive metastatic breast cancer // *J Clin Oncol*. 2008. 26(11): 1789-1796.
- [17] Shimizu C., Mogushi K., Morioka M.S., et al. Fc-Gamma receptor polymorphism and gene expression of peripheral blood mononuclear cells in patients with HER2-positive metastatic breast cancer receiving single-agent trastuzumab // *Breast Cancer*. 2016. 23(4): 624-632.
- [18] Mellor J.D., Brown M.P., Irving H.R., Zalcberg J.R., Dobrovic A. A critical review of the role of Fc gamma receptor polymorphisms in the response to monoclonal antibodies in cancer // *J Hematol Oncol*. 2013. 6:1.
- [19] Tamura K., Shimizu C., Hojo T., et al. FcγR2A and 3A polymorphisms predict clinical outcome of trastuzumab in both neoadjuvant and metastatic settings in patients with HER2-positive breast cancer // *Ann Oncol*. 2011. 22(6): 1302-1307.
- [20] Musolino A., Naldi N., Bortesi B., et al. Immunoglobulin G fragment C receptor polymorphisms and clinical efficacy of trastuzumab-based therapy in patients with HER-2/neu-positive metastatic breast cancer // *J Clin Oncol*. 2008. 26(11): 1789-1796.

- [21] Norton N., Olson R.M., Pegram M., et al. Association studies of Fcγ receptor polymorphisms with outcome in HER2+ breast cancer patients treated with trastuzumab in NCCTG (Alliance) Trial N9831 // *Cancer Immunol Res.* 2014. 2(10): 962-969.
- [22] Hurvitz S.A., Betting D.J., Stern H.M., et al. Analysis of Fcγ receptor IIIa and IIa polymorphisms: lack of correlation with outcome in trastuzumab-treated breast cancer patients // *Clin Cancer Res.* 2012. 18(12): 3478-3486.
- [23] Tecza K., Pamula-Pilat J., Lanuszevska J., Grzybowska E. Genetic polymorphisms and response to 5-fluorouracil, doxorubicin and cyclophosphamide chemotherapy in breast cancer patients // *Oncotarget.* 2016. 7: 66790-808.
- [24] Patel K., Yerram S.R., Azad N.A., Kern S.E. A thymidylate synthase ternary complex-specific antibody, FTS, permits functional monitoring of fluoropyrimidines dosing // *Oncotarget.* 2012. 3: 678-85.
- [25] Del Re M., Quaquarelli E., Sottotetti F., Michelucci A., Palumbo R., Simi P., Danesi R., Bernardo A. Uncommon dihydropyrimidine dehydrogenase mutations and toxicity by fluoropyrimidines: a lethal case with a new variant // *Pharmacogenomics.* 2016. 17: 5-9.
- [26] Offer S.M., Wegner N.J., Fossum C., Wang K., Diasio R.B. Phenotypic profiling of DPYD variations relevant to 5-fluorouracil sensitivity using real-time cellular analysis and in vitro measurement of enzyme activity // *Cancer Res.* 2013. 73: 1958-68.
- [27] Zhao X.Q., Cao W.J., Yang H.P., Yang X.W., Tang P., Sun L., Gao X. DPYD gene polymorphisms are associated with risk and chemotherapy prognosis in pediatric patients with acute lymphoblastic leukemia // *Tumour Biol.* 2016. 37: 10393-402.
- [28] Saif M.W. Dihydropyrimidine dehydrogenase gene (DPYD) polymorphism among Caucasian and non-Caucasian patients with 5-FU- and capecitabine-related toxicity using full sequencing of DPYD // *Cancer Genomics Proteomics.* 2013. 10:89-92.
- [29] Joerger M., Huitema A.D., Boot H., Cats A., Doodeman V.D., Smits P.H., Vainchtein L., Rosing H., Meijerman I., Zueger M., Meulendijks D., Cerny T.D., Beijnen J.H., et al. Germline TYMS genotype is highly predictive in patients with metastatic gastrointestinal malignancies receiving capecitabine-based chemotherapy // *Cancer Chemother Pharmacol.* 2015. 75: 763-72.
- [30] Kelemen L.E., Terry K.L., Goodman M.T., Webb P.M., Bandera E.V., McGuire V., Rossing M.A., Wang Q., Dicks E., Tyrer J.P., Song H., Kupryjanczyk J., Dansonka-Mieszkowska A., et al. Consortium analysis of gene and gene-folate interactions in purine and pyrimidine metabolism pathways with ovarian carcinoma risk // *Mol Nutr Food Res.* 2014. 58: 2023-35.
- [31] Zhang X.P., Bai Z.B., Chen B.A., Feng J.F., Yan F., Jiang Z., Zhong Y.J., Wu J.Z., Chen L., Lu Z.H., Tong N., Zhang Z.D., Xu P.P., et al. Polymorphisms of dihydropyrimidine dehydrogenase gene and clinical outcomes of gastric cancer patients treated with fluorouracil-based adjuvant chemotherapy in Chinese population // *Chin Med J (Engl)* 2012. 125: 741-6.
- [32] Fengxia Qin, Huikun Zhang, Yong Huang, Limin Yang, Feng Yu, Xiaoli Liu, Li Fu, Feng Gu, Yongjie Ma. Effect of dihydropyrimidine dehydrogenase single nucleotide polymorphisms on prognosis of breast cancer patients with chemotherapy // *Oncotarget.* 2017 Dec 19. 8(67): 112060-112075.
- [33] Toffoli G., Giodini L., Buonadonna A., Berretta M., De Paoli A., Scalone S., Miolo G., Mini E., Nobili S., Lonardi S., Pella N., Lo Re G., Montico M., et al. Clinical validity of a DPYD-based pharmacogenetic test to predict severe toxicity to fluoropyrimidines // *Int J Cancer.* 2015. 137: 2971-80.
- [34] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // *Bulletin of National academy of sciences of the Republic of Kazakhstan.* ISSN 1991-3494.4(380). P. 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [35] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S., Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. (2019). Foresight and the role of innovation in the development of education // *Bulletin of National academy of sciences of the Republic of Kazakhstan.* ISSN 1991-3494.4(380). 93-101. <https://doi.org/10.32014/2019.2518-1467.96>
- [36] Mamyrbayev O.Z., Othman M., Akhmediyarova A.T., Kydyrbekova A.S., Mekebayev N.O. Voice verification using I-vectors and neural networks with limited training data // *Bulletin of the National academy of sciences of the Republic of Kazakhstan.* 2019. N 3(379). P. 36-43. <https://doi.org/10.32014/2019.2518-1467.66>
- [37] Lavrinenko S.V., Arpentieva M.R., Kassymova G.K. (2019). The negative impact of the internet on the educational process. International youth scientific conference "Heat and mass transfer in the thermal control system of technical and technological energy equipment" (HMTTSC 2019). <https://doi.org/10.1063/1.5120671>
- [38] Atayeva M., Putro N.H.P.S., Kassymova G., Kosbay S. (2019) Impact of reading on students' writing ability // *Materials of International Practical Internet Conference "Challenges of Science".* ISBN 978-601-323-144-0. Issue II, 2019. P. 5-13. <https://doi.org/10.31643/2019.001>
- [39] Kassymova K.G., Tyumaseva Z.I., Valeeva G.V., Lavrinenko S.V., Arpentieva M.R., Kenzhaliyev B.K., Kosherbayeva A.N., Kosov A.V., Duvalina O.N., Dossayeva S.K. Integrative model of student and teacher stress coping: the correction of relations in educational, professional and personal interaction // *Bulletin of National academy of sciences of the Republic of Kazakhstan.* ISSN 1991-3494. 2019. Vol. 3, N 379. P. 169-179. <https://doi.org/10.32014/2019.2518-1467.83>
- [40] Arpentieva M.R., Kassymova G.K., Lavrinenko S.V., Tyumaseva Z.I., Valeeva G.V., Kenzhaliyev O.B., Triyono M.B., Duvalina O.N., Kosov A.V., Dossayeva S.K. Environmental education in the system of global and additional education // *Bulletin of National academy of sciences of the Republic of Kazakhstan.* ISSN 1991-3494. 2019. Vol. 3, N 379. P. 158-168. <https://doi.org/10.32014/2019.2518-1467.82>
- [41] Azatbek T., Panzabekova A., Bekenova L., Yegizbyeve Zh. The share of drug trafficking in Kazakhstan's GDP: methods for evaluation // *Economic Annals-XXI* (2017). 166(7-8). P. 31-36(Scopus). DOI: <https://doi.org/10.21003/ea.V166-06>
- [42] Khalitova M.M., Praliev G.S., Panzabekova A.Z., Andreeva Z.M., Dzhubaliyeva Z.A. Financial instruments of state regulation industrial and innovative development of Kazakhstan economy // *Life Sci J.* 2014. 11(10s):369-378. (ISSN:1097-8135). <http://www.lifesciencesite.com.70>



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## **MODERNIZATION OF XINJIANG UYGHUR AUTONOMOUS REGION AND ITS IMPACT ON TRANSBOUNDARY RELATIONSHIPS KAZAKHSTAN AND CHINA**

**Abstract.** For nearly two decades, XUAR has been the vanguard in the implementation of the program of large-scale development of the western regions of the PRC. The article discusses the internal and external causes that determine the special role of the studied national region in the Chinese regional politics. The undeniable advantage of Xinjiang Uyghur Autonomous Region (XUAR) is its geographical location. That on XUAR accounted for 1/4 of the Chinese state land border, and it borders with the largest number of foreign countries (in comparison with other autonomous regions) determines the importance of its place in geostrategic plans of China. This geographical position allows to activate the policy of "going outside", that is, the policy of expansion and intensification international trade and economic relations of the country Central Asian, and further in the European direction, forcing course "East accumulates, the West exports." Focus in the article is devoted to dynamic changes in the socio-economic development of the area as a result of the strategy being implemented. As a result, the study justifies the unique place of XUAR in China's cross-border relationship with Kazakhstan. Accelerated development of XUAR is an important factor influencing the Kazakh-Chinese cooperation in trade, energy, transport infrastructure, safety, ecology, culture. Moreover, without the factor of XUAR it is impossible to design a holistic system of development of Central Asian region.

**Keywords:** Xinjiang Uyghur Autonomous Region, PRC, regional imbalances, economic modernization, Kazakh-Chinese cross-border cooperation.

**Introduction.** Despite quite promising prospects and positive trends in the Chinese economy, China still faces many serious problems. One of the most important reasons for cautious skepticism about the possibility of China becoming a truly dominant power in the next quarter-century is its uneven regional development. This reason is quite aptly noted by the author of the famous book "The Great Chessboard" Z. Brzezinski: "The rapid development of China increases social inequality. At some point, either because the government may try to limit these inequalities or because of social inequalities from below in the development of certain areas and inequalities in living standards may, in turn, have an impact on the political stability of the country [1, p. 192].

Indeed, the grandiose transformations of the Chinese economy, which began about forty years ago, are often contradictory. On the one hand, they have helped to achieve prosperity in the country that could not even have been dreamed of until recently. On the other hand, they have further exacerbated and exposed social inequalities. The regional problem becomes particularly complex and acute in countries where nations and nationalities are at different stages of socio-economic and political development, where one of the peoples is superior to the others in economic development, many times more numerous than they are, and has been dominating the society for centuries. Not without reason, China is one of those countries. Back in the early 1980s, some Chinese scientists noted that China, like the rest of the world, has

so-called "first", "second" and "third worlds", referring to the huge socio-economic differences in the level of development of individual areas of the country.

The so-called "third world" includes, first of all, the western regions of China, among which the Xinjiang Uyghur Autonomous Region should be singled out, [2, 3] in which the problems of socio-economic lagging behind are aggravated by the ethnic factor.

**Methods of research.** To study the socio-economic results of the accelerated modernization of XUAR and the role of the region in the transboundary Kazakhstan-China cooperation, the author used the civilizational [4, 5] and socio-constructivist approaches [6], which allow to expand the field of analysis and see in the studied object not only cognitive, but also social component. The application of economic and statistical analysis and regional diagnostics methods has made it possible to process a variety of statistical material, various input data characterizing the level, structure, and characteristics of XUAR's socio-economic development. The assessment is given to the development of the region as a whole and covers all the main aspects of its development. [7, 8] In addition, the diagnostic method made it possible to identify and assess the key problems that are most significant from the point of view of solving specific tasks of regulating territorial development, in what direction and with what changes the general regional situation and certain regional problems are transformed.

**Results and discussion.** Since the beginning of the policy of reform and openness, especially after the 12th CPC Congress, the economic development of China has clearly shown a trend of priority development of the eastern regions. The meaning of regional policy was the gradual, step-by-step economic development of China. Three economic belts were identified: the developed East, the underdeveloped Centre and the underdeveloped West. For each belt, specific tasks were set. The eastern (coastal) regions were given the task of anticipatory development. Central areas were to be developed on the basis of existing critical facilities. The western districts had to prepare for the development. The more developed eastern region was assigned the role of a locomotive, which should have been pulled by the less developed central and western regions. However, this regional policy has increased the imbalance in regional socio-economic development.

Unequal starting conditions gave significant advantages to the coastal regions, which by the beginning of the reform were far ahead of the inner regions in terms of socio-economic development. On the other hand, these benefits were enhanced by the creation of a favourable market environment for business in the coastal provinces. As China's economic ties with other countries have become more intense and the Chinese economy has become more open, external factors of regional development have become increasingly important. The best conditions for inclusion in the world economic processes are the coastal provinces with advantages in terms of transport and geography, specializing in light industry, electronics and electrical engineering, and characterized by a higher degree of denationalization of the economy and a favorable business climate [9, p. 51].

As a result of this regional disparity, since the beginning of economic reforms, the gap in the socio-economic development of the eastern and western regions has become so wide that it is very difficult to overcome in the short term.

There is a significant regional differentiation in the Gross Regional Product (GRP) per capita, the level of development of the productive forces and the structure of the economy. Thus, the post-industrial structure of the economy includes the central subordinate cities of Beijing (the tertiary sector - 76.5% in 2012.) and Shanghai (60.4 per cent); the strongest industrial structure with the highest share of secondary sector is in Qinghai (57.7 per cent), Henan (56.3 per cent), Shanxi (55.6 per cent); the highest share of primary sector is in Hainan (24.9 per cent), XUAR (17.6 per cent), Guangxi Zhuang Autonomous Region (16.7 per cent) [9, p. 50].

The imbalance in the level of development of China's regions has remained for many decades the most perceptible and painful problem, without which successful progress towards reform was impossible. Different starting levels of social and economic development, different economic structure and specialization, and varying degrees of urgency in addressing the social problems of China's regions make it necessary to take into account the regional specifics of economic management.

Until recently, the problem of "western territories" has been specifically addressed by changing the demographic situation and the direction of the Han Chinese titular nationality labor force in XUAR to reduce the percentage of the Uyghur population, as well as by stationing units of the People's Liberation



Army of China (PLA) and paramilitary groups there. However, such a complex problem could not be solved only by administrative measures, and the policy of the Chinese leadership to change the demographic balance has repeatedly caused aggravation of the situation in this region. As a result, Beijing's policy has been reoriented towards equalizing economic life in the eastern and western parts of China [10, p. 65].

Despite the fact that the task of modernizing Xinjiang has been set repeatedly, the Chinese leadership was able to approach it only at the beginning of the XXI century within the framework of a long-term comprehensive program of large-scale development of western provinces. It is noteworthy that XUAR has become the main link in the implementation of this strategy. The focus of PRC's central government on Xinjiang UAR has a number of internal and external causes.

Internal reasons include the following:

Firstly, realizing that uneven regional development can become not only an economic, but also an acute socio-political problem, causing ethnic conflicts and strengthening separatist sentiments, the Chinese leadership has decided to shift the bias in regional policy towards the western regions by raising their economy, infrastructure construction, and improving the welfare of the population.

Second, XUAR is the region with the richest natural resources. The deposits of 138 types of minerals out of 171 available in China, including 7 types of energy resources, 42 types of metals, 70 types of non-metallic ores, 3 types of underground waters were discovered here. In 2013, XUAR has ranked first in China in terms of potential mineral reserves. Energy resources are of the greatest interest to the country. According to the second energy assessment, Xinjiang's oil reserves amount to 20.9 billion tons (30% of China's total oil reserves), natural gas reserves - 2.1 billion cubic meters (more than 40% of the total natural gas reserves), coal reserves - 2.19 trillion tons (40% of China's coal production) [11, p. 24].

The strategic plan is to turn XUAR into China's largest oil and gas industry base in the near future. To achieve this goal, the Central Government annually increases funding for exploration and development of hydrocarbon deposits in XUAR. Credits from international financial institutions and foreign governments are also actively used. Here the pragmatic interest of the Chinese leadership in Xinjiang is evident, which is related to the prospect of using Xinjiang's natural wealth, and its mainly usage outside the national autonomous region.

Thus, on July 4, 2002, the Tarim Basin Natural Gas Transmission Project (XUAR) was officially launched in densely populated Eastern China (Shanghai), where industrial production is concentrated. Investments in the first and second phases of the Project amounted to over 290 billion yuan. The main pipeline and 8 gas pipeline branches were commissioned on December 30, 2012. At the end of the second phase, almost 40,000 km of gas pipeline network covering 28 provinces and autonomous regions of mainland China and the Hong Kong Special Administrative Region were constructed in China [12, p. 59].

Third, XUAR is the largest administrative unit among the autonomous regions of China, occupying 1/6 of the total area of the country, while its population is only 1.5% of the country's population. Therefore, it is equally important for the Chinese leadership to be able to mitigate the demographic problem in the country's interior and coastal provinces by relocating their surplus population to the sparsely populated Xinjiang UAR by Chinese standards [13]. The justification for such a relocation is explained by the need for staff support for the implementation of the strategic project and the unwillingness of the western regions to perform such grandiose tasks on their own.

Indeed, the western region suffers from a huge shortage of qualified personnel, especially in science and technology. At the beginning of the implementation of the Strategy, 75% of the country's top-level professionals were concentrated in coastal areas, 21% in the central regions and only 4% in the western regions. In the eastern regions, out of 10 thousand employed 885 persons had professional education, while in the western regions, only 92 persons had professional education. While the eastern regions had 415 higher education institutions, the western regions had only 142, most of which were located in the Han Chinese regions [14, p. 130]. The lack of specialists in the western regions has been covered by their mass transfer from the eastern regions of China for a decade already. But the fact is that the attraction of additional labor resources from other regions of the country can not continue indefinitely, as it has already radically changed the ethnic composition of the population of the national districts, significantly increased the demographic burden on the territory of Xinjiang UAR and created the ground for ethnic conflicts.

Xinjiang's geographical location has specific regional characteristics. In terms of transport and geographical continentality, it belongs to the ultra-continental regions, as most of its territory is located more than 2,000 km from the coastline, which means that it has the least favourable geographical position in relation to the sea routes. Therefore, the industrial development of XUAR territory is not linked to the export of products through seaports, but to the creation of a single inland market of Central Asian countries and western provinces of China [16]. Xinjiang's ultra-continentalism is thus used as a beneficial geographical factor to facilitate cross-border economic cooperation with neighboring countries.

Source: <http://silk.owasia.org/2015/10/89/silk/>

Xinjiang's borderline Xinjiang may give a powerful impetus to trade and economic relations between Kazakhstan and China.

In 2018, trade turnover between Xinjiang and Kazakhstan reached 15.195 billion U.S. dollars (USD), representing 36% of Xinjiang's trade with countries along the Belt and Road [17].

Unfortunately, the structure of economic cooperation between Kazakhstan and Xinjiang UAR has been deformed. Bilateral relations are limited to trade in raw materials, household and consumer goods, and small and medium-sized businesses. There is a lack of mutually beneficial cooperation in technological, inter-sectoral, as well as intrasectoral areas, which reduces the effectiveness of regional cooperation with Xinjiang UAR, and cross-border trade with China as a whole. Kazakhstan and Central Asia are gradually becoming one of China's most important energy import bases, while the western parts of the country are becoming the country's largest oil and gas processing capacity, contributing to the development of the economies of these regions and to China's energy security. Therefore, it is possible to assume further strengthening of Chinese energy diplomacy in the Central Asian direction, contributing to the creation of a favorable external energy environment and ensuring the flow of oil to China. However, the negative consequences of the raw material orientation of exports for our country are well known. This includes the depletion of limited natural resources, losses associated with the disparity of prices for Kazakh raw materials and Chinese finished products, and huge risks associated with the dependence of the country's economy on the oil and gas situation, and finally, the decline in international competitiveness of the country.

Solving this problem involves the formation of new impulses and mechanisms of cross-border Kazakh-Chinese cooperation, promoting the international competitiveness of our country and the implementation of innovation-oriented modernization of the national economy [18].

As you know, Kazakhstan supported China's initiative to revive the Silk Road and, for its part, put forward a proposal to link the Nurlı Zhol programme with the Silk Road Economic Belt. The priority direction of the current stage of the Kazakh-Chinese partnership is the transport and logistics sector. Cooperation in this area will allow not only to develop the transport infrastructure of Kazakhstan, but also to increase revenues from transit. After modernization of its transport system, Kazakhstan expects to increase its share in transit services for Chinese cargo to Europe to 8% [19].

However, it should be noted that Kazakhstan's participation in the Silk Road Economic Belt project should not be limited to servicing huge cargo flows and establishing reliable transit of Chinese goods to Europe. According to the academician of the National Academy of Sciences of the Republic of Kazakhstan A.K. Koshanov, there would be a one-sided interpretation of the economic benefits of the land "Silk Road" from the position of "pure transit". The development of this route on the basis of public-private partnership (PPP) will mean the "subsidence" of capital in Kazakhstan together with the labor force and the organization of modern enterprises in the country. Central Asian states therefore need to structure their policies in such a way as to generate substantial economic dividends from such cooperation, while at the same time preserving national sovereignty. When opening transport and energy corridors on the Single Silk Road, Kazakhstan should play a key role in infrastructure and industrial development along their entire length [20, p. 11].

The New Silk Road project promoted by China involves not only the revival of the ancient transport route between East and West, but also a large-scale transformation of the entire trade and economic model of Eurasia, primarily Central Asia. In fact, it is a question of reaching a new level of partnership and interaction on the entire Eurasian continent in the long run. The length of the main direction of the "New Silk Road" through Central Asia is about 6500 km, of which 4000 will pass through the Chinese territory - from the Pacific coast to Xinjiang Uyghur Autonomous Region. The proposed route will then pass through Kazakhstan, Uzbekistan, Turkmenistan, Iran, Iraq, Syria and Turkey, and from there to Europe via Bulgaria, Romania and the Czech Republic to Germany; branches from the main route will also reach many other neighbouring countries [21].

In purely transport dimension, the construction of new transport corridors should reduce the time of delivery of goods from China to Europe from the current 45-60 days by sea to 10-13 days by land. Of course, such a shortening of transportation time could lead to a significant optimization and cheapening of many Chinese goods, which would allow China to strengthen its position in the European and Asian markets, as well as to conquer new markets in Africa and the Middle East [22].



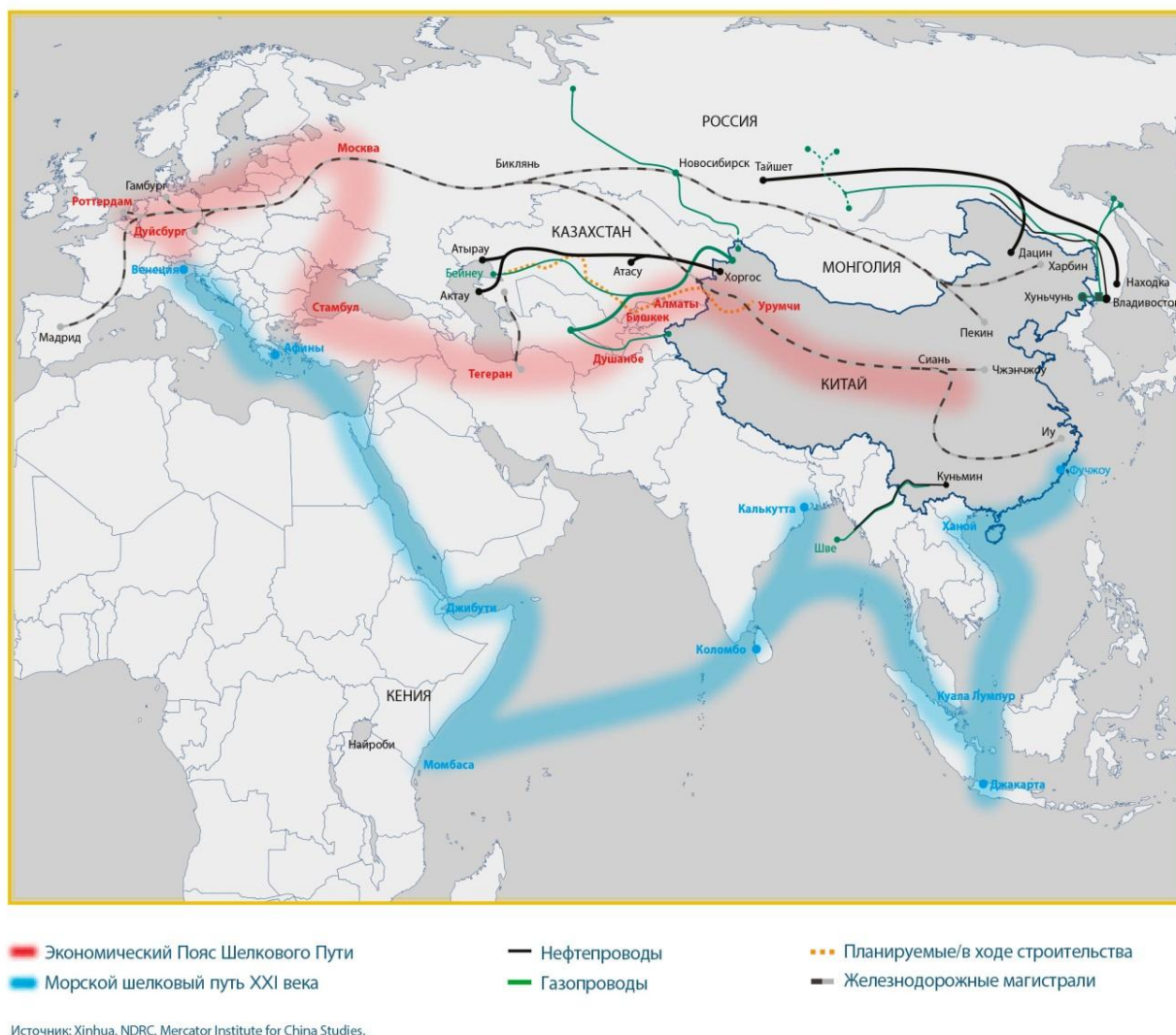


Figure 2 – Land and Sea Route Map of the Silk Road.

Source: Xinhua NDRC Mercator Institute for Chinese Studies.

Xinjiang, at the heart of Eurasia, plays the role of a bridge on the Silk Road Economic Belt for China's trade with Central, South and West Asian countries, transit to Europe and the Middle East, as well as imports of strategically important minerals from Central Asia and Russia.

To fulfil this role, the Chinese government has established the Kashgar Economic Development Zone in South Xinjiang, which is one of the six largest FEZs in China. Its residents enjoy almost all the benefits and privileges available in other Chinese Free Economic Zones. In the northern part of Xinjiang, bordering Kazakhstan, the Khorgos International Center for Border Cooperation was opened in 2011 with a total area of 5.28 square kilometers, which is expected to increase the volume of cargo transit from 5 million tons in 2015 to 20 million tons by 2020. XUAR has a total of 29 checkpoints, of which 17 are Class 1 and 12 are Class 2 border crossings. There is trade through them with 119 countries and regions. The majority of the gateway checkpoints are equipped with high-class equipment, which allows for customs clearance of goods in the shortest possible time. For example, Alashankou, through which the railroad passes, is the second largest in China in terms of cargo volume and is the largest and most efficient checkpoint in Northwest China. An important condition for the development of FEZs in XUAR was the establishment and further development of transport highways and services for trade and investment. In particular, the Urumqi-Khorgos high-speed railroad was commissioned in 2018. In China's information field, it has already been called "the central part of the New Silk Road starting in China" and "a strategic railway for all border states" [11, 15, 21].

**Conclusions.** From the very first steps of implementing its strategy of large-scale development of the western regions, China has made every effort to turn Xinjiang into an "exemplary land for the whole country". The current scale and pace of economic construction in the Xinjiang UAR border areas indicates that the PRC's plans are indeed being implemented. There is no doubt that in the coming years, the southeastern borders of our republic will have the largest international trade, industrial, transport and logistics hub in Central Asia, which will undoubtedly exert a powerful pressure on the economic, demographic and environmental situation in Kazakhstan and other Central Asian countries.

XUAR is linked to Kazakhstan and Central Asia not only by historical, cultural, and linguistic roots, but also by close economic ties. It is short-sighted not to take into account the potential impact of XUAR on material production intensification processes in Kazakhstan. Therefore, one of the most important tasks of Kazakhstan's foreign economic strategy is to form a balanced model of cross-border cooperation between Kazakhstan and China, in which the economic security of trade partners would not be in doubt.

For Kazakhstan, the prospect of becoming a bridge between entire regions and the subsequent deepening of trade and economic ties with China is economically attractive. But the actual participation of our country should not be limited only to the servicing of huge cargo flows, establishment of reliable transit of Chinese goods to Europe. Kazakhstan's primary task in considering participation in the Chinese Silk Road Economic Belt project is to make the most effective use of the advantages of the Chinese initiative, on the one hand, and to minimize the inevitable risks, on the other.

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#### **ШЫҢЖАҢ ҰЙҒЫР АВТОНОМИЯЛЫҚ АУДАНЫНЫҢ МОДЕРНИЗАЦИЯСЫ ЖӘНЕ ОНЫҢ ҚАЗАҚСТАН МЕН ҚЫТАЙ АРАСЫНДАҒЫ ТРАНСШЕКАРАЛЫҚ ҚАРЫМ-ҚАТЫНАСТАРҒА ӘСЕРІ**

**Аннотация.** ҚХР-ның батыс аймақтарды игеру бойынша ауқымды бағдарламасын жүзеге асыруда ШҰАА шамамен 20 жыл бойы алдыңғы шепте орын алып келеді. Мақалада зерттелетін ұлттық ауданның қытай аймақтық саясатындағы рөлін анықтайтын сыртқы және ішкі себептері қарастырылады. Шыңжаң Ұйғыр автономиялық ауданының (ШҰАА) артықшылығы оның географиялық орналасуында. ШҰАА-ның Қытай геостратегиялық жоспарларындағы маңызды орны оның қытай мемлекеттік шекарасының 1/4 бөлігін құрауымен және көптеген басқа елдермен шекаралас болуымен (басқа автономиялық аймақтармен салыстырғанда) анықталады. Мұндай географиялық жағдай «сыртқа шығу» саясатын жандандыруға, яғни Орталық Азия бағытында халықаралық сауда-экономикалық қатынастарды кеңейту мен қарқынды саясатын, ал еуропалық бағытта «Шығыс шоғырландырады, Батыс экспорттайды» бағытын әрі қарай күшейтуге мүмкіндік береді. Мақалада іске асырылатын стратегияның нәтижесінде орын алған облыстың әлеуметтік-экономикалық дамуының серпінді өзгерістеріне аса мән беріледі. Зерттеу нәтижесінде ҚХР-мен Қазақстанның трансшекаралық қарым-қатынастарындағы ШҰАА-ның бірегей орны негізделеді. ШҰАА-ның жедел түрде игерілуі сауда, энергетика, көлік инфрақұрылымы, қауіпсіздік, экология, мәдениет салаларындағы Қазақстан-Қытай ынтымақтастығына әсер ететін маңызды фактор болып табылады. Сонымен қатар, Орталық Азия аймағын дамытудың толыққанды жүйесін ШҰАА факторын ескерусіз әзірлеу мүмкін емес.

**Түйін сөздер:** Шыңжаң Ұйғыр автономиялық ауданы, ҚХР, аймақтық диспропорция, экономикалық модернизация, Қазақстан-Қытай шекаралық серіктестігі.

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#### **МОДЕРНИЗАЦИЯ СИНЬЦЗЯН-УЙГУРСКОГО АВТОНОМНОГО РАЙОНА И ЕЕ ВЛИЯНИЕ НА ТРАНСГРАНИЧНЫЕ ВЗАИМООТНОШЕНИЯ КАЗАХСТАНА И КИТАЯ**

**Аннотация.** Вот уже почти два десятка лет СУАР является авангардом в реализации Программы масштабного освоения западных районов КНР. В статье рассматриваются внутренние и внешние причины, определяющие особую роль исследуемого национального района в китайской региональной политике.

Неоспоримым преимуществом Синьцзян-Уйгурского автономного района (СУАР) является его географическое расположение. То, что на СУАР приходится 1/4 часть китайской государственной сухопутной границы, и он граничит с наибольшим числом зарубежных стран (в сравнении с другими автономными районами) определяет важность его места в геостратегических планах Китая. Такое географическое положение позволяет активизировать политику «идти вовне», то есть политику расширения и интенсификации международных торгово-экономических связей страны в центральноазиатском, и далее в европейском направлении, форсирования курса «Восток аккумулирует, Запад экспортирует». Основное внимание в статье уделяется динамичным изменениям в социально-экономическом развитии района в результате осуществляемой стратегии. В результате проведенного исследования обосновывается уникальное место СУАР в трансграничном взаимоотношении КНР с Казахстаном. Ускоренное освоение СУАР является важным фактором, влияющим на казахстанско-китайское взаимодействие в сфере торговли, энергетики, транспортной инфраструктуры, безопасности, экологии, культуры. Более того, без учета фактора СУАР невозможно сконструировать целостную систему развития региона Центральной Азии.

**Ключевые слова:** Синьцзян-Уйгурский автономный район, КНР, региональные диспропорции, экономическая модернизация, казахстанско-китайское приграничное сотрудничество.

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#### **REFERENCES**

- [1] Bzhezinskij Z. (1999) Velikaja shahmatnaja doska. Gospodstvo Ameriki i ego geostrategicheskie imperativy. M.: Mezhdunarodnye otnoshenija, 1999. 256 p. ISBN: 5-7133-0967-3 (in Russ.).
- [2] Preobrazovannyj Kitaj. Desjat' pjatiletnih kitajskih planov (2002) / Pod red. Jao Kajczajija, Chjen' Junsjunja. Pekin: Kit. jekon. izd., 2002. 486 p. (in Chinese).
- [3] Gao Chzhaopin, Lju Chzhun, Chjen' Sjaosjuje. (2000) Izuchenie strategii bol'shogo osvoenija zapadnyh rajonov Kitaja. Pekin: Cinhajskoe narodnoe izdatel'stvo. 2000. 357 p. (in Chinese).
- [4] Rybina M.V. (2013) Civilizacionnyj podhod: vozmozhnosti i perspektivy // Izvestija MGTU «MAMI». 2013. N 1(15). Serija 6. Gumanitarnye nauki. P. 70-77 (in Russ.).
- [5] Baltabayeva A.Yu., Naciye Y., Beskempirova A.U. (2019) Cultural values of Great silk way: past and future // Bulletin of the National academy of sciences of the Republic of Kazakhstan. 2019. Vol. 1, N 377. P. 222-228. <https://doi.org/10.32014/2019.2518-1467.25> ISSN 2518-1467 (Online), ISSN 1991-3494 (Print) (in Eng.).
- [6] Golovneva E.V. (2015) Social'nyj konstruktivizm i znachenie material'nogo v jeksplikacii ponjatija «region» // Labirint: Zhurnal social'no-gumanitarnyh issledovanij. 2015. N 1. P. 120-128 (in Russ.).
- [7] Leonov S.N., Barabash E.S. (2014) Regional'naja diagnostika, ee sushhnost' i osnovnye harakteristiki. Primer Dal'nevostochnyh sub#ektov Federacii // Regional'naja jekonomika: teorija i praktika. 2014. N 41 (368). P. 2-9 (in Russ.).
- [8] Leonov S.N. (2005) Tipologija problemnyh regionov na osnove ocenki mezhregional'nyh social'no-jekonomicheskikh i finansovyh razlichij // Izvestija RAN. Serija geograficheskaja. 2005. N 2. P. 68-76 (in Russ.).
- [9] Samburova E.N. (2014) Regional'nye disproporcii sovremennogo razvitija jekonomiki Kitaja // Vestn. Mosk. un-ta. Ser. 5. Geografija. 2014. N 4. P. 49-55 (in Russ.).
- [10] Frolova I.Ju. (2014) Jekonomicheskaja politika KNR v Sin'czjan-Ujgurskom avtonomnom rajone v kontekste interesov stran Central'noj Azii // Problemy nacional'noj strategii. 2014. N 4 (25). P. 65-85 (in Russ.).
- [11] Bazhenova E.S., Ostrovskij A.V. (2016) Sin'czjan – gorizonty novogo Shelkovogo puti / Izd. 2-e, dopolnennoe. M.: OOO «Izdatel'stvo MBA», 2016. 276 p. ISBN: 978-5-9907748-9-6 (in Russ.).
- [12] Jekonomicheskoe razvitie regionov: opyt Rossii i Kitaja: monografija (2017) / Pod red. nauch. ruk. V.A. Il'ina, A.A. Shabunovoj, K.A. Gulina, D. Mao. Vologda: ISJeRT RAN, 2017. 402 p. ISBN: 978-593299-367-5 (in Russ.).
- [13] Karimova R., Khajiyeva G. (2018) Examining ethno-political and socio-economic transformation of the Xinjiang Uyghur Autonomous Region in the context of the PRC national policies // News of the National academy of sciences of the Republic of Kazakhstan. Series of Social and Humanities. 2018. Vol. 6, N 322. P. 176-184. <https://doi.org/10.32014/2018.2224-5294.51> ISSN 2224-5294 (in Eng.).

- [14] Kalbinur Kasim. (2002) O regulirovanii kadrovoj politiki v hode osvoenii zapadnyh rajonov // Nauchnyj zhurnal Sin'czjanskogo universiteta. 2002. N 6. P. 130-132 (perevod s uigurskogo jazyka) (in Uighur).
- [15] Van Chaolin', Savkovich E.V. (2018) Formirovanie pojasa razvitiya v Sin'czjan-Ujgurskom avtonomnom rajone KNR v nachale 2010-h gg. // Vestnik Tomskogo gosudarstvennogo universiteta. Istorija. 2018. N 55. P. 94-99 (in Russ.).
- [16] Fartyshev A.N. (2013) Regional'naja politika Rossii i Kitaja v otnoshenii svoih vnutrikontinental'nyh territorij: Sibir' i Sin'czjan // Izvestija Irkutskogo gosudarstvennogo un-ta. Serija «Politologija. Religiovedenie». 2013. N 2(11), ch. 1. P. 144-153.
- [17] Press-reliz Posol'stva KNR v RK (2019/02/18). URL: <http://kz.china-embassy.org/rus/sgxx/sgdt/t1638788.htm> (in Russ.).
- [18] Dyrka S., Gussenov B.Sh. (2018) The main aspects of the development of foreign economic activity in the era of globalization // Bulletin of National academy of sciences of the Republic of Kazakhstan. 2018. Vol. 6, N 376. P. 234-238. <https://doi.org/10.32014/2018.2518-1467.50> ISSN 2518-1467 (Online), ISSN 1991-3494 (Print) (in Eng.).
- [19] Aristova L.B., Semenova N.K. (2018) Geopoliticheskij shans Rossii: transportnaja sistema v formate RF – KNR – Central'naja Azija. Izd. 2-e, ispr. / Otv. red. d.je.n. A.I. Salikij; In-t vostokovedenija RAN. M.: IV RAN, 2018. 162 p. ISBN: 978-5-89282-810-9 (in Russ.).
- [20] Koshanov A. (2016) «Edinyj pojas shelkovogo puti» i perspektivy formirovaniya ob#edinennogo evrazijskogo jekonomicheskogo soobshhestva // Obshhestvo i jekonomika. 2016. N 4. P. 5-20 (in Russ.).
- [21] Bondarevich A. (2015) Novyj shjolkovyj put' // Zhurnal «Inzhenernaja zashhita». 2015. N 3(8). P. 18-26 (in Russ.).
- [22] Zhonggu zhenmin van. (2012) L'goty i preferentsii opredeleny spetsial'nym dokumentom pravitel'stva KNR “Predlozheniya po finansovoy podderzhke ekonomicheskikh rayonov razvitiya v Khorgose i Kashgare”. 7th November. URL: <http://fi-nance.people.com.cn/money/n/2012/1107/c218900-19518946.html> (in Chinese).
- [23] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494.4(380). P. 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [24] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S., Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. (2019). Foresight and the role of innovation in the development of education // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494.4(380). 93-101. <https://doi.org/10.32014/2019.2518-1467.96>
- [25] Mamyrbayev O.Z., Othman M., Akhmediyarova A.T., Kydyrbekova A.S., Mekebayev N.O. Voice verification using I-vectors and neural networks with limited training data // Bulletin of the National academy of sciences of the Republic of Kazakhstan. 2019. N 3(379). P. 36-43. <https://doi.org/10.32014/2019.2518-1467.66>
- [26] Lavrinenko S.V., Arpentieva M.R., Kassymova G.K. (2019). The negative impact of the internet on the educational process. International youth scientific conference “Heat and mass transfer in the thermal control system of technical and technological energy equipment” (HMTTSC 2019). <https://doi.org/10.1063/1.5120671>
- [27] Atayeva M., Putro N.H.P.S., Kassymova G., Kosbay S. (2019) Impact of reading on students' writing ability // Materials of International Practical Internet Conference “Challenges of Science”. ISBN 978-601-323-144-0. Issue II, 2019. P. 5-13. <https://doi.org/10.31643/2019.001>
- [28] Kassymova K.G., Tyumaseva Z.I., Valeeva G.V., Lavrinenko S.V., Arpentieva M.R., Kenzhaliyev B.K., Kosherbayeva A.N., Kosov A.V., Duvalina O.N., Dossayeva S.K. Integrative model of student and teacher stress coping: the correction of relations in educational, professional and personal interaction // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494. 2019. Vol. 3, N 379. P. 169-179. <https://doi.org/10.32014/2019.2518-1467.83>
- [29] Arpentieva M.R., Kassymova G.K., Lavrinenko S.V., Tyumaseva Z.I., Valeeva G.V., Kenzhaliyev O.B., Triyono M.B., Duvalina O.N., Kosov A.V., Dossayeva S.K. Environmental education in the system of global and additional education // Bulletin of National academy of sciences of the Republic of Kazakhstan. ISSN 1991-3494. 2019. Vol. 3, N 379. P. 158-168. <https://doi.org/10.32014/2019.2518-1467.82>
- [30] Azatbek T., Panzabekova A., Bekenova L., Yegizbyeve Zh. The share of drug trafficking in Kazakhstan's GDP: methods for evaluation // Economic Annals-XXI (2017). 166(7-8). P. 31-36(Scopus). DOI: <https://doi.org/10.21003/ea.V166-06>
- [31] Khalitova M.M., Praliev G.S., Panzabekova A.Z., Andreeva Z.M., Dzhubaliyeva Z.A. Financial instruments of state regulation industrial and innovative development of Kazakhstan economy // Life Sci J. 2014. 11(10s):369-378. (ISSN: 1097-8135). <http://www.lifesciencesite.com.70>

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## **IMPROVING THE FUNCTIONING OF THE INTEGRATED SYSTEM FOR MANAGING LABOR AND INDUSTRIAL SAFETY IN THE OIL AND GAS INDUSTRY**

**Abstract.** The article deals with methodology of improving the functioning of the integrated system for managing labor and industrial safety in the oil and gas sector. This industry is represented by dangerous production facilities and improving safety production become more relevant every year. The main constituent point is an integrated system for managing labor and industrial safety. The fact is that the main production assets become out-of-date, new technologies, normative and technical documentation changes every year. These factors require the necessity to pay attention to safety and put it in accordance with modern requirements. So safety at explosion and fire hazardous industrial facilities is a necessary element of production control. There is examined regulatory framework in the sphere of labor and industrial safety, main principles of construction and realization of an integrated managing system, types of audits, and there are also determined the main criteria for evaluating the performance of the integrated system for managing labor and industry safety.

**Key words:** integrated managing system, industrial safety, labor safety, system design principles, evaluating criteria for efficiency effect, audit, production risks, hazardous production facility, oil and gas industry, risk management.

Internal audit is a means of monitoring the state of working conditions at each workplace and the level of accidents in the facility.

An important task in the framework of the operation for the facility managing system, which is based on the recommendations of international standards, is risk management. This involves the identification of hazards and risk evaluation, setting goals and objectives for reducing risk to acceptable values.

One of the constituent points of the whole method of organizing the administrative management of oil and gas corporations is an integrated system for managing labor and industrial safety. Creating safe working conditions, preserving the life and health of workers, ensuring reliable operation of hazardous production facilities is one of the priorities of any oil and gas company.

When conducting research on risks, special attention is paid to individual risk (risk of death, loss of health, temporary or permanent disability). The main absolute indicator of individual risk is the probability of premature death. One of the important terms in risk management is - «Acceptability».

According to certain criteria, there is made evaluation of the effective functioning of an integrated system for managing labor and industrial safety. The integrated use of performance evaluation criteria in the sphere of industrial safety and labor protection guarantees completeness and a comprehensive evaluation of the effectiveness and production safety.



In order to provide a comprehensive and truthful evaluation of the effective functioning of the ISM for fire and labor safety (hereinafter FS and LS) of industrial safety, there is a complex of quantitative and qualitative indicators.

The goal of this article is to determine the criterion for evaluating the effective functioning of the integrated system for managing labor and industrial safety.

To achieve this goal, there were set the following tasks:

1. To analyze the regulatory framework in the sphere of industrial and labor safety at the oil and gas industry facilities;
2. Analyze the basic principles of construction and realization of an integrated system managing for labor and industrial safety;
3. Determine the functioning of the safety managing system;
4. To analyze the main factors (criteria) determining the effectiveness of an integrated management system for labor and industrial safety in the oil and gas industry.

In the current conditions of increasing the volume of extraction and processing of hydrocarbon raw materials, the work of oil and gas companies is of strategic importance in order to build the country's economy, and their reliable and accident-free activity to large extent determines the energy security and stable socio-financial formation of the Russian Federation [1]. It is possible to achieve a similar result if there is a continuous process of improving safety managing systems at the oil industry facilities.

Integrated system managing (ISM) for labor (LS) and industrial safety (IS) are represented in the form of one of the constituent points of the whole method of organizing the administration of oil and gas corporations. ISM acts as a set of processes, operations, laws, organizational structure and resources that are necessary to realize the ideas of politics achieve goals and manage labor and industrial safety. ISM for industrial safety and labor protection in the oil and gas industry is built on the following principles:

- the involvement of each level of the organization's staff in minimizing production risks and improving the management of FS and LS;
- personal guarantee of any employee of the corporation for complying with the requirements for reducing production risks that could harm the physical condition of workers, the environment and property;
- motivating colleagues to look for opportunities to optimize the regulation of industrial hazards;
- Advantages of precautionary measures over responding measures;
- constant improvement of ISM FS and LS.

The goals in the sphere of FS and LS are oriented to:

- prediction of dangerous situations that can exert a negative impact on the environment, the health of staff and its property;
- reducing the harmful effects of industrial activity on the health of employees;
- absolute elimination of risks at work or reducing them in the presence of suitable circumstances;
- modernization and introduction of the new scientific and technical movements, the use of materials, raw materials and reagents that have a non-hazardous effect in terms of FS and LS;
- rationalization of ISM.

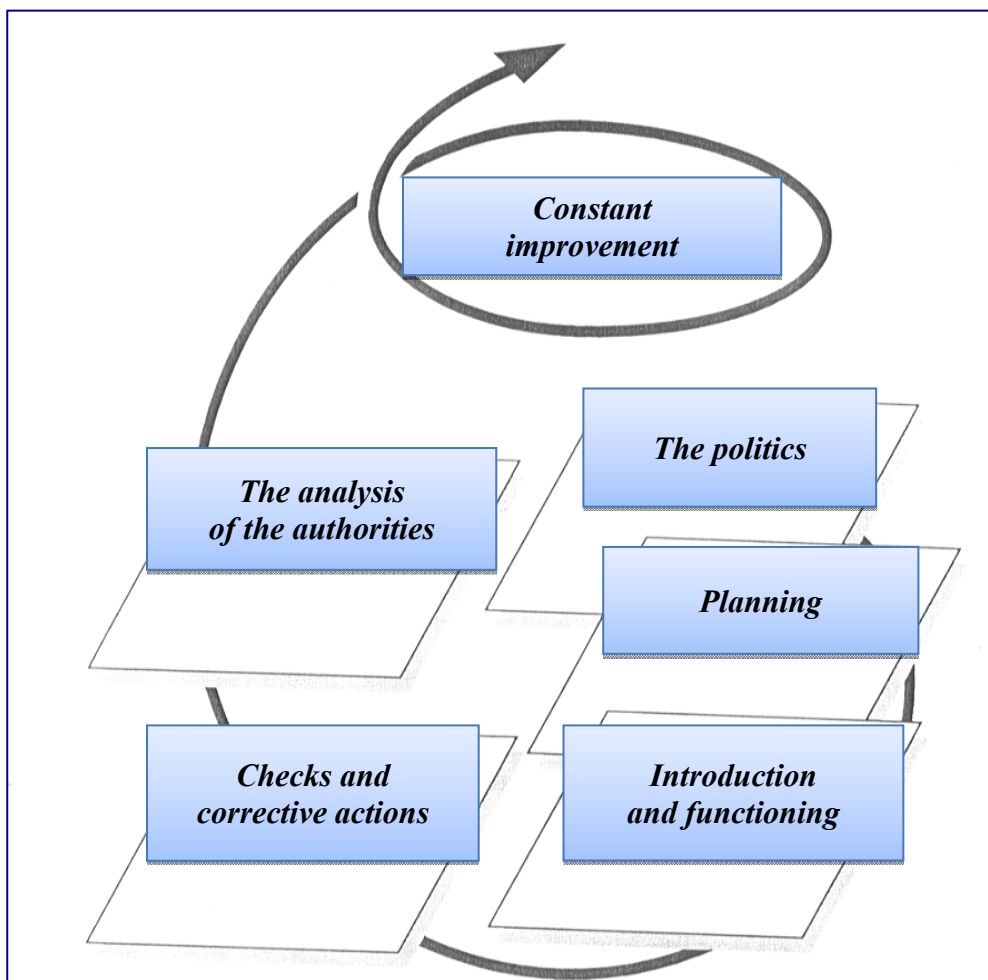
The goals must be measurable, real and exact. When setting collective goals, industrial hazards are foreseen. The realization of the goals of the ISM of FS and LS is carried out by developing special programs. Such programs include:

- events to achieve the goals and objectives of the system;
- methods and deadlines for the set tasks;
- distribution of opportunities and responsibility for the realization of events in the sphere of industrial safety and labor protection.

The policy of the oil and gas industry organization in the sphere of labor and industrial safety should be:

- be fit for work;
- be comparable to the impact on the well-being of the entire staff, the environment and property of these industries;
- be compatible with other corporation rules;
- be introduced and maintained at every level of organization;

- be open to the people involved;
  - fit the applicable law;
  - include the obligation to update the regulatory framework of the ISM for labor and industrial safety;
  - define the main goals and objectives of organizations in the sphere of labor and industrial safety and the environment;
  - warn about all sorts of risks affecting the physical condition of staff and the environment.
- In picture 1 there is shown the functioning scheme of ISM FS and LS.



Picture 1 – Scheme of the functioning processes of ISM

The formation of the legislative base in the Russian Federation is carried out at the federal, territorial, municipal and facility levels. Regulatory legal acts, which have different legal force, are the normative, legal and methodological basis in the sphere of guaranteeing the safety of hazardous production facilities [2].

The basis of the regulatory framework is: RF Constitution, Labor Code of the RF, federal laws, orders, regulations, Government standards, Building regulations and others [3]. In recent years, there has been an increase in the number of regulations in the regulatory legal framework of Russia, which contain the basic methods of risk analysis as a basis for guaranteeing the safety of oil and gas facilities.

Oil companies should be guided in their activities by applicable legal and other requirements. For fulfillment of obligations to comply with legislative and other conditions in the field of labor and industrial safety in the company [4]:

- there is updated information on legislative and other regulations with the introduced periodicity;
- there are defined identification keys;
- there are determined legislative and other regulations;

- the organization's staff is informed of the appropriate legislative and other regulations, and there are admitted relevant personnel of the organization to the already known legislative and other conditions;
- technical documentation covering legislative and different issues;
- there is guaranteed circulation of data on legislative and other regulations at the facility.

The basic document of the production safety managing system is the company's policy in the sphere of ISM FS and LS.

The level of labor and industrial safety at the oil and gas industry facilities is determined using various types of inspections (audits). Audits can be of two types: external and internal audits [5].

The first type of audit is conducted by independent auditors on the basis of an agreement with audited persons or non-affiliated organization (legal entities). During the audit in the sphere of labor and industrial safety, it is possible to identify violations in technological processes. After that, the auditors give the necessary recommendations that are aimed at improving the safety managing system, improving the production process and integrating production safety.

Internal audit is another available means of monitoring the state of working conditions at each workplace and the level of accidents at the facility. [6]. When such audit work completed, the head of the facility uses the material of this audit to compile internal statistics on violations in the sphere of labor and industrial safety, provides the necessary information to shareholders and investors about the effectiveness of their work. The stages of the audit are presented in picture 2.

The stages of the audit	
1	The preparatory stage
2	Planning stage
3	Audit evidence gathering
4	Completion

Picture 2 – Audit stages

At certain time, oil companies conduct inspections on the main operations that directly affect the well-being of workers, property and the environment (monitoring and measurement, evaluation of nonconformity). The creation of an integrated system for managing labor and industrial safety in the oil industry has increased the efficiency of this system [7].

Risk management is an important objective within the framework of the facility managing system functioning, which is formed on the basis of recommendations of international standards [8]. This involves the identification of hazards and risk evaluation, setting goals and objectives for reducing risk to acceptable values.

Currently, the risks are very diverse. Special attention in conducting risk research is devoted to the risk of death and loss of health, temporary or permanent disability, that is, individual risk [9, 10]. The main absolute indicator of individual risk is the probability of premature death. «Acceptability» - this is an important risk management term [11, 12].

Evaluation of the effective functioning of the ISM of FS and LS is carried out according to certain criteria. The use of evaluation criteria of effectiveness in the sphere of labor and industrial safety guarantees completeness and a comprehensive evaluation of the effectiveness and production safety [13].

Evaluation of the effective functioning of ISM of FS and LP in the sphere of labor safety is carried out by the criteria given below [14, 15]:

- the ratio of the number of internal audits already conducted to the number of planned ones for the year;
- total number of labor safety meetings;
- availability of labor safety sample surveys for the workers;
- the number of risks already defined at work;
- the number of risk evaluations carried out at a certain stage, in which employees took part;

- the total number of prescription points, non-compliances with the requirements of labor safety revealed during inspections by state bodies and within the organization;
- total number of safe conduct audits conducted in the organization;
- the number of labor safety trainings;
- conducting the procedure for investigating the causes of accidents within the organization;
- strict observance of the rules and deadlines for supplying the employees with personal protective equipment;
- the number of offers received from employees to improve the security system;
- the presence within the organization of local regulatory documents that improve working conditions in the workplace;
- efficiency and visibility of information promotion of safe labor.

In order to provide a comprehensive and truthful evaluation of the effective functioning of the ISM for FS and LS, in terms of industrial safety, there is a set of quantitative and qualitative indicators [16]:

1. General indicators of accidents and injuries at the facility. Here are included: coefficients of frequency and severity of accidents and injuries; the number of accidents, incidents, accidents; general dynamics of the degree of production security.

2. Economic indicators: the total damage caused to the organization as a result of workers' injuries, accidents, incidents and interruptions in production; total costs connected with providing security at the facility.

3. Indicators that determine the current state of the security system (the presence of damage in the equipment, which leads to production risks): professionalism of workers, the effectiveness of the concept of remuneration, staff awareness, conditions causing the manifestation of unsafe production environments. It is possible to achieve efficiency in risk management at work with constant monitoring of compliance with safety requirements and the impact on the main causes of such violations [17,18].

**The conclusions.** Conducting audits allows you to determine the compliance of the activities and results of the organization in the sphere of labor and industrial safety with the existing requirements of the legislation. The effective use of a set of criteria for evaluating the effectiveness of the security system is the key to improving the ISM for FS and LS. Improvement of the ISM for FS and LS prevents the number of accidents, incidents, injuries, deterioration of the health of personnel at the oil industry and leads to a decrease in the negative impact on the environment.

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**МҰНАЙ-ГАЗ САЛАСЫНДА ӨНЕРКӘСІПТІК ҚАУІПСІЗДІКТІ  
ЖӘНЕ ЕҢБЕКТІ ҚОРҒАУДЫ БАСҚАРУДЫҢ ИНТЕГРАЦИЯЛАНҒАН ЖҮЙЕСІНІҢ  
ЖҰМЫС ІСТЕУІН ЖЕТІЛДІРУ**

**Аннотация.** Мақалада мұнай-газ саласындағы өнеркәсіптік қауіпсіздікті және еңбекті қорғауды басқарудың интеграцияланған жүйесінің жұмыс істеуін жетілдіру әдіснамасы зерттелді. Мұнай-газ өнеркәсіптік саласы негізінен тұрақты өрт және жарылыс қауіпі бар қауіпті өндірістік объектілер болғандықтан, өндіріс қауіпсіздігін арттыру мәселелері жыл сайын өзекті болып келеді. Мұнай және газ корпорацияларын әкімшілік басқаруды ұйымдастырудың барлық тәсілдерінің құрамдас бірліктерінің бірі өнеркәсіптік қауіпсіздік пен еңбекті қорғауды басқарудың интеграцияланған жүйесі болып табылады. Бұл бір жағынан негізгі өндірістік қорлар жыл сайын ескірген, екінші жағынан жаңа өзекті техника және технологиялар енгізілуде, нормативтік-техникалық құжаттама өзгеруде. Осы факторлардың барлығы мұнай-газ саласында өнеркәсіптік қауіпсіздікке ерекше назар аудару және оны қазіргі заманғы талаптарға сәйкес келтіру қажеттілігін талап етеді. Осылайша, жарылыс өрт қауіпті өнеркәсіптік деректер объектілерде қауіпсіздікті қамтамасыз ету өндірісті басқарудың қажетті және ажырамас элементі болып келеді. Мұнай-газ саласында өнеркәсіптік қауіпсіздік және еңбекті қорғау саласындағы нормативтік құқықтық база, басқарудың интеграцияланған жүйесін құру мен іске асырудың басты қағидалары, аудит түрлері қаралды, сондай-ақ өнеркәсіптік қауіпсіздік пен еңбекті қорғауды басқарудың интеграцияланған жүйесінің жұмыс істеу тиімділігін бағалаудың негізгі өлшемдері анықталды.

**Түйін сөздер:** біріктірілген басқару жүйесі, өнеркәсіптік қауіпсіздік, еңбекті қорғау жүйесін құру принциптері, критерийлер тиімділігін бағалау, аудит, өндірістік тәуекелдерді, қауіпті өндірістік объекті, мұнай-газ саласы, тәуекелдерді басқару.

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### **СОВЕРШЕНСТВОВАНИЕ ФУНКЦИОНИРОВАНИЯ ИНТЕГРИРОВАННОЙ СИСТЕМЫ УПРАВЛЕНИЯ ПРОМЫШЛЕННОЙ БЕЗОПАСНОСТЬЮ И ОХРАНОЙ ТРУДА В НЕФТЕГАЗОВОЙ ОТРАСЛИ**

**Аннотация.** Исследована методология совершенствования функционирования интегрированной системы управления промышленной безопасностью и охраной труда в нефтегазовой сфере. Поскольку нефтегазовая отрасль представлена в основном опасными производственными объектами, обладающими постоянной пожарной и взрывоопасностью, то вопросы повышения безопасности производства с каждым годом становятся все более актуальными. Одной из составляющих единиц всего способа организации административного управления нефтяных и газовых корпораций является интегрированная система управления промышленной безопасностью и охраной труда. Это связано с тем, что с одной стороны основные производственные фонды с каждым годом устаревают, с другой стороны внедряются новые технологии, меняется нормативно-техническая документация. Все эти факторы требуют необходимость уделять особое внимание безопасности и приведения его в соответствие с современными требованиями. Так обеспечение безопасности на взрывопожароопасных промышленных объектах является необходимым и неотъемлемым элементом управления производством. Рассмотрены нормативная правовая база в области промышленной безопасности и охраны труда, главные принципы построения и реализации интегрированной системы управления, виды аудитов, а также определены основные критерии оценки эффективности функционирования интегрированной системы управления промышленной безопасностью и охраной труда.

**Ключевые слова:** интегрированная система управления, промышленная безопасность, охрана труда, принципы построения системы, критерии оценки эффективности, аудит, производственные риски, опасный производственный объект, нефтегазовая отрасль, управление рисками.

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### **REFERENCES**

[1] Fedosov A.V., Vadulina N.V., Abdrakhmanova K.N. Features of the organization of industrial safety and labor protection at the enterprises of the oil and gas industry // Problems of Gathering, Treatment and Transportation of Oil and Oil Products. 2017. N 4. 110 p. (in Russ.).

[2] Kunelbayev M.M., Gaisin E.Sh., Repin V.V., Galiullin M.M., Abdrakhmanova K.N. Heat Absorption by Heat-Transfer Agent in a Flat Plate Solar Collector // International Journal of Pure and Applied Mathematics. 2017. Vol. 115, N 3. P. 561-575 (in Russ.).

- [3] Grazhdankin A.I., Pecherkin A.S., Sidorov V.I. Research of accidents in chemical, petrochemical and oil-processing industry of the USA: Legal practice and lessons // *Occupational Safety in Industry*. 2013. N 7. P. 58-66 (in Russ.).
- [4] Akbashev N.R., Solodovnikov A.V. Analysis of a Management System for Industrial Safety at Oil Refineries // *Chemical and Petroleum Engineering*. 2014. Vol. 50, N 7-8. P. 542-546 (in Russ.).
- [5] Proskura V.S., Gallyamov M.A., Abdrakhmanova K.N., Basyrova A.R. The analysis and current problem of ensuring the safe operation of hazardous production facility for example installing gasoline fractions hydrotreating oil refinery // *Problems of Gathering, Treatment and Transportation of Oil and Oil Products*. 2018. N 5(115). P. 124-133 (in Russ.).
- [6] Aleksandrova A.V. On the essence of internal audit in the management of labor protection at industrial enterprises // *International Journal of Applied and Fundamental Research*. 2018. N 5 (part 2). P. 273-277 9 (in Russ.).
- [7] Buligin O.V., Emelyanov A.A., Emelyanova N.Z., Kukushkin A.A. Systems analysis in management: Textbook. manual / Ed. Dr. Econ. Sciences, prof. A.A. Yemelyanov. 2nd ed., Pererab. and add. M.: FORUM: INFRA-Moscow, 2017. 450 p. (in Russ.).
- [8] Abdrakhmanov N., Abdrakhmanova K., Vorohobko V., Abdrakhmanova L., Basyrova A. Development of Implementation Chart for Non-Stationary Risks Minimization Management Technology based on Information-Management Safety System // *Journal of Engineering and Applied Sciences*. 2017. N 12. P. 7880-7888 (in Russ.).
- [9] Fedosov A.V., Mannanova G.R., Shipilova Yu.A. Hazard Analysis, Accident Risk Assessment at Hazardous Production Facilities and Recommendations for Choosing Risk Analysis Methods // *Oil and Gas Business*. 2016. N 3. P. 322-336 (in Russ.).
- [10] Lavorato D., Nuti C., Santini S., Briseghella B., Xue J. A repair and retrofitting intervention to improve plastic dissipation and shear strength of oil tanks // In: IABSE conference, Geneva 2015: Structural engineering, providing solutions to global challenges report. P. 1762-1767 (in Russ.).
- [11] Abdrakhmanov N.Kh., Vadulina N.V., Fedosov A.V., Ryamova S.M., Gaisin E.Sh. A New Approach for a Special Assessment of the Working Conditions at the Production Factors' Impact through Forecasting the Occupational Risks // *Man in India*. 2017. Vol. 97, N 20. P. 495-511 (in Russ.).
- [12] Monteiro M.S. Experimental investigations of various methods of sludge measurements in storage oil tanks // *Advances in Remote Sensing*. 2015. Vol. 4, N 2. P. 119-137 (in Russ.).
- [13] Fedosov A.V., Akhmetova D.D., Galeeva A.F. Review of existing methods of analysis and assessment of resources at hazardous production facilities // *Actual problems of science and technology*. 2016. – Collection of articles, reports and speeches of the IX International Scientific and Practical Conference of Young Scientists. 2016. P. 194-195 (in Russ.).
- [14] Koufoudi E., Cornou C., Grange S., Dufour F., Imtiaz A. Quantification of the amplitude variability of the steel. Variability of linear and non-linear structural response of a single degree of freedom system // *Bull Earthq Eng*. 2018. N 5. P. 202-208 (in Eng.).
- [15] Sekerin V.D., Gaisina L.M., Shutov N.V., Abdrakhmanov N.Kh., Valitova N.E. Improving the Quality of Competence-Oriented Training of Personnel at Industrial Enterprises // *Quality – Access to Success*. 2018. Vol. 19, N 165. P. 68-73 (in Russ.).
- [16] Gaisina L.M., Maier V.V., Abdrakhmanov N.K., Sultanova E.A., Belonozhko M.L. Deliberate Reorganization of the System of Social Relations in Oil and Gas Companies in the period of Changes in Economics // *Espacios*. 2017. Vol. 38, N 48. 12 p. (in Russ.).
- [17] Narbayev K.A., Kussainov A.B. About the Operating Techniques of Assessment of Social and Economic Consequences of Emergency Situations // *Bulletin of the Academy of sciences of the Republic of Kazakhstan*. 2017. Vol. 2. P. 256-265. <https://doi.org/10.32014/2018.2518-1467> (in Eng.).
- [18] Esenbekova A.B., Alan Robert. Economic mechanisms of providing of sustainable development of the Republic of Kazakhstan in the conditions of global warming // *Bulletin of the Academy of sciences of the Republic of Kazakhstan*. 2018. Vol. 2. P. 197-202 <https://doi.org/10.32014/2018.2518-1467> (in Eng.).
- [19] Aksarina I.Y., Dossayeva S.K., Kosov A.V., Stepanova G.A., Akentyeva I.Y., Brovkina S.N., Kozhedorov A.I., Arpentieva M.R., Khoteeva R.I., Kassymova K.G. (2019). Foresight innovations in educational systems in the BRICS countries // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494.4(380). P. 123-131. <https://doi.org/10.32014/2019.2518-1467.100>
- [20] Kassymova K.G., Aksarina I.Y., Demchuk A.V., Stepanova G.A., Aksarina Y.S., Bogach M.A., Brovkina S.N., Kosov A.V., Arpentieva M.R., Dossayeva S.K. (2019). Foresight and the role of innovation in the development of education // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494.4(380). 93-101. <https://doi.org/10.32014/2019.2518-1467.96>
- [21] Mamyrbayev O.Z., Othman M., Akhmediyarova A.T., Kydyrbekova A.S., Mekebayev N.O. Voice verification using I-vectors and neural networks with limited training data // *Bulletin of the National academy of sciences of the Republic of Kazakhstan*. 2019. N 3(379). P. 36-43. <https://doi.org/10.32014/2019.2518-1467.66>
- [22] Lavrinenko S.V., Arpentieva M.R., Kassymova G.K. (2019). The negative impact of the internet on the educational process. International youth scientific conference "Heat and mass transfer in the thermal control system of technical and technological energy equipment" (HMTTSC 2019). <https://doi.org/10.1063/1.5120671>
- [23] Atayeva M., Putro N.H.P.S., Kassymova G., Kosbay S. (2019) Impact of reading on students' writing ability // *Materials of International Practical Internet Conference "Challenges of Science"*. ISBN 978-601-323-144-0. Issue II, 2019. P. 5-13. <https://doi.org/10.31643/2019.001>
- [24] Kassymova K.G., Tyumaseva Z.I., Valeeva G.V., Lavrinenko S.V., Arpentieva M.R., Kenzhaliyev B.K., Kosherbayeva A.N., Kosov A.V., Duvalina O.N., Dossayeva S.K. Integrative model of student and teacher stress coping: the correction of relations in educational, professional and personal interaction // *Bulletin of National academy of sciences of the Republic of Kazakhstan*. ISSN 1991-3494. 2019. Vol. 3, N 379. P. 169-179. <https://doi.org/10.32014/2019.2518-1467.83>

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**AIFC IN THE DEVELOPMENT OF MECHANISMS  
OF GREEN FINANCING FOR THE MODERNIZATION  
OF THE KAZAKHSTAN ECONOMY**

**Abstract.** The scientific article discusses the role of the Astana International Financial Center in the development of green financing mechanisms for the modernization of the Kazakhstani economy. “Green finance” is defined as financial services that provide an environmental impact in the context of sustainable development, in particular, measures aimed at combating climate change, air pollution, loss of biodiversity, improving resource efficiency, waste and water management, and rural sustainability and forestry. The main results of the assessment of the AIFC role in creating green financing mechanisms for the modernization of the domestic economy are presented by the authors in a number of publications.

**Key words:** AIFC, green finances, investments, capital.

**Introduction.** Currently, the importance of environmental, social and managerial factors is recognized as the main feature of the development of the financial sector throughout the world. This means that sustainability is a key performance indicator at all levels - from managing individual assets of financial portfolios and financial institutions to managing the financial system as a whole. In the Kazakhstan context, the assessment of the extent to which the AIFC is able to increase the volume of environmental and sustainable financing in the country and accelerate measures for sustainable development is of particular relevance. The main results of the evaluation of the role of the AIFC in creating green financing mechanisms for the modernization of the domestic economy are presented by the author in a number of publications [1, 2].

As known, “Green Finance” is defined as financial services that provide environmental benefits in the context of sustainable development, in particular, measures aimed at combating climate change, air pollution, loss of biodiversity, improving the efficiency of resource use, waste and water management, and also the sustainability of agriculture and forestry. This term is often used to indicate the environmental nature of specific assets (for example, green bonds). Three key signals testify to the aforementioned role in the global financial sector towards strengthening the role of sustainable financing:

- Financial relevance. Investment institutions with assets under management of more than 70 trillion US dollars currently adhere to the Principles of Responsible Investments, which require the integration of environmental, social and management (hereinafter – ESG (environmental, social and governance)) factors in the procedure for capital allocation, interaction with shareholders and policy discussions.

- Attraction of capital. Green bonds are one of the most visible indicators of the ongoing redistribution of capital. In 2018, global green bond issuance reached a new record of \$ 167.3 billion, increasing from \$ 81 billion in 2016 to reach \$ 250 billion by the end of 2019. In 2017, the United States, China, and France were the leading issuing countries.

Stock markets are also transforming in response to the sustainability problem: Stock Exchanges for Sustainable Development (SSE) has so far joined 75 exchanges as members, including KASE, together representing more than 77% of the market capitalization of shares worth more than 55 trillions of US dollars [3].

- Measures in the framework of national policy. By October 2017, over 300 financial and regulatory policies were in place in more than 60 countries to ensure sustainability. Following the example of the EU countries, China, Morocco, many states have begun to develop national roadmaps for green and sustainable financing.

**Methods.** When writing the article, general scientific and special methods were used, such as: the system analysis method; content analysis method; comparative analysis method; analysis and synthesis method; system approach method.

**Results.** Kazakhstan has already taken important early steps to achieve its goals on the path to a low-carbon future by developing national strategic plans and green economy development programs. Progressive domestic laws have been adopted, including laws on renewable energy, energy efficiency and the introduction of an emissions trading system. These efforts, supported by ambitious target indicators for reducing carbon emissions and ensuring sustainability, are guided by the following regulatory documents: National Development Strategy "Kazakhstan - 2050", Concept for the Republic of Kazakhstan Transition to a Green Economy from 2013, Nationally Determined Contribution of Kazakhstan (NDC) providing for, in accordance with the Paris Agreement, a reduction of greenhouse gas emissions throughout the economy by 15% by 2030 compared with the 1990 level, Strategic development "Kazakhstan - 2025".

The momentum described above is encouraging, but remains insufficient to achieve the goals of the Paris Agreement. In Kazakhstan, reducing emissions by 132 MtCO<sub>2</sub>e to achieve the unconditional NDC target by 2030 requires a green investment of \$ 140 billion from 2016 to 2030 [4]. These numbers reflect the huge need for funding. However, due to the complexity of technologies and long investment cycles, energy saving and environmental protection projects have always faced the problem of difficult and costly access to financing, and traditional financing instruments are not able to satisfy the huge demand for them. Green projects are usually capital intensive, often requiring long-term financing. At the same time, as the practice of state investment banks in developed countries shows, achieving a yield of 6-9% on green investments made is seen as a huge success. Accordingly, the implementation of government support programs for project green financing is absolutely necessary. In the world, the ratio of the shares of the public sector, represented mainly by financial development institutions, and the private sector in climate investment, amounted to 37% in 2016 compared to 63%. In Kazakhstan, we can only talk about the beginning of real state support in the form of financing, benefits or grants to the initiators of the introduction of green technologies.

In this situation, large-scale mobilization of financing of green investments from the private sector is required. Public resources are limited, and long-term dependence on public investment should be avoided to ensure sustainable green growth. It should also be noted that in world practice more than 79% of green financial resources in 2015-2016 were attracted in the same country in which they were spent, so it is likely that most of the investments in Kazakhstan can come from domestic sources. And this underlines the importance of sound national policies and regulations for environmentally friendly projects.

In particular, it is necessary to develop innovative models of financial investments, new mechanisms for raising funds from both domestic and international sources, and companies may require significant new incentives to increase the profitability of green investments. Kazakhstan has not yet developed the mechanisms for creating and developing a green cluster in the economy and limited the experience of public-private partnerships in this industry, which is represented by the recently created (in July 2018) "green" fund Green Capital Management at the International Center for Green Technologies. A green financing system is needed that focuses on specific sectors that need the most funding and where emission reductions can be achieved at relatively low costs. For example, according to the estimates of the Concept of transition to a green economy, up to 75% of the green financing necessary to achieve the set goals should be invested in renewable energy sources, in the transition to gas electricity and energy efficiency. Moreover, according to a recent study, the transport, heating and construction sectors are promising areas for green investment, with little or no government support [5].

Based on the foregoing, it is necessary to position the potentially key role of the AIFC in mobilizing green investment and in general for the formation of a sustainable economy. As such, financial centers create a powerful clustering effect, concentrating in one place a complex of interconnected financial operations and regulation, which can be used for more systematic measures to expand environmentally-oriented financing.



The growth of green and sustainable financing in the world is currently taking place with the participation of an increasing number of financial centers that have put forward their own initiatives in the field of green and sustainable financing in addition to market forces. At the same time, some centers focus more on capital markets, while others focus on banking services, including SME financing. This diversity is real power and means that there is no single template for greening financial centers. The formation of these initiatives is dictated by two drivers: the desire of governments to attract financial centers to the problem of mobilizing capital to achieve key goals in the field of environmental protection, climate and sustainable development, and, secondly, the desire of the centers themselves and their key players to promote sustainable development as the main element of competitiveness.

The result is a new generation of public-private partnerships. Some of them are led by assistance agencies (such as the City Financial Office, Casablanca, City of London Corporation, EUROPLACE in Paris). In other cases, public-private partnerships are facilitated by national sustainable development bodies (for example, China's Green Finance Committee, Ireland's Sustainable Nation Committee, and Switzerland's Sustainable Finance Agency). In some centers, private sector initiatives are based on public policies (for example, the Hong Kong Green Finance Working Group and the Frankfurt Stock Exchange Sustainable Finance Initiative). In addition, a number of financial centers are actively involved in sustainable financing without developing a special initiative (for example, in Mumbai or New York). Finally, most financial centers are not yet involved in this trend.

There is currently no single set of indicators for measuring green and environmentally-friendly financing at the country or financial center level. To give an idea of the range of factors that can be considered, table provides quantitative data on some key measurements at the country and center levels [6]. These key indicators include: 1) the size of the stock market, 2) disclosure of environmental effects according to the requirements of the stock exchange (assessment of disclosure is given on a 100-point scale), 3) "green" revenues as a percentage of the total issue proceeds, 4) financing of renewable energy in the country (percentage of financing of renewable energy sources), 5) volume of green bonds issue.

Green and Sustainable Financing in G7 Countries

Country	Financial centre	Market capitalization, trillion USD	Rating of disclosure of ecological effect information (max=100)	Share of "green emissions", %	RES in the country	Green Bonds Issue (2016), billion USD
Canada	Toronto	1,6	73	0,68%	88,80%	0,537
France	Paris	2	88	0,66%	96,40%	1,9
Germany	Frankfurt	1,6	82	1,31%	93,20%	4,3
Italy	Milan	0,6	73	2,35%	99,10%	0,25
Japan	Tokyo	4,5	68	2,01%	39,50%	1,1
United Kingdom	London	3,3	83	0,38%	87,80%	—
USA	NewYork	26	70	0,72%	74,90%	15,5

*Note:* according to Financial centres for sustainability reviewing G7 financial centres in mobilizing green and sustainable finance, The UN Environment Inquiry.

As can be seen from the table, the indicators vary in a wide range without a clear correlation between each other (for example, between the level of information disclosure and the volume of green bonds issued). For example, the Paris Financial Center has the highest disclosure of information on environmental effects, and the country is one of the leaders in the field of renewable energy financing, however, the volume of green bond issues relative to the total volume of issue receipts is significantly lower than Tokyo, while in Japan the share of renewable energy financing is in relatively modest position.

In 2017, two new initiatives were launched to better understand how financial centers are involved in promoting sustainable development. The first one was nominated by the "International Network of Financial Centers for Sustainable Development" (FC4S), of which AIFC is also a member. Its goal is to evaluate the progress of various centers in the field of green finance and appropriate benchmarking. The second initiative, led by Finance Watch together with Z / Yen, aims to create a single index of financial

centers in the field of green financing [7]. In the Global Green Finance Index (GGFI) of March 2018, London, Luxembourg and Copenhagen are in first place, with financial centers in Western Europe generally ahead of centers from other regions. Centers with strong leadership in green finance are expected to rise in rank with Paris at the top of the list.

The AIFC is not yet included in this index, but it has been given the task of assessing, conceptualizing and initiating the development of a domestic green financing system. Together with the EBRD Center, the concept of “Green Financial System for Kazakhstan” (hereinafter referred to as the FSF) was developed, which defines approaches to building green finance in the country. The main instruments of green financing are green bonds, soft loans, subsidies for green projects and others. The introduction of a “green financial system” should bring not only environmental benefits, but also stimulate new sources of growth, helping to strengthen the role of Kazakhstan as a prominent regional and international financial player at the forefront of a dynamic and rapidly growing sphere of finance.

Other institutions of Kazakhstan can play an important role in creating an effective green financial system, including the SWF Samruk-Kazyna, the National Holding Baiterek, the banking sector, pension funds and the domestic capital market.

So, since 2018, Samruk-Kazyna has strengthened the degree of disclosure of information about ESG factors in the consolidated reporting on sustainable development based on the principles of the Global Reporting Initiative. However, the Fund does not define green investments as a strategic priority. It delegates to his subsidiaries the right to determine the economic feasibility and attractiveness of green investments on an individual basis.

The National Holding Baiterek is an important institution aimed at promoting economic diversification and sustainable development. The holding supports the green economy through separate lending and support programs. For example, a joint project of UNDP-GEF, the Government of the Republic of Kazakhstan and the “Damu” Fund “Sustainable Cities for Low-Carbon Development” supports private investment in energy-efficient urban infrastructure by subsidizing a 10% interest rate on loans and providing guarantees up to 50% of the loan amount. Development Bank of Kazakhstan JSC in 2017 provided a loan of 5 billion tenge to the project for the construction of the Turgusun hydroelectric power station in the East Kazakhstan region, implemented under the law on supporting “green energy” in Kazakhstan. But Baiterek does not place much emphasis on the development of a green economy, and the policy and practice of disclosing information in the field of environmental protection are also limited.

The banking sector of Kazakhstan is a key source of financing for development. However, the banking sector is not deep enough both in absolute and relative terms, and is still struggling with the residual consequences of the global financial crisis. The recent path to banking sector reform and rehabilitation has been positive, and there is interest in green investment projects. But today, the banking sector plays a limited role in the development of the green economy. Multilateral development banks (European Bank for Reconstruction and Development (EBRD), Eurasian Development Bank (EDB), Development Bank of Kazakhstan (DBK)) are still the main institutions providing credit lines and financing for new projects in tenge at fairly low interest rates.

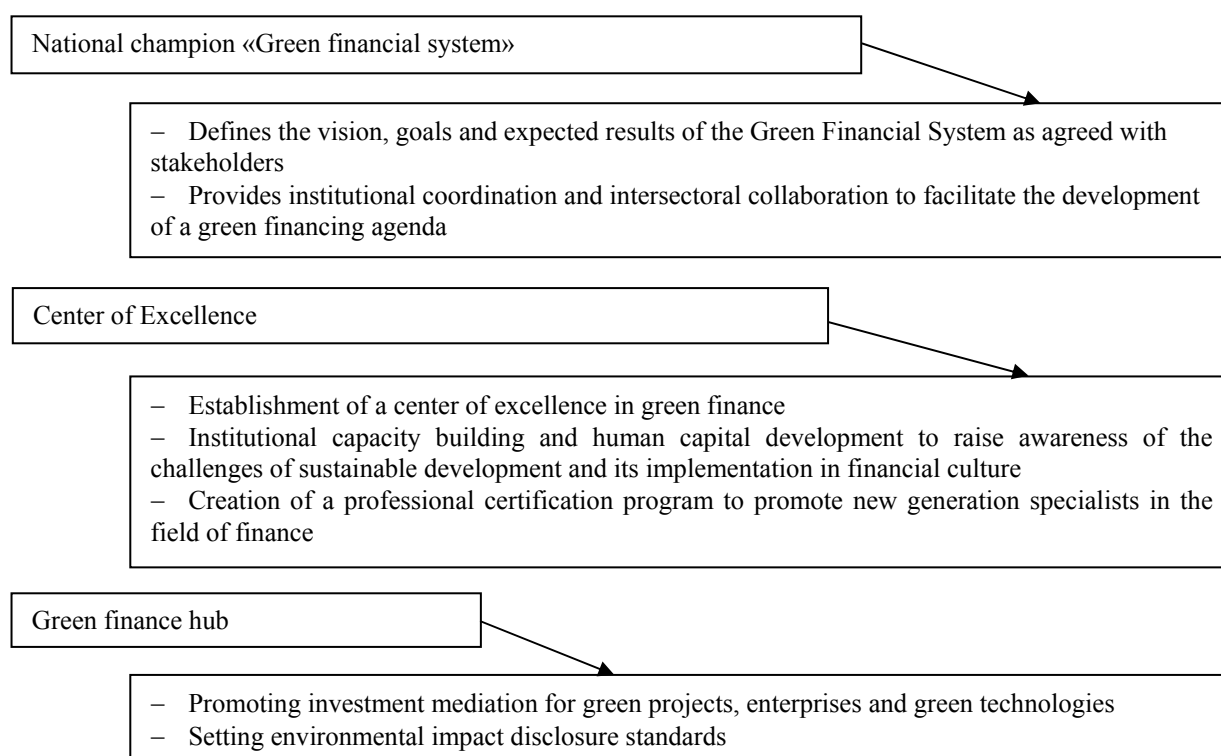
The state-controlled Unified Accumulative Pension Fund represents a significant and growing potential source of long-term capital. It is expected that it will play an increasingly important role in domestic capital markets. However, as is the case with other financial institutions in Kazakhstan, the role of the UAPF in the development of the green economy is not significant. In general, national funds do not have a special mandate for green investments.

As repeatedly noted above, today the domestic securities market is also not the main source of long-term capital. Kazakhstan's the largest securities exchange, KASE, is a member of the Sustainable Stock Exchanges Initiative and published in March 2018 detailed recommendations for issuers on preparing ESG reports. However, these statements are not a listing requirement, and so far the reports of voluntary issuers have not been published. Thus, the exchange currently plays an insignificant role in promoting the country's green agenda.

At present, key financial sector entities, banks, and institutional investors have only partially taken the envisaged voluntary measures. Thus, not a single Kazakhstani investor has joined the UN Responsible Investment Principles, which is a set of six principles that provide a global standard for responsible investment in the aspect of environmental, social and corporate governance (ESG). As of August 2018, more

than 1,180 investment organizations from more than 50 countries, representing approximately \$ 70 trillion, have confirmed their adherence to the Principles [8]. Banks of Kazakhstan, for their part, have not yet implemented the Equator Principles, a set of voluntary rules adopted by private financial institutions to ensure that when considering large-scale construction projects, potential impacts on the environment and populated territories are considered. There is no centralized monitoring of green investment projects. Nationwide, many special green products like green housing deposits, green mortgages and green securitization, green insurance have not yet been developed.

Given the unique regulatory status of the AIFC, the mandate entrusted to it to develop green finances and the high political priority in achieving success, the center is suitable for fulfilling the main coordinating role. It acts as the core on which the developed policy, “green” financial decisions and activity in the domestic market will be based. This central coordinating role, thus, provides critical support for the demand for green financing, gives the center the necessary political influence to promote the green agenda and attract private sector investment. This role will be based on the principles shown in figure.



Figure

Currently, regulatory acts do not give special attention directly to “green” financing. In the “Green Financial System for Kazakhstan” concept, the government recommended that the AIFC take a leading role in the development of the National Roadmap for the implementation of the PFS at the level of a strategic document. On its territory, the AIFC has the right to introduce standards that are different from those applied at the national level, and thus act as an innovator, testing the developed rules at the initial stage before their subsequent application throughout the country. Consequently, AIFC has the opportunity to create a working regulatory framework for green financing by developing rules:

- disclosure of environmental risks, effects and mitigation measures;
- assessment and monitoring of environmental and climate risks;
- on the responsibility of creditors, investors and the AIFC itself for adverse environmental impacts;
- according to the criteria and procedures for determining “green” investment projects;
- according to the procedure for monitoring green investment projects and reporting on their environmental impact.

The main recommendations for the establishment of the GFS in Kazakhstan are structured in three consecutive stages: the Initial stage (2017-2018), the Deepening Stage (2019-2021) and the Extension Stage (2022-2025). At the initial stage, the AIFC's potential can be strengthened by establishing partnerships with international organizations in the field of green finance and representing the financial sector in key national bodies for the development of the green economy. A further focus of the initial stage is the launch of specific benchmark financial instruments, i.e. issuing a green bond and studying its impact on other AIFC strategic directions, in particular, the development of local capital markets, asset management and wealth management of wealthy individuals. This involves a number of incentive measures, for example, the development of localized criteria for classifying investments as green finance, the introduction of international standards to create a national scheme for issuing green bonds and the mobilization of the domestic and international financial community.

In view of the fact that the AIFC is faced with the task of increasing the ability of the financial system to mobilize private capital for green investments and contribute to changes in the real economy through investment decisions, it is important to consider its role in the development of specific areas of green financing, in particular, green banking, green bonds, green funds and green indices.

Speaking about green banking, it is important to keep in mind that banking is also part of the AIFC regulated operations, and it is on the basis of banks registered with the AIFC that the center can take the first steps towards the development of green banking in Kazakhstan, primarily with the involvement of foreign banks, and later - domestic banks. As noted above, Kazakhstan banks have all the legal capabilities to become a member of a financial center, subject to the prudential requirements of the center and the availability of resources to ensure operations on its territory.

A green banking system is a fundamental part of a green financial system. Banking systems around the world are at different stages of the transition to green financial activities. According to a UNEP study, approximately 80% of the G20 green infrastructure financing is funded, at least in part, by banks. Of the estimated \$ 50 trillion of banking assets in emerging markets (about a third of global banking assets), less than 10% is currently directed to green lending [9]. Green loans account for 40% of the total portfolio of the Green Climate Fund [10]. According to IFC, the total amount of syndicated lending in 2014 amounted to 1.1 trillion. US dollars, of which almost 15% of loans were "green" in value terms, while the USA was the leader in terms of lending by a wide margin. The share of green loans in the total number of loans issued varies significantly across countries, with an average of 15 percent [11].

Despite a number of examples of how private sector banks implemented the green financing program in the G20 countries, experts admit that private banks and companies avoid the risks associated with financing the first steps of the transition to a green economy [12]. Moreover, in Kazakhstan, measures to overcome these barriers should be comprehensive at the national level and should not be limited to AIFC measures. This is especially true of the banking sector, which in the early stages cannot be a full-fledged member of the AIFC in the green lending sector, and therefore the role of the National Bank and development institutions, rather than the AIFC, will, for objective reasons, be key to stimulating green lending in Kazakhstan. Green state investment banks, specialized green financial institutions, and other green banking structures can provide a way to develop the banking system to help share risks and send a strong signal of government confidence regarding green investments and the green financial system.

Drawing analogies with foreign financial centers and the role of banks in these centers, especially in developed countries, it must be borne in mind that these centers mainly operate within the framework of a nationwide jurisdiction and one regulatory field, unlike Kazakhstan, which refers to two regulatory jurisdictions, each of which will solve the development of green financing at its own pace, with all the mutual influence. At the level of national laws, disclosure requirements on environmental effects and environmental risks can be included in the Law on Banks and Banking activities.

At present, Kazakhstan's lending by commercial banks to green projects is being hindered by the perceived high risks and low economic feasibility. Barriers to credit expansion in general are a number of factors. Firstly, deposits are represented to a large extent in foreign currency, and loans are in demand in the national currency. So, as of December 1, 18, the share of deposits in foreign currency in Kazakhstan

banks amounted to 49.5% [13]. Secondly, deposits are predominantly short-term, and the required loans are long-term. Thirdly, as was shown in the previous subsection, interest rates in national currency and collateral requirements are high. Green projects are currently not considered profitable in themselves, and need government support. In addition, banks currently do not set goals for green financing, and there are few incentives for this. And finally, banks are not yet required to assess environmental risks and project security.

Having a good business case is critical to driving widespread adoption and innovation in green banking. Due to the fact that this practice is still at the development stage, there are few academic and empirical studies on the real costs and benefits of banks that have embarked on the path of green lending. At the same time, there is significant research evidence that firms with high corporate social responsibility ratings and ESG factors demonstrate lower preliminary cost of capital for debts (loans and bonds) and equity. In fact, they are characterized by lower risk in a fundamental sense (although not necessarily in terms of short-term volatility) [14]. Hermes Investment research shows that companies with better ESG ratings have lower credit default spreads [15]. At the same time, according to a survey conducted by IFC in 25 countries, since the practice of green lending requires a more thorough examination and rigorous selection of clients and projects for financing, banks tend to consider green lending as a potentially more expensive area of business. Therefore, the industry needs local champions who enter the field of “green” financing and are ready to share their experience, demonstrate costs and profits. It is here that the key role of the AIFC is manifested, whose banks, both international and domestic, can act as “pioneers”, subject to the correct regulatory policy [16].

**Discussions.** Thus, summing up the role of the AIFC in the development of green financing mechanisms for economic modernization, we note that it will consist in stimulating the green financial instruments market both on the AIFC exchange and within the framework of banking activities of its participants, as well as in attracting organizations engaged in green finance due to the formation of a favorable legal regime and certain forms of state support. At the same time, speaking in the person of the Green Finance Hub created at the forefront of promoting green financial instruments, the AIFC is building the legal framework and experience for subsequent replication in the republican practice [17]. Equal importance should be attached to the development of human capital in the green economy through the establishment on the basis of the AIFC Green Finance Hub of the relevant competence centers and research working groups, along with close cooperation with international organizations offering grant, preferential financing and advisory assistance in the field of green financing.

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#### **ҚАЗАҚСТАН ЭКОНОМИКАСЫН МОДЕРНИЗАЦИЯЛАУ ҮШІН ЖАСЫЛ ҚАРЖЫЛАНДЫРУ МЕХАНИЗМДЕРІН ӨЗІРЛЕУДЕГІ АХҚО**

**Аннотация.** Ғылыми мақалада Астана халықаралық қаржы орталығының Қазақстан экономикасын модернизациялау үшін жасыл қаржыландыру тетіктерін дамытудағы рөлі талқыланады. «Жасыл қаржыландыру» дегеніміз – тұрақты даму жағдайында экологиялық артықшылықтар беретін қаржылық қызметтер, атап айтқанда климаттың өзгеруіне, ауаның ластануына, биоалуан түрліліктің жоғалуына, ресурстардың тиімділігін арттыруға, ағындар мен су ресурстарын басқаруға және ауылдардың тұрақтылығына қарсы бағытталған шаралар және орман шаруашылығы. Авторлар отандық экономиканы модернизациялау үшін «жасыл» қаржыландыру тетіктерін құрудағы AIFC рөлін бағалаудың негізгі нәтижелерін бір қатар жарияланымдарда ұсынады.

**Түйін сөздер:** АХҚО, жасыл қаржы, инвестициялар, капитал.

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**МФЦА В ВЫРАБОТКЕ МЕХАНИЗМОВ ЗЕЛЕННОГО ФИНАНСИРОВАНИЯ  
ДЛЯ МОДЕРНИЗАЦИИ КАЗАХСТАНСКОЙ ЭКОНОМИКИ**

**Аннотация.** В научной статье рассматривается роль Международного финансового центра Астаны в выработке механизмов зеленого финансирования для модернизации казахстанской экономики. «Зеленые финансы» определяются как финансовые услуги, обеспечивающие экологический эффект в контексте устойчивого развития, в частности, мер, направленных на борьбу с изменением климата, загрязнением воздуха, утратой биоразнообразия, на повышение эффективности использования ресурсов, управления отходами и водой, а также устойчивости сельского и лесного хозяйства. Основные результаты оценки роли МФЦА в создании механизмов зеленого финансирования для модернизации отечественной экономики изложены авторами в ряде публикаций.

**Ключевые слова:** МФЦА, зеленые финансы, инвестиции, капитал.

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**REFERENCES**

[1] Takhanova M.S. The role of the AIFC in the formation of the green financial system of Kazakhstan // Materials of the International Scientific and Practical Conference dedicated to the 25th anniversary of the national currency of the Republic of Kazakhstan "Modernization of the economy of Kazakhstan - a factor in the stability of the financial system of the state and national currency". Astana: ENU named after L.N. Gumilev. November 9, 2018. P. 209-212.

[2] Takhanova M.S. The potential for the development of a green financial system on the basis of the AIFC // Collection of materials of the International scientific-practical conference "New financial model as a factor in improving the welfare of Kazakhstan people. Astana: ENU named after L. N. Gumilev. January 25, 2019. P. 738-744.

[3] FinancialcentresforsustainabilityreviewingG7financialcentresinmobilizinggreenandsustainablefinance, TheUNEnvironmentInquir, 2017 - <http://unepinquiry.org/> (дата обращения: 03.03.2019 г.)

[4] FinalReport:GreenFinancialSystemforKazakhstanPartI:Synthesis,04October2017-<http://greenfinance.kz> (дата обращения: 11.03.2019 г.)

[5] AsianDevelopmentBank.EconomicsofClimateChangeMitigationincentralandWestAsia, February 2017. <https://www.adb.org> (дата обращения: 03.03.2019 г.)

[6] OffshoreFinancialCentersIMFBackgroundPaper,2000 -<https://www.imf.org> (дата обращения: 06.12.2018 г.)

[7] Acceleratingfinancialcentreactiononsustainabledevelopment.TheUNEnvironmentInquiry.2017-<http://unepinquiry.org/> (дата обращения: 03.03.2019 г.)

[8] UN PrinciplesforResponsibleInvestment-<https://www.unpri.org/pri>

[9] GreeningtheBankingSystem-ExperiencesfromtheSustainableBankingNetwork(SBN),2016 - <https://www.ifc.org/> (дата обращения: 03.03.2019 г.)

[10] GCF - <https://www.greenclimate.fund/what-we-do/portfolio-dashboard> (дата обращения: 03.03.2019 г.)

[11] GreenFinanceABottom-upApproachtoTrackExistingFlows.IFC (2017). - <https://www.ifc.org/> (дата обращения: 03.03.2019 г.)

[12] Green financial systems. Analysis of international experience - <http://greenfinance.kz> (дата обращения: 03.03.2019 г.)

[13] The current state of the banking sector of the Republic of Kazakhstan as of December 1, 2018, National Bank of the Republic of Kazakhstan - <http://nationalbank.kz> (дата обращения: 11.03.2019 г.)

[14] Deutsche Bank Group, Sustainable Investing: Establishing Long-Term Value and Performance. 2012 - <https://www.db.com> (дата обращения: 03.03.2019 г.)

[15] Hermes shows relationship between ESG factors and credit spreads. 19.04.2017 - <https://www.institutionalassetmanager.co.uk/> (дата обращения: 03.03.2019 г.)

[16] Takhanova M., Sembiyeva L. Ways to increase the liquidity of the capital market in the international financial center "Astana" // Izvestiya NAN RK. 2019. N 3. P. 60-69.

[17] Zhanybaeva Z.K., LukpanovaZh.O., Orazgalieva A.K. The latest technologies in the financial sector // Izvestiya NAN RK. 2019. N 3. P. 121-126.

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## ISOLATION AND CHARACTERIZATION ISOLATES OF NOSOCOMIAL INFECTIONS

**Abstract.** The study aimed to identify clinical isolates of nosocomial infections to characterize and create a Bank of strains to study the phenomenon of reversion of antibiotic sensitivity in different types of pathogenic bacteria.

**Methods:** Clinical isolates from patients suffering from nosocomial infections were plated on respective media to obtain pure cultures, which then were identified and characterized by morpho-cultural, tinctorial, physiological and biochemical traits carried out using standard test systems. The antibiotic sensitivity profile of clinical isolates was studied by the disco-diffusion method. Isolation of DNA from bacteria was carried out using the PureLink Genomic DNA Kit. DNA library for sequencing was obtained by the enzymatic approach using the Ion Xpress Plus Fragment Library Kit (Life Technologies, USA). Barcoding of isolates was carried out using the Xpress Barcode Adapters Kit (Life Technologies, USA). Sequencing of the resulting library was carried out on 318 chips using the Ion PGM Hi-Q View Sequencing Kit. Quality of the reads and trimming of DNA fragments were carried out using the computer programs fastqc and Cassava fastq filter. Genome fragments were assembled using Velvet 1.2.10. Large genome fragments were used to search for the closest reference genomes in the NCBI database. The complete genomes of the isolates were used as reference sequences for an alignment of the generated DNA reads using the program bowtie2. The completeness of the final assemblies was evaluated by the program BUSCO. Genome annotation was carried out using the NCBI annotation pipeline.

The results of the quantitative studies were processed using one-way ANOVA single-factor variance analysis followed by a statistical analysis using the software package GraphPad Prism 6.

In total, 12 clinical isolates were obtained. Complete genome sequence of four isolates was determined - *Enterococcus faecalis* PHRX1, *Pseudomonas aeruginosa* WND1-2019, *P. aeruginosa* WND2-2019, and *P. aeruginosa* WND3-2019. Annotated genomes were deposited at the NCBI database.

**Key words:** nosocomial infections, isolates, DNA, sequencing, *Enterococcus faecalis*, *Pseudomonas aeruginosa*.

**Introduction.** Despite the achievements of the modern medicine, the problem of nosocomial infections remains one of the most urgent at present, which leads to over-spending of additional resources and poses a threat to human health and life. Maternity and obstetric facilities (40% of all registered diseases) and surgical hospitals (15%) are recognized as the most vulnerable areas suffering from the spread of infections [1-3].

Pathogens of nosocomial infections are formed in hospitals in close contact between individual patients, as well as between patients and staff, where there is a possibility of circulation of highly virulent pathogens [4]. Against the background of the use of antibiotics, selection of antibiotic-resistant strains that pose the greatest threat to the health of patients occurs. The most commonly isolated nosocomial pathogens are *Escherichia coli* and *Staphylococcus aureus*, and every 10 cases of nosocomial infections caused by *Pseudomonas aeruginosa*. Less common are *Clostridium difficile*, *Enterococcus* and

*Enterobacter*, *Candida albicans*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Streptococcus*, in several cases – other types of *Candida*, *Acinetobacter*, *Serratia marcescens*, *Citrobacter*, *Haemophilus influenza*, etc. [5-7].

For reasons of nosocomial infections, the course of treatment of patients is extended by an average of 10 days, the cost of treatment increases 3-4 times and 5-7 times increases the risk of death. Of every 100 hospitalized patients, 7 in developed and 10 in developing countries are infected with nosocomial infections [8]. This problem arose because of the poorly developed system of epidemic surveillance and the lack of effective control methods [9, 10].

Annually 6 to 27% patients in Europe are suffering from hospital infections. These numbers in the USA are about 7-8% and 2-3% in Russian Federation [11] bringing the economic damage to 10-15 billion rubles in Russia; – 7 billion euros in Europe and 6.5 billion dollars per year in the USA [12].

Currently, the number of antibiotics effective against nosocomial infections has sharply decreased [13-15]. The key of prevention of nosocomial infections is timely diagnosis with an emphasis on the use of targeted antimicrobial therapy. Genomic analysis of individual organisms and characterization of population dynamics of microbial communities make it easier to identify new pathogens to better track disease outbreaks and to study the evolution of antibiotic resistance.

The study aimed to identify clinical isolates of nosocomial infections to characterize and create a Bank of strains to study the mechanisms and prospects of clinical use of drugs that cause reversion of pathogens to antibiotic sensitive phenotype.

**Methods.** Primary identification of clinical isolates, preparation of pure cultures, morpho-cultural, tinctorial, physiological and biochemical trials were carried out following the «*Manual for the Laboratory Identification and Antimicrobial Susceptibility Testing of Bacterial Pathogens of Public Health Importance in the Developing World*» (WHO/CDS/CSR/RMD/2003.6), M35-A2 *Abbreviation Identification of Bacteria and Yeasts Approved Guideline-Second Edition* [16, 17], CLSI and Bergey's Manual of Systematic Bacteriology [18]. For typing isolates used well-standardized commercial test system STREPTOtest 16, STAPHYtest 16, EN-COCCUStest and NEFERMtest 24 [19]. Alpha-hemolysis ( $\alpha$ -hemolysis) is a partial or “green” hemolysis associated with reduction of red cell hemoglobin. Alpha hemolysis is caused by hydrogen peroxide produced by the bacterium, oxidizing hemoglobin to green methemoglobin. Beta-hemolysis ( $\beta$ -hemolysis) is associated with complete lysis of red cells surrounding the colony.

Antibiotic sensitivity profiling of clinical isolates was performed by the disco-diffusion method [20]. Determination of the biofilm-forming ability of the isolates was carried out as described before [21].

DNA samples were extracted from bacterial cells using PureLink Genomic DNA Kits (Publication Number: MAN0000601, Revision 2.0) following the manufacturer's recommendations. The quality and quantity of the resulting DNA samples were determined using the NanoDrop 2000c spectrophotometer (Thermo Scientific, USA) at optical wavelengths of 260 and 280 nm.

The Ion Torrent PGM sequencer (USA) was used to sequence genomic DNA samples. The library for sequencing was obtained by an enzymatic approach using the Ion Xpress Plus Fragment Library Kit (Life Technologies, USA). The degree and quality of fragmentation of the library were evaluated by capillary electrophoresis Bioanalyzer 2100 (Agilent). DNA read barcoding for multiplex sequencing was carried out using the Xpress Barcode Adapters Kit (Life Technologies, USA). Sequencing of the resulting library was carried out on a 318 chip using Ion PGM Hi-Q View Sequencing Kit. At each of the intermediate stages, the quality and quantity of the DNA library were monitored. All operations were carried out according to the manufacturer's instructions.

The quality control and trimming of DNA reads were carried out using the computer programs *fastqc* and *Cassava fastq filter*. DNA reads were assembled using Velvet 1.2.10. Large genome contigs were used to search for the closest reference genomes in the NCBI database. The complete genomes of the isolates were then assembled by aligning DNA reads against the respective reference genomes using the program Bowtie2 implemented in UGENE 1.32.0 [22].

The completeness of the final assemblies was evaluated by benchmarking universal single-copy orthologous genes (BUSCO) [23]. Automatic search for coding genes was carried by NCBI annotation pipeline.

The results of the quantitative studies were processed using the one-way ANOVA single-factor variance analysis followed by a statistical analysis using the software package GraphPad Prism 6.



**Results.** During the period from 2018 to 2019, a collection of clinical isolates of nosocomial infections from hospitals of phthisiological profile in Almaty and Almaty region was carried out. In result, a collection of 12 strains of pathogenic microorganisms causing nosocomial infections has been created. The primary identification of the isolates was carried out on selective and differential diagnostic media, according to generally accepted methods. Table 1 presents the data about the source and species affiliation of the obtained isolates.

Table 1 – Clinical isolates, their sources and species identification

#	Isolate	Source	Cell morphology
1	<i>Staphylococcus spp. 01-18</i>	Urine	Single, pairs and in the form in grape-like clusters
2	<i>Staphylococcus spp. 02-18</i>	Purulent wound	Single, pairs and in the form in grape
3	<i>Staphylococcus spp. 03-18</i>	Vagina	Single, pairs and in the form in grape
4	<i>Staphylococcus spp. 04-18</i>	Pharynx	Single, pairs and in the form in grape
5	<i>Staphylococcus spp. 05-18</i>	Incubation tube of an intensive care unit	Single, pairs and in the form in grape
6	<i>St.pneumoniae spp. 01-18</i>	Sputum	Paired cocci, oval and slightly elongated lanceolate cells
7	<i>P.aeruginosa spp. 01-18</i>	Purulent wound	Rod-shaped asporogenic cells in pairs or in short chains
8	<i>P.aeruginosa spp. 02-18</i>	Purulent wound	Rod-shaped asporogenic cells in pairs or in short chains
9	<i>E.faecalis spp. 01-18</i>	Pharynx	Cells in pairs (diplococci) or short chains
10	<i>P.aeruginosa spp. 01-19</i>	Purulent wound	Rod-shaped asporogenic cells in pairs or in short chains
11	<i>P.aeruginosa spp. 02-19</i>	Purulent wound	Rod-shaped asporogenic cells in pairs or in short chains
12	<i>P.aeruginosa spp. 03-19</i>	Purulent wound	Rod-shaped asporogenic cells in pairs or in short chains

Tinctorial properties of all obtained clinical isolates were studied using the standard commercial kits.

A study of morpho-cultural and physiology-biochemical characteristics of the isolates was carried out subsequently. Morphological characteristics of colonies including the characteristic pigmentation of the bacterial growth, ability to grow on diagnostic liquid and solid media were recorded for different isolates.

Table 2 characterize physiological and biochemical features of clinical isolates of *Staphylococcus spp.*

Table 2 – Physiological and biochemical features of clinical isolates of *Staphylococcus spp.*

Name of test	Isolates				
	<i>Stapylococcus spp. 01-18</i>	<i>Stapylococcus spp. 02-18</i>	<i>Stapylococcus spp. 03-18</i>	<i>Stapylococcus spp. 04-18</i>	<i>Stapylococcus spp. 05-18</i>
	Reaction				
Hemolysis	+	+	+	+	+
	( $\alpha$ -hemolysis)	( $\alpha$ -hemolysis)	( $\beta$ - hemolysis)	( $\beta$ - hemolysis)	( $\alpha$ -hemolysis)
DNase	+	–	+	+	+
Plasmocoagulase	+	+	+	+	+
Lecithinase	+	+	–	–	+
Catalase	+	+	+	+	+
Oxidase	+	+	+	+	+
Ornithine decarboxylase	+	–	+	+	+
Arginine dihydrolase	+	+	+	+	+
Lysine decarboxylase	+	+	+	+	+
Fermentation of carbohydrates					
Sucrose	+	+	+	+	+
Lactose	–	–	+	+	+
Ramnose	+	+	–	–	–
Dulcitol	–	–	–	–	–
Mannitol	+	+	+	+	+
Biofilm formation index	1,13	1,10	1,21	1,18	1,29
Note: «+» positive test result, «–» negative test result.					

According to the data in table 2, the clinical isolates of *Staphylococcus* spp. showed the hemolytic activity with formation of zones of  $\alpha$  - and  $\beta$ -hemolysis; DNase, plasmocoagulase, lecithinase (for some isolates), catalase, oxidase and arginine dihydrolase activities, as well as the ability to decarboxylate ornithine and lysine. Coagulase causes clotting of blood plasma. Staphylococci producing this enzyme are covered with a fibrin capsule that protects them from phagocytosis. Large concentrations of coagulase circulating in the host body lead to a decrease in blood clotting, hemodynamic disorders, progressive oxygen starvation of tissues. In laboratories, an identification of the coagulase activity deems possible pathogenicity of isolated *Staphylococcus* strains. The enzyme lecithinase destroys lecithin in the cell membranes of leukocytes and other cells, which promotes leukopenia. DNase causes depolymerization of DNA and also is considered as a pathogenicity factor characteristic also for infections caused by *S. aureus*. The presence of these exoenzymes, as well as the ability to ferment sucrose, lactose, rhamnose, and mannitol, all indicate a high virulence potential of the isolates.

Besides, active formation of biofilm by these strains was recorded. The indexes of biofilm formation ranged from 1.10 to 1.29, which is regarded as a strong propensity for biofilm formation [21]. Given the above features, these isolates can be attributed to cultures with a high virulent potential.

The results of the biochemical trial of *Streptococcus pneumoniae* isolates are shown in table 3.

Table 3 – Physiological and biochemical traits of the clinical isolate of *Streptococcus pneumoniae*

Name of test	Reaction
Hemolysis	$\alpha$ -hemolysis
Catalase test	–
Motility test	–
Growth in anaerobic conditions	+
Arginine dihydrolase	+
Ornithine decarboxylase	–
Fermentation of carbohydrates:	
Sucrose	+
Lactose	+
Mannitol	+
Note: «+» positive test result, «–» negative test result.	

The clinical isolate of *Streptococcus pneumoniae* grew under anaerobic conditions and fermented sucrose, lactose and mannitol. The presence of the exotoxin, hemolysin, which is responsible for hemolytic and cytotoxicity activities, was recorded by the formation of zones of  $\alpha$ -hemolysis. The index of biofilm formation for this strain was around 2.10, which indicates a high propensity to form biofilms. All these features including the arginine dihydrolase activity imply high virulence of these isolates.

Similar biochemical trials were carried out for the isolates affiliated with the genus *Pseudomonas* (table 4).

Isolates of *Pseudomonas aeruginosa* could grow at 42 °C and produce pigment pyocyanin. Pyocyanin producing isolates are commonly found in the sputum of patients with cystic fibrosis. An important factor of the pathogenicity of *P. aeruginosa* is the production of extracellular mucus formed by surface glycoproteins. This mucus forms a biofilm around the infected tissues leading eventually to chronic infections. Such biofilm can be formed on objects of the hospital environment that contributes to the spread of nosocomial infections. All isolated strains of *P. aeruginosa* actively formed biofilms. The value of the biofilm formation indexes was in the range of 2.56 to 7.30, which is seen as a strong biofilm propensity [21]. Additionally, the isolates produced positive reactions to oxidase and catalase. The complex of the recorded traits allows referring the isolates to high-virulent strains.

*E. faecalis* isolate from throat was characterized by such traits as  $\alpha$ -hemolysis,  $\beta$ -galactosidase, glucuronidase, arginine dihydrolase activity and the ability to decarboxylate lysine and ornithine. The isolate also activity fermented lactose, sucrose, mannitol, trehalose, cellobiose, melibiose, sorbitol, inositol, adonitol and arabitol (table 5). It was concluded that this isolate represents a highly virulent strain of *E. faecalis*.

Table 4 – Physiological and biochemical traits of the clinical isolates of *Pseudomonas aeruginosa*

Name of test	Isolates				
	<i>Pseudomonas aeruginosa</i> spp. 01-18	<i>Pseudomonas aeruginosa</i> spp. 02-18	<i>Pseudomonas aeruginosa</i> spp. 01-2019	<i>Pseudomonas aeruginosa</i> spp. 02-2019	<i>Pseudomonas aeruginosa</i> spp. 03-2019
	Reaction				
Growth at 42 °C	+	+	+	+	+
Pyocyanin production	+	+	+	+	+
Oxidase test	+	+	+	+	+
Catalase test	+	+	+	+	+
Lysine decarboxylase	–	–	–	–	–
Arginine dihydrolase	–	–	+	+	+
Ornithine decarboxylase	+	+	–	–	–
Gelatin hydrolysis test	+	+	+	+	+
Fermentation of carbohydrates					
Glucose	–	–	–	–	–
Maltose	–	–	–	–	+
Mannitol	–	–	–	–	–
Sucrose	–	–	–	–	–
Lactose	–	–	–	–	–
Biofilm formation index	2,92	2,56	7,3	6,2	5,9
Note: «+» positive test result, «–» negative test result.					

Table 5 – Physiological and biochemical traits of the clinical isolate *E. faecalis*.

Name of test	Reaction
Hemolysis	$\alpha$ -гемолиз
Lecithinase test	–
$\beta$ -galactosidase	+
$\beta$ -xylosidase	–
$\beta$ -glucuronidase	+
Ornithine decarboxylase	+
Arginine dihydrolase	+
Lysine decarboxylase	+
Fermentation of carbohydrates	
Lactose	+
Sucrose	+
Raffinose	–
Dulcitol	–
Mannitol	+
Trehalose	+
Cellobiose	+
Melibiose	+
Sorbitol	+
Salicine	–
Malonate	–
Aesculine	–
Inositol	+
Adonitol	+
Arabitol	+
Simmons citrate	–
H <sub>2</sub> S	–
Urease	–
Note: «+» positive test result, «–» negative test result.	

All studied isolates were properly identified to the genus and species level and accession numbers of the JSC "Scientific Centre for Anti-infectious Drugs" - SCAID culture collection were assigned according to international standards and specifications of collecting virulent clinical isolates [17-19].

On the next step of the study, profiles of antibiotic sensitivity were detected for all isolates. The evaluation was performed by the disco-diffusion method using 12 the most common antibiotics (table 6).

Table 6 – Sensitivity of clinical isolates to antibacterial drugs

Isolates	Antibiotics concentration, µg/disc											
	OX 1	CZ 30	AMX 10	GEN 30	MRP 10	IMP 10	AK 10	E 10	AZM 30	CTR 30	TOB 30	CB 10
	Zones of growth inhibition, M±StD, mm (according to CLSI)											
<i>S. aureus</i> SCAID URN1-2018	25 ± 1.15 (S)	40 ± 1.15 (S)	30 ± 1.15 (S)	25 ± 0.58 (S)	33 ± 1.15 (S)	50 ± 1.15 (S)	20 ± 0.58 (S)	10 ± 0.58 (R)	6 ± 0 (R)	30 ± 1.15 (S)	25 ± 1.15 (S)	42 ± 0.58 (S)
<i>S. aureus</i> SCAID WND1-2018	23 ± 1.15 (S)	40 ± 1.15 (S)	45 ± 1.15 (S)	30 ± 0.58 (S)	35 ± 1.15 (S)	56 ± 1.15 (S)	20 ± 0.58 (S)	32 ± 0.58 (S)	28 ± 0.58 (S)	30 ± 1.15 (S)	30 ± 0.58 (S)	25 ± 0.58 (S)
<i>S. aureus</i> SCAID VGN1-2018	18 ± 0.58 (S)	36 ± 1.15 (S)	30 ± 1.15 (S)	25 ± 0.58 (S)	33 ± 1.15 (S)	52 ± 1.15 (S)	25 ± 0.58 (S)	6 ± 0 (R)	6 ± 0 (R)	30 ± 1.15 (S)	23 ± 0.58 (S)	30 ± 0.58 (S)
<i>S. aureus</i> SCAID PHRX1-2018	23 ± 0.58 (S)	40 ± 1.15 (S)	40 ± 1.15 (S)	30 ± 0.58 (S)	40 ± 1.15 (S)	53 ± 1.15 (S)	23 ± 0.58 (S)	27 ± 0.58 (S)	30 ± 1.15 (S)	30 ± 0.58 (S)	30 ± 1.15 (S)	45 ± 1.15 (S)
<i>St. pneumoniae</i> SCAID SPT1-2018	6 ± 0 (R)	6 ± 0 (R)	6 ± 0 (R)	12 ± 0.58 (R)	6 ± 0 (R)	10 ± 0.58 (R)	20 ± 0.58 (S)	6 ± 0 (R)	6 ± 0 (R)	6 ± 0 (R)	25 ± 0.58 (S)	6 ± 0 (R)
<i>E. faecalis</i> SCAID PHRX1-2018	6 ± 0 (R)	23 ± 1.15 (S)	25 ± 1.15 (S)	21 ± 0.58 (S)	29 ± 1.15 (S)	23 ± 0.58 (S)	15 ± 0.58 (I)	6 ± 0 (R)	14 ± 0.58 (I)	34 ± 1.15 (S)	19 ± 0.58 (S)	25 ± 1.15 (S)
<i>Pseudomonas aeruginosa</i> SCAID WND1-2018	6 ± 0 (R)	6 ± 0 (R)	6 ± 0 (R)	30 ± 1.15 (S)	35 ± 1.15 (S)	36 ± 1.15 (S)	25 ± 0.58 (S)	6 ± 0 (R)	30 ± 1.15 (S)	25 ± 0.58 (S)	35 ± 1.15 (S)	27 ± 0.58 (S)
<i>Pseudomonas aeruginosa</i> SCAID WND2-2018	6 ± 0 (R)	6 ± 0 (R)	6 ± 0 (R)	10 ± 0.58 (R)	23 ± 1.15 (S)	30 ± 0.58 (S)	15 ± 0.58 (S)	6 ± 0 (R)	22 ± 0.58 (S)	6 ± 0 (R)	18 ± 0.58 (S)	10 ± 0.58 (R)
<i>S. aureus</i> SCAID ITICU1-2018	25 ± 0.58 (S)	35 ± 1.15 (S)	35 ± 1.15 (S)	25 ± 0.58 (S)	35 ± 1.15 (S)	50 ± 1.15 (S)	23 ± 0.58 (S)	30 ± 1.15 (S)	30 ± 1.15 (S)	30 ± 1.15 (S)	28 ± 0.58 (S)	35 ± 1.15 (S)
<i>Pseudomonas aeruginosa</i> spp. SCAID WND1-2019	6 ± 0 (R)	6 ± 0 (R)	6 ± 0 (R)	23 ± 0 (S)	34 ± 0.58 (S)	27 ± 0.58 (S)	20 ± 0.58 (S)	15 ± 0 (R)	23 ± 0.58 (S)	14 ± 0.58 (I)	6 ± 0 (R)	25 ± 0.58 (S)
<i>Pseudomonas aeruginosa</i> spp. SCAID WND2-2019	6 ± 0 (R)	6 ± 0 (R)	6 ± 0 (R)	20 ± 0.58 (S)	20 ± 0.58 (S)	8 ± 0.58 (R)	24 ± 0.58 (S)	6 ± 0 (R)	6 ± 0 (R)	12 ± 0 (R)	25 ± 0.58 (S)	14 ± 0.58 (R)
<i>Pseudomonas aeruginosa</i> spp. SCAID WND3-2019	6 ± 0 (R)	6 ± 0 (R)	6 ± 0 (R)	6 ± 0 (R)	25 ± 0.58 (S)	25 ± 0.58 (S)	20 ± 0.58 (S)	15 ± 0.58 (I)	25 ± 0.58 (S)	6 ± 0 (R)	15 ± 0.58 (S)	20 ± 0.58 (I)

Note: «OX» - Oxacillin, «CZ» - Cefazolin, «AMX» - Amoxycillin, «GEN» - Gentamicin, «MRP» - Meropenem, «IMP» - Imipenem, «AK» - Amikacin, «E» - Erythromycin, «AZM» - Azithromycin, «CTR» - Ceftriaxone, «TOB» - Tobramycin, «CB» - Carbenicillin, «R» - Resistant, «I» - Intermediate, «S» - Sensitive.

The studied clinical isolates were characterized by varying degrees of sensitivity to antibiotics. The isolates *S. aureus* SCAID URN1-2018 and *S. aureus* SCAID VGN1-2018 showed sensitivity to almost all classes of investigated antibiotics. Surprisingly, these strains showed resistance to azithromycin that is considered as a last resort reserved drug against staphylococcal infections. Clinical isolates *S. aureus* SCAID WND1-2018, *S. aureus* SCAID ITICU1-2018 and *S. aureus* SCAID PHRX1-2018 were sensitive to all the antibacterial drugs in the study.

Antibiotic sensitivity profiling of *S. pneumoniae* SCAID SPT1-2018 revealed a polyresistance of this culture. Resistance to oxacillin, cefazolin, amoxicillin, gentamicin, meropenem, imipenem, erythromycin, azithromycin, ceftriaxone and carbenicillin was observed. The strain was sensitive to amikacin and tobramycin, only.

The strain *P. aeruginosa* SCAID WND2-2018 also showed a significant resistance to a wide range of antibiotics including oxacillin, cefazolin, amoxicillin, gentamicin, erythromycin, ceftriaxone and carbenicillin; to carbapenem antibiotics, meropenem and imipenem, and also to amikacin, azithromycin and tobramycin. Another *P. aeruginosa* isolate, SCAID WND1-2018, was resistant to oxacillin, cefazolin, amoxicillin and erythromycin but sensitive to gentamicin, meropenem, imipenem, amikacin, azithromycin, ceftriaxone, tobramycin and carbenicillin.

The strain *P. aeruginosa* SCAID WND1-2019 was characterized by resistance to oxacillin, cefazolin, amoxicillin, erythromycin and tobramycin. This clinical isolate was sensitive to carbapenems, – meropenem and imipenem, as well as to amikacin, azithromycin, carbenicillin, and gentamicin. An intermediate resistance was observed against ceftriaxone. Of the strain *P. aeruginosa* SCAID WND2-2019 was a multidrug resistant isolated showing sensitivity only to gentamicin, meropenem, amikacin and tobramycin. It was resistant to oxacillin, cefazolin, amoxicillin, imipenem, erythromycin, azithromycin, carbenicillin and ceftriaxone. The last *P. aeruginosa* isolate, SCAID WND3-2019, was characterized by resistance to oxacillin, cefazolin, amoxicillin, gentamicin and ceftriaxone. It was sensitive to carbapenems and to amikacin, azithromycin and tobramycin. An intermediate resistance was observed against erythromycin and carbenicillin.

*E. faecalis* SCAID PHRX1-2018 showed sensitivity to all the studied antibiotics but to erythromycin and oxacillin with an intermediate sensitivity to azithromycin.

Four isolates were selected for subsequent whole genome sequencing that was carried out on the Ion Torrent PGM platform. Assembly and annotation of complete genome sequences was performed as it was explained in detail in the section Methods.

*De novo* assembly was carried out by Velvet 1.2.10 assembler. The largest contigs were used to search for homologous sequences through NCBI *nr* database. Identified closed genomes were used for re-sequencing by mapping DNA reads with the program Bowtie2. For the isolate *P. aeruginosa* SCAID WND1-2019 the reference genome was the strain *P. aeruginosa* Pb18 (access number CP015650), for *P. aeruginosa* SCAID WND2-2019 – the strain *P. aeruginosa* AJ D 2 (access number CP038661) and for *P. aeruginosa* SCAID WND3-2019 – *P. aeruginosa* AR442 (access number CP029090).

Analysis of contigs of *E. faecalis* SCAID PHRX1-2018 revealed presence of a plasmid. Therefore, two reference sequences were identified: complete genome sequence of *E. faecalis* KB1 (access number CP022712), and for plasmid sequence of an *E. faecalis* plasmid pPD1 (access number KT290268).

Consensus complete genome sequences of the selected isolates were obtained BAM files of alignments of DNA reads using preserving the length of the reference genome that allowed copying the annotation of the reference genome to the obtained sequences. The gene prediction then was checked by the NCBI annotation pipeline. Unmapped regions and loci of ambiguity were marked by 100 N' trails. The resulted genome sequences were deposited at NCBI as shown in table 7.

Table 7 – Whole genome sequences of SCAID virulent clinical isolates deposited at NCBI

Isolate	GenBank AC	Length including gaps	GC-content	BUSCO genome completeness
<i>P. aeruginosa</i> SCAID WND1-2019	CP041787.1	6,267,146 bp	66.57%	95.1%
<i>P. aeruginosa</i> SCAID WND2-2019	CP041786.1	6,185,611 bp	66.7%	98.2%
<i>P. aeruginosa</i> SCAID WND3-2019	CP041785.1	6,382,154 bp	66.61%	97.8%
<i>E. faecalis</i> SCAID PHRX1-2018 (chromosome)	CP041877.1	2,597,557 bp	37.92%	43.8%
<i>E. faecalis</i> SCAID PHRX1-2018 (plasmid)	CP041878.1	98,263 bp	35.81%	Not applicable

Raw sequencing data for all these sequenced strains also was made available from NCBI at BioProject accession numbers: PRJNA555137 for *E. faecalis* SCAID PHRX1-2018 and PRJNA554979 for all sequenced *P. aeruginosa* clinical isolates.

A search for genetic drug resistance determinants in whole genome sequences was performed by the on-line service CARD RDI (<https://card.mcmaster.ca/analyze/rgi>) using NCBI accession numbers of the sequenced genomes as an input. A summary of this analysis is shown in table 8.

Table 8 – Identification of drug resistance determinants in whole genome sequences by CARD RDI

Genome	Gene category	Gene number	Possible association with drug resistance
<i>P. aeruginosa</i> CP041787	Antibiotic efflux pumps	43	Acridine; aminocoumarins; aminoglycosides; carbapenems; cephalosporins; fluoroquinolones; macrolides; tetracycline and others
	Lactamases	5	Beta-lactam antibiotics
	Other antibiotic inactivators excluding lactamases	5	Aminoglycosides; carbapenems; cephalosporins
	Antibiotic target alteration enzymes	3	Polypeptide antibiotics
<i>P. aeruginosa</i> CP041786	Antibiotic efflux pumps	43	Acridine; aminocoumarins; aminoglycosides; carbapenems; cephalosporins; fluoroquinolones; macrolides; tetracycline and others
	Lactamases	5	Beta-lactam antibiotics
	Other antibiotic inactivators excluding lactamases	5	Aminoglycosides; carbapenems; cephalosporins
	Antibiotic target alteration enzymes	4	fluoroquinolones; nybomycins and peptide antibiotics
<i>P. aeruginosa</i> CP041785	Antibiotic efflux pumps	42	Acridine; aminocoumarins; aminoglycosides; carbapenems; cephalosporins; fluoroquinolones; macrolides; tetracycline and others
	Lactamases	4	Beta-lactam antibiotics
	Other antibiotic inactivators excluding lactamases	5	Aminoglycosides; carbapenems; cephalosporins
	Antibiotic target alteration enzymes	3	Polypeptide antibiotics
	Antibiotic target replacement proteins	2	Sulfone and sulfonamide antibiotics
<i>E. faecalis</i> CP041877 (chromosome)	Antibiotic efflux pumps	3	Cephalosporins; fluoroquinolones; macrolides; peptide antibiotics; rifamycin and tetracycline
	Lactamases	2	Beta-lactam antibiotics
	Antibiotic target protection proteins	1	Lincosamide; macrolides; oxazolidinone; phenicol; streptogramin; tetracycline
	Antibiotic target replacement proteins	1	Diaminopyrimidine
<i>E. faecalis</i> CP041878 (plasmid)	Antibiotic inactivators	2	Aminoglycoside antibiotics
	Antibiotic target alteration enzyme	1	Streptomycin
Note: Genome accession numbers are the same as in table 7.			

*P. aeruginosa* isolates are naturally resistant to many antibiotics as they contain multiple efflux pumps removing antibiotics from cytoplasm. Majority of drug resistance genes are constitutionally present in all sequenced genomes of *P. aeruginosa*. Our study shows that the sequenced genomes differed by several genes encoding antibiotic target alteration and replacement proteins, which probably were acquired by horizontal gene transfer. Contrary, *E. faecalis* isolates normally are sensitive to all antibiotics. The drug-resistant isolate *E. faecalis* SCAID PHRX1-2018 acquired the antibiotic resistance through horizontal gene transfer including an acquisition of a large virulence plasmid comprising at least 3 antibiotic inactivator genes of APH(3')-IIIa and aad(6) families, and a SAT-4 streptomycin acetyltransferase. The BUSCO analysis of genome completeness (table 7) showed that the genome of *E. faecalis* SCAID PHRX1-2018 is still rather fragmented and many genes may be missed including some additional drug resistance genes.

**Conclusion.** Collection of clinical isolates of nosocomial infections from hospitals of phthisiological profile in Almaty and Almaty region was carried out. In result, a collection of 12 strains of pathogenic microorganisms causing nosocomial infections has been created. Using classical microbiological approaches of morpho-cultural and physiology-biochemical characteristics of the isolates was carried out subsequently. Morphological characteristics of colonies including the characteristic pigmentation of the bacterial growth, ability to grow on diagnostic liquid and solid media were recorded for different isolates. On the basis of the conducted researches, all investigated isolates of *S. aureus* belong to cultures with high virulent potential, capable to form biofilms. Clinical isolates of *P. aeruginosa* is also characterized as highly virulent strains with a high propensity to form biofilms. Isolates of *Streptococcus pneumoniae* and *E. faecalis* spp. were attributed to virulent strains. All studied isolates were assigned according to international standards and specifications of collecting virulent clinical isolates.

The profiles of antibiotic sensitivity were detected for all isolates. The evaluation was conducted to 12 of the most common antibiotics. The clinical isolates are characterized by varying degrees of sensitivity to antimicrobial drugs. Surprisingly, that some strains were resistant to azithromycin that is considered as a last resort reserved drug. This fact causes concern about the circulation and distribution in hospitals of microorganisms resistant to antibiotics of recent generation.

Four isolates were selected for subsequent whole genome sequencing. After sequencing and assembling reads the full-genome sequences of strains *E. faecalis* SCAID PHRX1-2018, *P. aeruginosa* SCAID WND1-2019, *P. aeruginosa* SCAID WND2-2019 and *P. aeruginosa* SCAID WND3-2019 were obtained. All sequencing data are deposited at NCBI under access numbers CP041877 for isolate *E. faecalis* SCAID PHRX1-2018 (plasmid DNA access number CP041878), CP041787, CP041786, and CP041785 for isolates *P. aeruginosa* SCAID WND1-2019, *P. aeruginosa* SCAID WND2-2019 and *P. aeruginosa* SCAID WND3-2019 respectively.

A search for genetic drug resistance determinants in whole genome sequences was carried out. Our study shows that the genomes differed by several genes encoding antibiotic target alteration and replacement proteins, which probably were acquired by horizontal gene transfer.

The data on the genetic characteristics of microorganisms that cause nosocomial infections in the future will help to improve the monitoring of nosocomial diseases, and will also contribute to the improvement of the protocols of treatment of the population, to prevent the occurrence and spread of antibiotic resistance.

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#### АУРУХАНАШІЛІК ИНФЕКЦИЯЛАР ИЗОЛЯТОРЛАРЫНЫҢ БӨЛІНУІ ЖӘНЕ СИПАТТАМАСЫ

**Аннотация.** Зерттеудің мақсаты патогенді бактериялардың әртүрлі түрлерінде антибиотиктерге сезімталдық реверсиясының феноменін зерттеу мақсатында штаммдардың банкін құру және сипаттау үшін нозокомиальды инфекциялардың клиникалық изоляторларын анықтау болып табылады.

Әдістері: клиникалық оқшаулағыштарды алғашқы идентификациялау: таза дақылдарды алу, морфокультуралық, тинкториалдық, физиологиялық және биохимиялық қасиеттерін зерттеу коммерциялық тест-жүйелерді қолдану арқылы жүзеге асырылды. Клиникалық изоляторлардың сезімталдық профилі диско-диффузиялық әдіспен зерттелді. Бактериялардан ДНҚ бөлу PureLink Genomic DNA Kit жиынтығымен жүргізілді. Секвенирлеуге арналған кітапхана Ion Xpress Plus Fragment Library kit (Life Technologies, АҚШ) жиынтығымен ферментативті әдіспен алынды. Баркодирование изоляттарды жүзеге асырылды жиынтығы көмегімен

Xpress Barcode Adapters (Life Technologies, USA). Алынған кітапхананы секвенирлеу 318 чипте Ion PGM Hi-Q View Sequencing Kit жиынтығымен жүргізілді. Алынған Риддердің сапасы және ДНҚ фрагменттерінің кесілуі FastQC және cassava fastq filter компьютерлік бағдарламаларының көмегімен жүзеге асырылды. Геном фрагменттері Velvet 1.2.10. Геномның үлкен фрагменттері NCBI деректер базасында ең жақын референттік геномдарды іздеу үшін пайдаланылды. Оқшаулағыштардың толық геномы Bawtie2 бағдарламасын пайдалана отырып референс геномдарымен бастапқы фрагменттерді теңестіру жолымен алынды. Соңғы жинақтардың толықтығы BUSCO бағаланды. Кодтаушы гендерді автоматты түрде іздеу RAST серверінің көмегімен жүзеге асырылды.

Сандық зерттеулердің нәтижелері One-Way ANOVA бір факторлы дисперсиялық талдау әдісін пайдалана отырып, GraphPad Prism 6 бағдарламалар пакетінің көмегімен кейіннен статистикалық талдаумен өңделді.

12 клиникалық изолятор бөлінді. Анықталған полногеномная нуклеотидная реттілігі төрт изоляттарды - *Enterococcus faecalis* PHRX1, *Pseudomonas aeruginosa* WND1-2019, *Pseudomonas aeruginosa* WND2-2019 және *Pseudomonas aeruginosa* WND3-2019. Аннотацияланған геномдар NCBI деректер базасында сақтауға алынған.

**Түйін сөздер:** ауруханаішілік инфекциялар, оқшаулау, ДНҚ, секвенирлеу, *Enterococcus faecalis*, *Pseudomonas aeruginosa*.

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#### ВЫДЕЛЕНИЕ И ХАРАКТЕРИСТИКА ИЗОЛЯТОВ ВНУТРИБОЛЬНИЧНЫХ ИНФЕКЦИЙ

**Аннотация.** Целью исследования являлось выявление клинических изолятов нозокомиальных инфекций для характеристики и создания банка штаммов с целью изучения феномена реверсии чувствительности к антибиотикам у различных видов патогенных бактерий.

Методы. Первичная идентификация клинических изолятов: получение чистых культур, изучение морфологических, тинкториальных, физиологических и биохимических свойств осуществлялась с использованием коммерческих тест-систем. Профиль чувствительности клинических изолятов изучали диско-диффузионным методом. Выделение ДНК из бактерий производили набором PureLink Genomic DNA Kit. Библиотека для секвенирования была получена ферментативным методом с использованием набора Ion Xpress Plus Fragment Library kit (Life Technologies, США). Баркодирование изолятов осуществлялось с помощью набора Xpress Barcode Adapters (Life Technologies, USA). Секвенирование полученной библиотеки проводили на 318 чипе с использованием набора Ion PGM Hi-Q View Sequencing Kit. Качество полученных ридов и обрезку фрагментов ДНК осуществляли с помощью компьютерных программ FastQC и Cassava fastq filter. Фрагменты генома были собраны с использованием Velvet 1.2.10. Большие фрагменты генома были использованы для поиска ближайших референсных геномов в базе данных NCBI. Полный геном изолятов был получен путем выравнивания исходных фрагментов с референсными геномами с использованием программы Bawtie2. Полнота окончательных сборок была оценена BUSCO. Автоматический поиск кодирующих генов осуществлялся с помощью сервера RAST.

Результаты количественных исследований были обработаны с использованием метода однофакторного дисперсионного анализа One-Way ANOVA с последующим статистическим анализом при помощи пакета программ GraphPad Prism 6.

Было выделено 12 клинических изолятов. Определена полногеномная нуклеотидная последовательность четырех изолятов - *Enterococcus faecalis* PHRX1, *Pseudomonas aeruginosa* WND1-2019, *Pseudomonas aeruginosa* WND2-2019 и *Pseudomonas aeruginosa* WND3-2019. Аннотированные геномы были депонированы в базе данных NCBI.

**Ключевые слова:** внутрибольничные инфекции, изоляция, ДНҚ, секвенирование, *Enterococcus faecalis*, *Pseudomonas aeruginosa*.

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## REFERENCES

- [1] CDC Types of healthcare-associated infections. Healthcare-associated infections (HAIs). 2016. Available at: <https://www.cdc.gov/hai/infectiontypes.html>. (Accessed August 02, 2019).
- [2] Allegranzi B. (2011) Report on the burden of endemic health care-associated infection worldwide // WHO. Geneva. ISBN 978 92 4 150150 7
- [3] WHO. Preventing bloodstream infections from central line venous catheters. WHO, Geneva. 2016. Available at: <http://www.who.int/patientsafety/implementation/bsi/en/> (Accessed August 01, 2019).
- [4] WHO The burden of health care-associated infection worldwide. WHO, Geneva. 2016. Available at: [http://www.who.int/gpsc/country\\_work/burden\\_hcai/en/](http://www.who.int/gpsc/country_work/burden_hcai/en/) (Accessed August 01, 2019).
- [5] St. Edwardson, Ch. Cairns (2019) Nosocomial infections in the ICU, Anesthesia & Intensive Care Medicine, 20:14-18. DOI: <https://doi.org/10.1016/j.mpaic.2018.11.004> (in Eng.).
- [6] Jayanthi A. (2014) Most common healthcare-associated infections: 25 bacteria, viruses causing HAIs, Becker's hospital review. 2014. Available at: <https://www.beckershospitalreview.com/quality/most-common-healthcare-associated-infections-25-bacteria-viruses-causing-hais.html>. (Accessed August 01, 2019).
- [7] CDC. Diseases and organisms in healthcare settings. Healthcare-associated infections (HAIs). Atlanta, Georgia. Available at: <https://www.cdc.gov/hai/organisms/organisms.html>. (Accessed August 02, 2019).
- [8] G.M. Raja Danasekaran, K. Annadurai (2014) Prevention of healthcare-associated infections: protecting patients, saving lives // Int J Community Med Public Health. 1:67-68. DOI: 10.5455/2394-6040.ijcmph20141114 (in Eng.).
- [9] Gupta A., Singh D.K., Kruthar B., Maria N., Srinivas R. (2015) Prevalence of health care associated infections in a tertiary care hospital in Dakshina Kannada, Karnataka: a hospital based cross sectional study // Int J Med Res Health Sci. 4:317-321. DOI: 10.5958/2319-5886.2015.00059.4 (in Eng.).
- [10] Khan H.A., Baig F.K., Mehboob R. (2017) Nosocomial infections: Epidemiology, prevention, control and surveillance // Asian Pacific Journal of Tropical Biomedicine. 7(5): 478-482. DOI: <https://doi.org/10.1016/j.apjtb.2017.01.019> (in Eng.).
- [11] Vnutribol'nichnye pnevmonii liderujut v spiske infekcij, svjazannyh s okazaniem medicinskoj pomoshhi // Medvestnik. 05.06.2019. Available At: <https://Medvestnik.Ru/Content/News/Vnutribolnichnye-Pnevmonii-Lidiruut-V-Spiske-Infekcii-Svyazannyh-S-Okazaniem-Medicinskoi-Pomoshi.Html> (Accessed August 01, 2019).
- [12] Babichev S., Korotjaev A. (2017) Medicinskaja mikrobiologija, immunologija i virusologija. Speclit. SPb. ISBN: 978-5-00032-239-0 (in Russ.).
- [13] WHO Urgent action needed to prevent a return to pre-antibiotic era // WHO. Geneva. 2015. Available at: <http://www.searo.who.int/mediacentre/releases/2015/1612/en/> (Accessed August 01, 2019).
- [14] Lukmanova G.V., Klivleyeva N.G., Glebova T.I., Sajatov M.H., Ongarbaeva N.S., Saktaganov N.T., Shamenova M.G., Kalkozhaeva M.K., Bajsejit S.B., Bajmuhametova A.M., Amirasheva L.K., Vebbi R.Dzh (2018) The sensitivity of Kazakhstani strains of influenza viruses of 2015 to chemotherapy 4(374): 217-222 (in Russ.).
- [15] Klivleyeva N.G., Ongarbaeva N.S., Saktaganov N.T., Glebova T.I., Lukmanova G.V., Shamenova M.G., Sayatov M.Kh., Berezin V.E., Nusupbaeva G.E., Aikimbayev A.M., Webby R.J. (2019) Circulation of influenza viruses among humans and swine in the territory of Kazakhstan during 2017–2018 // Bulletin of National Academy of Sciences of the Republic of Kazakhstan. 2(378): 6-13. DOI: 10.32014/2019.2518-1467.35 UDC 578:612.017.1.
- [16] «Manual for the Laboratory Identification and Antimicrobial Susceptibility Testing of Bacterial Pathogens of Public Health Importance in the Developing World» // (WHO/CDS/CSR/RMD/2003.6) (in Eng.).
- [17] M35-A2 Abbreviation Identification of Bacteria and Yeasts Approved Guideline-Second Edition, CLSI.
- [18] Hoult Dzh., Krig N. Opredelitel' bakterij Berdzhii. V 2-h t.
- [19] MUK 4.2.2886-11 Identifikacija mikroorganizmov i opredelenie chuvstvitel'nosti ih k antibiotikam s primeneniem avtomatizirovannoj sistemy dlja biohimicheskogo analiza (in Russ.).
- [20] Performance Standards for Antimicrobial Disc Susceptibility Test // CLSI. Jan 2010. Vol. 30, N 1 (in Eng.).
- [21] George O' Toole, Heidi B. Kaplan, Roberto Kotler. Biofilm formation as Microbial Development // Annual Review of Microbiology. 2000. Vol. 54. P. 49-79 (in Eng.).
- [22] Okonechnikov K, Golosova O, Fursov M, the UGENE team. Unipro UGENE: a unified bioinformatics toolkit // Bioinformatics. 2012. 28: 1166-1167 (in Eng.).
- [23] Waterhouse R.M., Seppey M., Simão F.A., Manni M., Ioannidis P., Klioutchnikov G., Kriventseva E.V., Zdobnov E.M. (2017) BUSCO applications from quality assessments to gene prediction and phylogenomics // Mol Biol Evol. 35(3): 543-548. DOI: 10.1093/molbev/msx319 (in Eng.).

**Выступление  
президента НАН РК, академика М. Журинова  
на Международном Конгрессе  
по истории культура в Центральной Азии, Ташкент  
(22.08.2019 г.)**

Хурматли Узбекистон Республикасы Бош вазирининг орынбасары Азиз Абдулкахарович!  
Хурматли халқаро конгресс иштирокчилары! Қозғистон олимлари номидан сизларни қутлайман  
ва ушбу муҳим халқаро конгрессда улкан ижодий муваффақиятлар тилайман!

Ученые наших братских народов, в том числе члены Академии наук Казахстана и Узбекистана имеют тесную историю культурного и научного сотрудничества. Культурно-гуманитарное направление занимает особое место в отношениях двух стран. Сотрудничество между учеными Казахстана и Узбекистана развивается в основном в области социально-политических наук, истории, этнологии, химии, медицины, аграрных наук, и осуществляется в форме совместных научных исследований, конференций, семинаров.

Непосредственную роль в поддержании уз дружбы играют проживающие в Узбекистане 1,5 миллиона этнических казахов, в интересах развития культуры и самобытности которых действуют национальные культурные центры, казахские театры, фольклорные и эстрадные ансамбли. В Узбекистане создан Совет по казахской литературе. За последние годы издано более 50 книг писателей и публицистов казахской национальности, издается газета республиканского значения «Нурлы жол». Такую же роль играют этнические узбеки, проживающие в Республике.

В Казахстане, в соответствии с государственной политикой по развитию этносов, узбекская диаспора имеет культурные центры в 14 городах Казахстана. Организовываются выставки узбекских художников, народные мастера участвуют в ремесленнических ярмарках, проводятся гастроли музыкальных и театральных коллективов. В Астане, Алматы и других регионах Казахстана открыты узбекские культурные центры, широко функционируют узбекские школы, проводятся Дни языка, культуры и традиций узбекского народа. А 2018 год был объявлен в Казахстане годом Узбекистана. В ходе реализации решения глав двух государств Шавката Мирзиёева и Нурсултана Назарбаева, в настоящее время поддерживаемого нашим новым Президентом Касым-Жомартом Токаевым, в рамках проведения года Узбекистана в Казахстане было запланировано 200 мероприятий в сфере экономики, туризма и культурно-гуманитарной отрасли. Тематика этих мероприятий настолько обширна, что часть из продолжена и в 2019 году, и в дальнейшем они будут проводиться на системной основе.

Так, 2018 год начался с Курултая ученых из Казахстана и Узбекистана, где были обсуждены роль Великого Шелкового пути и возрождение духовного наследия. На Курултай собралось около 100 ученых, социологов и культурологов из Казахстана и Узбекистана. Ученые двух стран отметили, что важно совместными усилиями изучать и сохранять наследие наших народов.

Значительным событием стало открытие летом 2018 года в Туркестане выставки знаменитого Музея истории Тимуридов. Выставку организовали государственный историко-культурный музей-заповедник «Азрет Султан» и Государственный музей истории Тимуридов Академии наук Республики Узбекистане. В фонде Музея истории Тимуридов насчитывается около 1000 экспонатов. Здесь собраны уникальные изделия, рассказывающие об истории Узбекистана. Среди них – предметы, повествующие об Эмире Тимуре и эпохе Тимуридов, такие как рукописи и письма, золотые, серебряные и медные монеты, керамические и медные изделия. Как известно, Великий Эмир Тимур построил в г.Туркестане самый крупный в Центральной Азии мавзолей великому

гуманисту, проповеднику суфизма и поэту Ходжа Ахмеду Яссауи. В 1991 г. там был создан Международный Казахско-Турецкий университет имени Х.А.Яссауи. Мне лично выпало счастье быть первым ректором этого университета и за 10 лет построить там современный университетский кампус с помощью наших турецких братьев.

В конце 2018 года в рамках Года Казахстана в Узбекистане в Национальной библиотеке Республики Узбекистан имени Алишера Навои открылся Центр казахстанской литературы и культуры. Центр предложил своим читателям ознакомиться с традициями, культурой и искусством казахского народа. В библиотеке были представлены произведения известных казахских писателей и поэтов на казахском, русском, узбекском и английском языках.

2019 год в Узбекистане объявлен Годом Казахстана, а это значит, что укрепление сотрудничества братских народов продолжается и, надеюсь, будет продолжаться вечно. В 1992 г. был подписан тогдашними президентами наших стран Договору о вечной дружбе между Казахстаном и Узбекистаном в г.Туркестане, перед мавзолеем Ходжа Ахмеда Яссави. Я был свидетелем этой потрясающей церемонии, будучи тогда ректором Международного казахско-турецкого университета имени Ходжа Ахмеда Яссави. После церемонии подписании договора, вручил обоим президентам дипломы почетного профессора нашего университета. В ответ Ислам Абдуганиевич подарил мне красивый узбекский чапан, который я берегу до сих пор.

В программах Конгресса предусмотрено множество выставок культурных и научных данного достижений. Цель выставки – укрепление культурных связей между регионами и пропаганда музейного дела, повествующее о наших исторических корнях, о тюркской цивилизации.

За прошедшие четверть века новой истории мы достигли многих успехов практически во всех областях: экономической, политической, военно-технической, гуманитарной. Для молодых государств в современном мире – в условиях постоянной и жесткой конкуренции, геополитических трансформаций и технологического прогресса – это уже немало. Важно и то, что мы не растеряли опыт прошлых отношений. Более того, мы постарались его приумножить, что и выразилось в современной политике региональной и континентальной интеграции. Я лично многие годы сотрудничал с замечательными узбекскими учеными, начиная с того, когда в молодые годы работал в г.Шымкенте в Казахском химико-технологическом институте. Мы сотрудничал и по химии алкалоидов на Шымкентском химико-фармацевтическом заводе. Мне выпала честь заниматься научными изысканиями вместе с замечательным узбекским ученым - проф. Х.А.Аслановым из Института биографической химии под общим руководством Президента АН Узбекской ССР, Героя Социалистического Труда, академика АН СССР, замечательного и добрейшего человека Садыкова Абида Садыковича. У нас имеются 3 авторских свидетельства СССР и около 10 научных статей в известных научных журналах СССР.

Учитывая приоритетную задачу по построению наукоемкой экономики и обеспечению повышения ее конкурентоспособности на международном уровне, казахстанские ученые заинтересованы в тесном сотрудничестве с узбекскими учеными в инновационной и исследовательской областях, меганаучных проектах по проблемам экологии, водообеспечения, пищевой безопасности, биоразнообразия и т.д. Вчера мы встретились с президентом АН Узбекистана академиком Бахзадом Садыковым которым является одним из выдающихся ученых в СНГ, к тому же является иностранным членом НАН РК.

Дорогие коллеги! Сотрудничество наших ученых, наших академий открывает новые перспективы прогресса интересах наших государств.

Созимнинг охирида биродорларимизга буюк ва истидодли озбек халкига янада равнак тилайман! Етиборингиз учун ташаккур!

### К 110-ЛЕТИЮ СО ДНЯ РОЖДЕНИЯ БАИШЕВА САКТАГАНА БАИШЕВИЧА



В этом году исполняется 110 лет со дня рождения известного ученого-экономиста, публициста, историка, государственного деятеля, бывшего долгие годы вице-президентом Академии наук Казахской ССР, директором Института экономики, академика Сактагана Баишевича Баишева.

Сактаган Баишевич Баишев родился 1 октября 1909 г. в с. Акжар Байганинского района Актюбинской области в 400 км от областного центра, в далекой глубинке.

Увидев стремление мальчика к знаниям, его отец Баиш после окончания аульной школы отвозит его в Темирскую русско-казахскую школу, после окончания которой он по комсомольской путевке едет работать на Карсакпайский медеплавильный завод. Затем работает в городах Арысь, Туркестан, Чимкент, пос. Славянка.

Желание писать, быть в гуще событий приводит молодого С.Баишева в редакцию газеты «Лениншіл жас», где он трудится в качестве заведующего отделом, а затем зам. директора газеты, откуда его призывают в Красную Армию. Затем он был рекомендован на учебу в Институт марксизма-ленинизма в Алма-Ате, который закончил с отличием.

В 30-е годы 20 века формировалась казахская советская интеллигенция и одним из ярких ее представителей явился С. Баишев. Ему доверяется руководство Институт марксизма-ленинизма, пост ответственного редактора республиканской газеты «Социалистік Қазақстан». Также он избирается депутатом Верховного Совета Казахской ССР первого созыва. Обязанности депутата он с честью выполнял в течение последующих 30 лет.

В грозные летние дни 1941 г. С. Баишев добровольно уходит на фронт. На войне он был комиссаром бригады, начальником отдела соединения, ответственным работником главного политического управления Красной Армии и закончил ее в Берлине в составе 3-й ударной Армии, штурмовавшей рейхстаг. Ратные подвиги Сактагана Баишевича отмечены орденом ВОВ 1 степени, медалями.

После войны С. Б. Баишев работает начальником Управления по делам искусств при Совете Министров, затем в течение девяти лет он возглавляет Казахский филиал Института марксизма-ленинизма при ЦК КПСС. Именно здесь осуществляется его мечта о научной работе: выходят его первые работы по индустриализации Казахстана, в 1948 г. он защищает кандидатскую диссертацию.

Будучи директором Казахского филиала Института марксизма-ленинизма Сактаган Баишевич Баишев провел большую организаторскую работу по переводу и изданию произведений классиков марксизма-ленинизма на казахском языке. По инициативе С. Баишева был создан специальный сектор перевода. Лично С. Баишевым были переведены на казахский язык «Капитал» К. Маркса, избранные произведения К. Маркса и Ф. Энгельса в 2-х томах, работы В. И. Ленина и др. Все это было сопряжено с большими трудностями, так как не было терминологических словарей. Надо было избежать неточностей. Сактаган Баишевич строго контролировал эту работу.

В Академию наук Сактаган Баишевич был приглашен президентом Академии наук Канышем Имантаевичем Сатпаевым, который разглядел в нем незаурядную личность и умелого организатора науки. В том же 1956 г. по предложению К.И. Сатпаева С.Баишев избирается академиком и вице-президентом АН Казахской ССР. С этого момента вся его последующая жизнь связана с развитием академической науки в республике. Выходят известные монографии «Победа социализма в Казахстане», «Коммунизм және экономика» (удостоенная премии им. Ч. Валиханова), «Социально-экономическое развитие Советского Казахстана» и др. В 1962 г. С. Баишев успешно защищает докторскую диссертацию, в 1961 г. ему присваивается звание заслуженного деятеля науки, в 1963 г. – профессора политической экономии.

С.Б. Баишевым было опубликовано более 300 научных работ, в том числе 7 монографий. Он был ответственным редактором десятка монографических работ, многие из которых не потеряли своей значимости.

Велики заслуги Сактагана Баишевича в развитии экономической науки и подготовке достойной смены ученых. Находясь на посту вице-президента АН КазССР (12 лет) и возглавляя в течение пяти лет Институт экономики, он много сил и труда положил для укрепления позиций казахстанских обществоведов в системе Академии наук СССР. Эти годы для Института экономики ознаменовались быстрым ростом его научного потенциала. Высокая требовательность и организованность, непримиримость к недостаткам, неустанная организаторская работа С.Б. Баишева на долгие годы определили стиль и тематику работы Института.

Тогда же Сактаган Баишевич возглавил разработку крупных и перспективных направлений развития экономической науки, таких, как размещение производительных сил Казахской ССР на генеральную перспективу (на период с 1970 по 1980 гг.), изучение трудовых ресурсов и их эффективное использование в общественном производстве, экономическая история. Так, с его одобрения и под его началом было создано такое направление в Институте, как планирование социального развития коллективов предприятий, переросшее затем в отдел социально-экономических проблем Института экономики АН КазССР.

Академик С. Баишев немало сделал в области подготовки экономистов, читая лекции по политической экономии в КазГУ и Алма-Атинском институте народного хозяйства. Под его непосредственным руководством воспитана целая плеяда ученых-экономистов и историков, из которых 30 стали докторами наук. Сейчас они представляют научную школу С. Баишева.

Возглавляя академические журналы «Вестник», «Известия», являясь членом редколлегии журнала «Народное хозяйство Казахстана», а также будучи председателем Спецсовета по защите докторских диссертаций, он отличался взыскательностью и чутким, внимательным отношением к авторам и диссертантам.

Создание спецсовета по защите докторских диссертаций является несомненной заслугой С. Баишева. Открытие и работа Совета способствовали созданию высококвалифицированных кадров – экономистов для Узбекистана, Таджикистана, Кыргызстана и Туркменистана.

Окружающих поражала его удивительная работоспособность, целеустремленность, принципиальность и справедливость в разрешении острых проблем.

В повседневной жизни Сактаган Баишевич был очень скромным, отзывчивым и человечным. Родина высоко оценила трудовые заслуги С.Баишева: он был награжден орденом Октябрьской революции, двумя орденами Трудового Красного Знамени, орденом «Знак Почета», медалями.

Умер С.Б. Баишев в 1982 г. Отмечалось 80-летие, к которому был приурочен выпуск биобиблиографии, избранных трудов и проведены юбилейные чтения. В ноябре 1999 г. был проведен Вечер памяти, посвященный 90-летию академика С. Баишева в Отделении общественных и гуманитарных наук НАН РК. В 2000 г. был выпущен сборник воспоминаний «Академик С.Б.Баишев – личность: гражданин, ученый, государственный деятель».

100-летие академика Сактагана Баишевича Баишева было отмечено проведением Круглого стола в Институте экономики и Международной конференции на его родине в г.Актобе. В 2011 году Институт экономики издал книгу «Күрескер-ғалым С.Б.Бәйішевтың 100 жылдығына орай» по итогам этих мероприятий.

Хотелось бы отметить следующие заслуги С.Б. Баишева перед казахстанской наукой и родным Отечеством:

- он впервые организовал сектор перевода в Институте марксизма-ленинизма. Благодаря этому казахские читатели получили доступ к произведениям классиков на родном языке. Тогда это было веление времени;

- в Академии наук он провел большую работу по упорядочению периодических изданий «Вестник АН», «Известия АН» по всем сериям, так как он отвечал за издательскую деятельность. Сактаган Баишевич просматривал поступающие статьи, поощрял тех авторов, в которых видел начинающих ученых. Приглашал к себе, беседовал, напутствовал на дальнейший рост. Это был баишевский стиль работы;

- в Институте экономики, начиная с 1963 г., стала издаваться серия «Проблемы современной экономики Казахстана», в которой публиковались статьи ученых-экономистов. Сейчас это трудно оценить, когда имеются большие возможности для публикации. А тогда было всего два журнала, а для молодых ученых попасть на страницы этих журналов было очень проблематично. Следовательно, была решена проблема выхода в свет новых работ;

- Сактаган Баишевич Баишев создал научный совет «Социально-экономическое развитие Казахской ССР», на котором обсуждались многие насущные проблемы экономики, а также проводилась апробация докторских диссертаций. В работе совета участвовали не только ученые Института экономики, но и преподаватели вузов, занимающиеся разработкой экономических проблем. Также был утвержден план защиты докторских диссертаций, который был опубликован в одном из академических журналов. И, надо сказать, из того проекта многое претворилось в жизнь;

- кадровая политика. В 1963 г. все сотрудники, которые имели заделы по кандидатским и докторским диссертациям, были взяты под контроль С. Баишевым. Им было назначено определенное время, к которому они должны были представить завершенные работы. Большинство из тех сотрудников защитили диссертации, так как их подготовку и защиту контролировал сам вице-президент Академии наук С. Баишев. Это была очень мудрая и дальновидная политика академика С. Баишева;

- в 1963 г. Институт экономики размещался в здании на ул. Карасай батыра, угол ул. Валиханова. Сактаган Баишевич вышел с ходатайством в Совет Министров КазССР, Академию наук, ездил в Москву, в Госплан СССР, добился специального проекта для нового здания Института, который мы строили своими руками, устраивая субботники. В 1968 г. Институт переехал в это здание по ул.Пушкина, 111/113, угол ул.Жамбыла. И там находился до 1984 г. Здание, построенное по инициативе академика С. Баишева, сейчас занимает Казахстанско-немецкий университет. Сегодня это капитальное сооружение, автором идеи и инициатором проекта которого был академик С.Б. Баишев, служит целям просвещения казахстанского народа. Не надо забывать, что он был сыном своего времени.

Мы постарались осветить все грани личности Сактагана Баишевича Баишева и благодарны судьбе что являемся его учениками.

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**Академику  
Национальной академии наук Республики Казахстан  
Сатыбалдину Азимхану Абилкаировичу – 60 лет**



13 октября 2019 года исполняется 60 лет ученому, доктору экономических наук, профессору, академику Национальной академии наук Республики Казахстан Сатыбалдину Азимхану Абилкаировичу.

Сатыбалдин Азимхан Абилкаирович – человек с многочисленными регалиями: награжден орденами «Құрмет», «Парасат», нагрудными знаками «За заслуги в развитии науки Республики Казахстан», «Белсендік қызметі үшін», «Міндет, Абырой, Ерлік», медалью за внесенный вклад и активное участие в продвижении Международного проекта G-Global и Астанинского экономического форума, благодарственным письмом Президента Республики Казахстан Н.А. Назарбаева и удостоен звания «Заслуженный деятель Республики Казахстан». По Постановлению Кабинета Министров Республики Казахстан награжден Государственной молодежной премией «Дарын» за научные достижения. Его достижения также были признаны за пределами Республики Казахстан: Азимхан Абилкаирович является академиком Российской академии наук и её иностранным членом, академиком Монгольской академии сельскохозяйственных наук, а также награжден орденом М. Ломоносова за заслуги и большой личный вклад в укрепление дружбы и сотрудничества между Российской Федерацией и Республикой Казахстан. Изобилие государственных и зарубежных наград за заслуги в развитии науки и общества характеризует Азимхана Абилкаировича как многогранную личность, к которому присуще качество перфекционизма.

Сатыбалдин Азимхан Абилкаирович родился в 1959 г. в селе Акколь Таласского района Джамбульской области Казахской ССР. Окончив Казахский сельскохозяйственный институт с отличием по специальности «Экономист-организатор», трудовую деятельность начал с самых низов, устроившись экономистом в овцесовхозе. Уже в то время будучи юношей, у него созревало желание заниматься исследованиями. Поступив в аспирантуру КазНИИ экономики и организации АПК в 1984 году, он начал закладывать фундамент своего потенциала как ученого-исследователя. Научную деятельность после аспирантуры продолжил в КазНИТИ овцеводства в качестве младшего научного сотрудника, в течение двух лет вырос в должности до старшего научного сотрудника.

Свое истинное вступление в казахстанское научное сообщество он почувствовал после успешной защиты докторской диссертации в 1993 году. Отличное знание экономики сельского хозяйства и его непревзойденные организаторские качества позволили ему легко справиться с обязанностями заведующего отделом, затем заместителя директора КазНИИ ЭиО АПК.

Уже в свои 35 лет Азимхан Абилкаирович начал занимать руководящие позиции: начиная с должности главного ученого секретаря президиума Казахской академии сельскохозяйственных наук и генерального директора НПО «Шымкент» до первого заместителя заведующего отделом экономической политики Администрации Президента Республики Казахстан. Уже через два года после смены столь важных должностных позиций, А.Сатыбалдин становится генеральным директором Национального академического центра аграрных исследований Республики Казахстан. Его знания и компетенции в аграрной сфере способствовали развитию отечественной сельскохозяйственной науки. Эти карьерные лестницы не были пройдены зря: в расцвете сил он имел колоссальный опыт в администрировании научной деятельности, что позволило ему стать вице-президентом Национальной академии наук Казахстана по аграрным наукам, членом Президиума Всемирной организации сельскохозяйственных исследований, академиком-секретарем Отделения сельскохозяйственных наук Национальной академии наук Казахстана.

Ответственное, скрупулезное отношение к выполняемым обязанностям было делом обыденным для А.Сатыбалдина, благодаря таким его качествам он был всегда востребован на руководящих должностях в крупных организациях страны. Он не только умел правильно организовывать работу, но и умел выстраивать особенные отношения с подчиненными. Его предложения по улучшению ситуации в аграрных отраслях страны были услышаны Правительством и Президентом, с которыми позже он взаимодействовал и работал. А. Сатыбалдин активно принимал участие в законотворческой деятельности в Сенате Парламента Республики Казахстан. В качестве сенатора А.Сатыбалдин курировал работу Комитета по вопросам регионального развития и местного самоуправления. Он глубоко понимал приоритеты экономической политики страны, поэтому работал над законодательным обеспечением прозрачности контрактов на недропользование и инвестиционную политику и регулирование государством процесса управления сырьевыми ресурсами с участием общественности. А.Сатыбалдин занимал пост заместителя председателя Республиканской политической партии «Отан». Еще тогда, больше двадцати лет назад, он говорил о необходимости объемных вложений в здравоохранение и образование страны чтобы не допустить разрушение сферы социальной инфраструктуры, и был прав. Рекомендации по развитию Алматинской агломерации, разработанные А.Сатыбалдиным, не потеряли свою актуальность и по сей день, более того, применимы и в условиях других территорий.

С его приходом в Институт экономики Комитета науки Министерства образования и науки Республики Казахстан в качестве директора, научный облик института трансформировался на качественно новый уровень благодаря его организаторским навыкам и опыту научной деятельности. Свою работу на посту директора Института экономики А.Сатыбалдин начал с внедрения программно-целевого подхода к исследованиям и активной поддержки молодых ученых. Сегодня в Институте на уровне дирекции и отделов уже работает молодое руководство. За годы его руководства Институтом многие молодые ученые смогли поступить и закончить докторантуру PhD, принять участие в международных исследовательских программах, пройти научные стажировки в ведущих зарубежных университетах, что увеличило лояльность молодых сотрудников к Институту и казахстанской науке в целом. Вместе с тем, благодаря правильной политике А.Сатыбалдина решена проблема преемственности поколений путем установления консенсуса между использованием научного опыта старшего поколения и активной поддержкой молодых ученых. Все эти структурные качественные изменения способствовали усилению позиции Института экономики в проведении научных исследований.

По идеям и инициативам А.Сатыбалдина Институтом экономики в 2019 году изданы такие книги как «Концептуальная модель управления и организации науки Республики Казахстан» и «Институциональные и организационные механизмы развития науки Казахстана», которые отражают современный научный взгляд на управление наукой с учетом предыдущего опыта и настоящих ситуаций в экономике. Под руководством А. Сатыбалдина в Институте экономики в общей сложности было подготовлено 16 монографий. Среди них изданы труды фундаментального характера, в которых впервые разработаны проблемы пространственного развития «Политика пространственного развития экономики Казахстана: новые принципы, ключевые приоритеты и механизмы реализации». Основные положения этой монографии были учтены и использованы при



формировании Прогнозной схемы территориально-пространственного развития Казахстана до 2030 года, подготовленной Министерством национальной экономики Республики Казахстан.

За свою профессиональную деятельность он успел написать более трехсот научных работ, включая монографии «Интенсификация кормопроизводства в овцеводческих совхозах Джамбульской области» (1988), «Аренда и кооперация в сельском хозяйстве» (1991), «Казахстан: рынок в АПК» (1994), «The Fight Against Corruption: Theory and Practice» (коллективная монография, 2016), «Экономика Казахстана: глобальные вызовы и новая реальность» (2016), «Стратегия перехода Республики Казахстан к низкоуглеродному развитию в условиях глобализации: потенциал, приоритеты и механизмы реализации» (2016).

Азимхану Абилкаировичу всегда свойственно новаторство, принципиальность и объективность научных выводов и в то же время ответственный подход к решению сложнейших экономических проблем национальной экономики. За свою эффективную научную деятельность А.Сатыбалдин воспитал и вырастил 11 докторов и более 39 кандидатов экономических наук, 30 магистров и 5 докторов PhD, многие из которых и ныне работают на высоких руководящих должностях в органах государственного управления Республики Казахстан. Сегодня А.Сатыбалдин успешно руководит Центром интеграции науки и образования по совместным образовательным программам магистратуры и PhD докторантуры научно-исследовательских институтов Комитета науки МОН РК и КазНУ им. аль-Фараби на базе РГП «Ғылым ордасы».

Научный авторитет, широкая эрудиция и управленческие навыки Азимхана Абилкаировича снискали ему высокий авторитет, как в казахстанском обществе, так и за рубежом. Его удивительная работоспособность, настойчивость в достижении намеченных целей, научный подход и справедливость в разрешении острых проблем, отзывчивость, человечность, цельность мировоззрения, порядочность не перестают восхищать его коллег и подчиненных.

Надежный семейный тыл, прочную опору и духовную поддержку Азимхану Абилкаировичу обеспечила его замечательная супруга Шмирбаева Рахима, воспитавшая вместе с ним сына и дочь. Дочь является докторантом PhD Высшей школы общественного здравоохранения, сын – заместителем директора Акмолинского филиала Фонда финансовой поддержки сельского хозяйства при КазАГРО. Сегодня Азимхан Абилкаирович успешно воспитывает внуков, для которых служит примером высоких человеческих качеств, прежде всего, честности, трудолюбия, справедливости и опоры там, где возникает необходимость.

Многогранную научную, общественную и государственную деятельность А.Сатыбалдина трудно кратко описать в одной статье. Он наставник молодежи, опора современников, выдающийся организатор науки, признанный на высоком уровне.

От всей души желаем Азимхану Абилкаировичу новых взлетов на вершины научного познания с растущей пользой для всех, достойной его природных дарований и высоких человеческих качеств.

*Институт экономики КН МОН РК,  
Редакция журнала «Вестник НАН РК»*

## МАЗМҰНЫ

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