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AGRICULTURAL SCIENCES

THE NUMBER OF SOIL BACTERIA IN THE AGROCENOSE OF WINTER WHEAT DEPENDS ON THE METHOD OF ITS PROCESSING

Dudar Ivan,

*Candidate of Agricultural Sciences
Lviv National Environmental University
m. Dubliany, Str. Vladimir the Great, 1*

Ohorodnyk Nataliia,

*Doctor of Veterinary Sciences
Lviv National Environmental University
m. Dubliany, Str. Vladimir the Great, 1*

Pavkovych Serhii,

*Candidate of Agricultural Sciences
Lviv National Environmental University
m. Dubliany, Str. Vladimir the Great, 1*

Lytvyn Olha

*Candidate of Agricultural Sciences
Lviv National Environmental University
m. Dubliany, Str. Vladimir the Great, 1*

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ЧИСЕЛЬНІСТЬ БАКТЕРІЙ ҐРУНТУ В АГРОЦЕНОЗІ ПШЕНИЦІ ОЗИМОЇ ЗАЛЕЖНО ВІД СПОСОБУ ЙОГО ОБРОБІТКУ

Дудар Іван

*кандидат сільськогосподарських наук
Львівський національний університет природокористування
м. Дубляни, вул. В. Великого 1*

Огородник Наталія

*доктор ветеринарних наук
Львівський національний університет природокористування
м. Дубляни, вул. В. Великого 1*

Павкович Сергій

*кандидат сільськогосподарських наук
Львівський національний університет природокористування
м. Дубляни, вул. В. Великого 1*

Литвин Ольга

*кандидат сільськогосподарських наук
Львівський національний університет природокористування
м. Дубляни, вул. В. Великого 1*

Abstract

The article presents the results of studies of the influence of tillage on the number of bacteria of the agroce-nosis of winter wheat of the Kolonia variety. It was established that the method of main cultivation has a significant effect on the number of bacteria in the dark gray podzolized light loamy soil. Plowing with a PYA-4-40 plow to a depth of 14-16 cm creates an optimal soil environment for the development of bacteria.

Анотація

У статті наведені результати досліджень впливу обробітку ґрунту на чисельність бактерій агроценозу пшениці озимої сорту Колонія. Встановлено, що спосіб основного обробітку має значний вплив на чисельність бактерій темно-сірого опідзоленого легкосуглинкового ґрунту. Виконання оранки плугом ПЯ-4-40 на глибину 14-16 см створює оптимальне ґрунтове середовище для розвитку бактерій.

Keywords: yield, meadow clover, feed units, digestible protein.

Ключові слова: bacteria, winter wheat, tillage.

Пшениця озима має пріоритетне продовольче значення, відзначається високою врожайністю і по-живною цінністю зерна. Основне її призначення – забезпечення населення хлібом і хлібобулочними

виробами. Воєнні дії росії в Україні показали, що хліб має геополітичне значення, виступає як важка зброя проти гуманної людяності на різних континен-тах.

За сучасних економічних умов у зв'язку із зменшенням родючості ґрунтів та глобальними змінами клімату, аграрна наука покликана переглянути та вдосконалити адаптивні технологічні заходи вирощування пшениці озимої.

Серед комплексу факторів, що впливають на ріст, розвиток та продуктивність культури, раціональний енергоощадний ґрунтозахисний обробіток ґрунту посідає чільне місце [4, 5]. Зокрема, він впливає на поліпшення агрофізичних властивостей орного шару [6], регулює перебіг біохімічних процесів в ґрунтовому середовищі, змінює інтенсивність трансформації органічних речовин та вологість [2], безпосередньо впливає на протиерозійну стійкість ґрунту та ефективність засвоєння рослинами елементів живлення [8], сприяє зменшенню забур'яненості агрофітоценозу, ураження культурних рослин шкідниками, пошкодження хворобами [3].

Спосіб обробітку ґрунту також впливає на склад, чисельність і функції мікрофлори [7, 10]. Негативний антропогенний вплив на ґрунтове середовище призводить до погіршення показників родючості та послаблення опірності екосистеми [9].

В умовах виробництва на темно-сірих опідзолених ґрунтах західного Лісостепу України основний обробіток у технології вирощування пшениці озимої практично не оцінюють за впливом на інтенсивність мікробіологічних процесів.

Тому необхідність дослідження цієї проблеми за умов глобальних змін клімату має важливе наукове і практичне значення у сфері охорони і поліпшення родючості ґрунтів та збільшення продуктивності агрофітоценозів.

Експериментальні дослідження розвитку бактерій агроценозу пшениці озимої сорту Колонія залежно від способу основного обробітку ґрунту виконано упродовж 2018-2022 рр.

Дослід закладали за триразового повторення, розташування ділянок – систематичне. Загальна площа ділянки 220 м², облікова –160 м². Дослід включав такі варіанти способу основного обробітку

ґрунту: 1. Звичайний (контроль) – оранка плугом ПЛН-4-35 на глибину 20-22 см; 2. Чизельний – обробіток плугом ПЧ-4,5 на глибину 20-22 см; 3. Ярусний – оранка плугом ПЯ-4-40 на глибину 14-16 см.

Агротехнічні заходи вирощування пшениці озимої були загальноприйняті для умов західного Лісостепу України.

Ґрунт дослідної ділянки темно-сірий опідзолений легкосуглинковий, характеризується низьким умістом гумусу (2,80-2,85%). Реакція ґрунтового розчину слабо кисла (рН сольове – 5,7-5,8). Забезпечення ґрунту азотом, що легко гідролізується, – низьке (106-110 мг/кг ґрунту), фосфором (188-193 мг/кг ґрунту) і калієм – середнє (122-126 мг/кг ґрунту).

Для визначення чисельності бактерій в агроценозі пшениці озимої відбирали зразки ґрунту за допомогою циліндричного бура. Для мікробіологічного аналізу готували середні проби із п'яти індивідуальних зразків.

Виділення бактерій з ґрунту здійснювали методом мікробіологічного висівання ґрунтової витяжки на тверде поживне середовище – м'ясо-пептонний агар (МПА), за триразового повторення.

Польові дослідження виконано згідно методики польового досліду [1].

Не зважаючи на високу здатність біоти ґрунту адаптуватися до умов навколишнього природного середовища, застосування способів основного обробітку ґрунту призводить до зміни чисельності мікроорганізмів впродовж усього періоду вегетації пшениці озимої.

Бактерії ґрунту в системі „ґрунт-мікроорганізм-рослина” є невід'ємною складовою. Виконані нами дослідження показали, що їх чисельність залежить безпосередньо від способу основного обробітку ґрунту та зазнає змін (рис. 1).

Встановлено, що за виконання оранки плугом ПЯ-4-40 на глибину 14-16 см за період вегетації культури відбувалось стимулювання розвитку бактерій у шарі ґрунту 0-40 см.



Рис. 1. Чисельність бактерій в агроценозі пшениці озимої сорту Колонія залежно від способу основного обробітку ґрунту, тис. КУО/г ґрунту (середнє за період вегетації 2018-2022 рр.)

Так, максимальна кількість бактерій (3807 тис. КУО/г ґрунту) була у варіанті за ярусного обробітку, а найменша (3287 тис КУО/г ґрунту) – у варіанті за чизельного способу основного обробітку. Характерно, що у варіанті за виконання оранки плугом ПЛН-4-35 на глибину 20-22 см бактерій було на 226 тис КУО/г ґрунту менше, ніж за комбінованого, але на 294 тис КУО/г ґрунту більше, ніж за чизельного обробітку.

Нами встановлено, що у варіанті за виконання оранки чизельним плугом відбувається диференціація орного шару ґрунту за родючістю: чітко проявляється зменшення її у нижньому горизонті порівняно з верхнім. У варіанті виконання полицевого обробітку ґрунту родючість верхнього і нижнього шарів практично вирівняна.

Таким чином, спосіб основного обробітку має значний вплив на чисельність бактерій темно-сірого опідзоленого легкосуглинкового ґрунту. Виконання оранки плугом ПЯ-4-40 на глибину 14-16 см створює оптимальне ґрунтове середовище для розвитку бактерій.

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ARCHITECTURE

NEW WEAK-GROWN MAPLE ROOTS FOR CHERRY

Hulko Valentyna,

Candidate of Agricultural Sciences

SS NULES of Ukraine

"Berezhany Agrotechnical Institute"

m. Berezhany. Str. Akademichna, 20.

Kudla Bohdan,

Assistant

SS NULES of Ukraine

"Berezhany Agrotechnical Institute"

m. Berezhany. Str. Akademichna, 20.

Dudka Svitlana,

Assistant

SS NULES of Ukraine

"Berezhany Agrotechnical Institute"

m. Berezhany. Str. Akademichna, 20.

Dynia Uliana

Assistant

SS NULES of Ukraine Berezhany professional college,

m. Berezhany. Sonyachna, 4.

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НОВІ СЛАБОРОСЛІ КЛОНОВІ ПІДЩЕПИ ДЛЯ ЧЕРЕШНІ

Гулько Валентина

кандидат сільськогосподарських наук, доцент

ВП НУБіП України «Бережанський агротехнічний інститут»,

м. Бережани, вул. Академічна 20.

Кудла Богдан

Асистент,

ВП НУБіП України «Бережанський агротехнічний інститут»,

м. Бережани, вул. Академічна 20.

Дудка Світлана

Асистент,

ВП НУБіП України «Бережанський агротехнічний інститут»,

м. Бережани, вул. Академічна 20.

Диня Уляна

Асистент,

ВСП «Бережанський фаховий коледж НУБіП України»

м. Бережани, вул. Сонячна 4а.

Abstract

The article presents a description and characteristics of main properties of rootstock's for sweet and tart cherries.

Анотація

В статті подано опис найкращих нових підщеп для вишні та черешні, способи їх розмноження, ріст у розсаднику та саду, зимостійкість та сумісність з основними сортами.

Keywords: rootstock's for sweet and tart cherries, propagation, winter hardiness, disease resistance, vigor, compatibility.

Ключові слова: підщепи вишні і черешні, розмноження, зимостійкість, стійкість до захворювань, сила росту, сумісність.

Основними проблемами під час вирощування плодів черешні та вишні є велика сила росту дерев, що зумовлює значні витрати праці на їх обрізування та збирання врожаю. Актуальним для цих ку-

льтур залишається добір високо-зимостійких слаборослих сортів та підщеп, забезпечення належного агротехнічного догляду, що сприяє високій продуктивності та довговічності дерев черешні. Для успі-

шного вирощування черешні та вишні велике значення має правильний підбір підщепи, оскільки саме від неї значною мірою залежить сила росту дерева, його довговічність, скороплідність, урожайність, зимо- та посухостійкість і товарна якість плодів.

Районованими підщепами черешні в Україні є сіянці дикої черешні (антипки – південні райони), культурних сортів черешні та вишні, на яких виростають, як правило, сильнорослі дерева.

Поряд з широким використанням сіянців у науково-дослідних установах проводяться роботи з виведення і добору слаборослих підщеп, які розмножуються вегетативно. Досвід, накопичений у нашій країні і за кордоном доводить, що вирощування черешні на цих підщепах є ефективнішим, ніж на традиційних насінєвих. Найпоширенішими є підщепи F12/1 (Мазард), Санта-Лючія, Колт, підщепи серії PHL, LM, Гізела 5, Табел Едабріз.

F12/1. Сильно або дуже сильноросла підщепа, яка відібрана серед сіянців дикої черешні на Іст-Моллінарській дослідній станції (Великобританія). Сумісність зі щепленими сортами добра. Підщепа стійка до бактеріальної плямистості листя, камедетечі, але чутлива до кореневого раку. Для неї краще підходять легкі суглинкові вологі ґрунти. Не придатні для неї слабоповітрянопроникні солонцюваті і дуже легкі ґрунти з близьким заляганням вод. Добре розмножується горизонтальними відсадками у маточнику.

Каміл (Camil LM 79). Напівкарликова підщепа, отримана від *Prunus canescens*. Сумісна з основними західноєвропейськими сортами, за винятком канадського сорту Самміт (Summit).

Дуже чутлива до грибних хвороб ряду *Phytophthora*. Не придатна для дуже вологих ґрунтів, достатньо морозостійка, в саду утворює багато кореневої порослі не потребує опори, легко розмножується зеленими живцями. Зменшення росту відповідно сильнорослій підщепі становить 33-50% і потребує у 8 разів менших затрат праці під час обрізування дерев.

Дерева на цій підщепі рано починають плодоносити і дуже урожайні в плодоносному віці, дозрівання плодів спостерігається на два дні раніше ніж на сильнорослих підщепах.

Даміл (Damil, LM 61/1). Карликова підщепа, отримана з популяції сіянців (*Prunus dawychensis*). Добре сумісна з сортами черешні. Чутлива до кореневого раку, який спостерігається на родючих ґрунтах. Дуже морозостійка підщепа, майже не утворює кореневої порослі, коренева система добре розгалужена, але в перші роки потребує опори. Легко розмножується зеленими живцями. Послаблює ріст дерев на 50-66%.

Інміл (Inmil, LM 9). Дуже карликова підщепа, має гібридне походження *P. Incisa* x *P. Sevrula*. Сумісна з більшістю сортів черешні. Дерева потребують опори і раннього омолоджуючого обрізування з метою підсилення росту пагонів.

Ступінь карликовості залежить від місця розташування, типу ґрунту, сили росту сорту. Знижує

силу росту дерев на 75%, вони рано починають плодоносити, сприяють високій урожайності. Підщепа менш морозостійка, ніж Каміл і Даміл.

Гізела 5 (GiSeLa 5). Напівкарликова підщепа, отримана в Німеччині від схрещування вишні *Prunus cerasus* x *Prunus canescens*. Сумісність з основними європейськими сортами нормальна, проте за повідомленнями польських вчених спостерігається несумісність з сортами Бурлат (Burlat) і Світ харт (Sweet heart).

Підщепа стійка до кокомікозу та вірусних хвороб, але чутлива до грибних хвороб роду *Phytophthora* особливо якщо вирощується на ґрунтах важкого механічного складу.

Цінною ознакою даної підщепи є висока морозостійкість кореневої системи. Гізела 5 дуже погано розмножується відсадками, краще зеленими живцями в туманоутворювальних установах. Основний спосіб розмноження – культурою тканин (*in vitro*) в лабораторних умовах.

Знижує ріст дерев порівняно з черешнею дикою на 40-50%, не утворює кореневої порослі. Дерева на цій підщепі рано (на 2-3 рік) вступають в пору плодоношення, дуже урожайні в продуктивному віці.

Останнім часом Гізела 5 набуває все більшої популярності в країнах Західної Європи. Продуктивний період дерев на цій підщепі – 12-15 років.

Табел Едабріз. Карликова підщепа французько-іранської селекції, отримана шляхом клонового підбору вишні роду *Cerasus vulgaris* (вишня звичайна). Дерева на цій підщепі необхідно вирощувати на дуже родючих ґрунтах, збагачених поживними речовинами і водою. В іншому випадку спостерігається дрібніння плодів.

Розмножується лише культурою тканин (*in vitro*) традиційні способи розмноження не забезпечують високого ефекту. На підщепі Едабріз ріст дерев менший на 60% порівняно із сильнорослими, дерева починають рано плодоносити, високоврожайні. На цій підщепі дерева утворюють в саду багато кореневої порослі і потребують опори.

ПХЛ А (PHL A). Напівкарликова підщепа для черешні, отримана в Чехії внаслідок селекції нового процесу в межах виду *Prunus avium*. Її не рекомендується застосовувати для сорту Гедельфінген через ранні прояви фізіологічної несумісності між компонентами щеплення. У молодому віці дерева на цій підщепі чутливі до дефіциту магнію в ґрунті, який викликає хлороз листя. Щеплені дерева ростуть на родючих і вологих ґрунтах, утворюють добре розгалужену, але поверхневу кореневу систему, тому потребують зрошення і опори, не утворюють кореневої порослі.

Підщепа важко розмножується відсадками, краще – зеленими живцями і культурою тканин (*in vitro*). Дерева на цій підщепі на 40-50% менші, ніж на черешні дикій, рано і щедро плодоносять. Підщепа вимоглива до умов вирощування.

ПХЛ Ц (PHL C). Карликова підщепа для черешні. Походження як і в ПХЛ А. Західні вчені спостерігають випадки фізіологічної несумісності цієї

підщепи з деякими сортами черешні (Кордія, Наполеон). З цієї причини вважається, що вона буде застосовуватись в садах значно рідше, ніж ПХЛ А.

Оскільки дерева на РНЛ С схильні до зав'язування надмірної кількості плодів і у зв'язку з цим до їх дрібніня, дерева на цій підщепі необхідно вирощувати на дуже родючих ґрунтах, добре забезпечених водою. Крім того, вони потребують опори і зрощення.

Дерева на РНЛ С ледь досягають 30-40% розмірів дерев на черешні дикій, дуже рано (на 2-й рік після садіння) вступають в пору плодоношення. Рекомендується для інтенсивних насаджень із щільністю 1500 дерев на гектар.

ВСЛ-2. Одержана шляхом гібридизації вишні степової з вишнею Ланнезіана (Л-2) в Краснодарському краї (Росія). Сумісна з основними сортами черешні. Чутлива до вірусної інфекції, тому вічка інфіковані вірусами не приживаються на цій підщепі у розсаднику взагалі.

Підщепа стійка до кокомікозу, нематод, кореневого раку, росте на важких перезволожених ґрунтах, має морозостійку кореневу систему (витримує зниження температури до 14°C). Відзначається посухостійкістю, не утворює порослі, дерева добре закріплені в ґрунті. Добре розмножується зеленими (93,3%), напівдерев'янілими (75,5%) живцями і горизонтальними відсадками. У розсаднику підщепа добре росте. Саджанці на цій підщепі добре розвинуті і мають розгалужену кореневу систему. Знижує силу росту дерев залежно від сорту на 40-50%

порівняно з деревами, які щеплено на черешню дику. Дерева починають плодоносити на 3 - 4-й рік після садіння, відзначаються регулярним плодоношенням і сталою урожайністю. Продуктивний період дерев на цій підщепі – 15-18 років. Рекомендується для інтенсивних насаджень зі щільністю садіння 800-1000 дерев на гектар.

Аналіз наведених літературних даних свідчить, що широке впровадження у виробництво нових слаборослих клонових підщеп для вишні та черешні дозволить зменшити силу росту дерев, підвищить скороплідність та урожайність насаджень, що відповідно знизить собівартість продукції.

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CULTURAL SCIENCES

ACTIVITY OF THE NATIONAL LIBRARY UNDER MARTIAL LAW: SOCIOCULTURAL ASPECT

Natalia Zakharova,

*Candidate of historical sciences, Senior scientific fellow,
V. I. Vernadskyi National Library of Ukraine,
3, Holosiivskyi Ave., Kyiv, 03039, Ukraine*

Tetiana Sereda

*Junior scientific fellow, V. I. Vernadskyi National Library of Ukraine,
3, Holosiivskyi Ave., Kyiv, 03039, Ukraine*

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Abstract

The role of the national library in country life is important as a given, and during the wartime, it increases and changes its activity directions. During wartime the libraries face new tasks in the scientific informational field, particularly in teaching and popularising the history of Ukraine, our country's defence stance, and the postwar rebuilding. Using modern technologies, it is possible to direct multiple types of informational activity and bring such work to an appropriate level.

Keywords: national library, sociocultural center, sociocultural activity, innovative activity, scientific informational activity, modern technologies, martial law.

It has been almost two years already since the full-scale invasion of the Russian Federation against Ukraine started, and libraries, museums, scientific and educational institutions, and cultural landmarks are being destroyed. Today, one of the pressing topics is the defence of library buildings and funds, as well as the formation of groups for internal work organisation. People with reliable Internet connection have started an active campaign on the information frontlines.

The course of the war and its consequences on the public life and scientific work have brought major changes to work of V. I. Vernadskyi National Library of Ukraine (VNLU), particularly to the sociocultural department. The lack of traditional information on VNLU's usual activities can be explained by the necessity to inform the readers of the actions of the terrorist state, particularly from the end of February 2022 throughout to the end of May 2022. The informational work back then had been consciously shifted to two chief topics: our reaction to the unexpected and baseless invasion of the enemy, our corresponding actions, as well as the numerous cases of VNLU's international colleagues, libraries, professional unions, numerous friends, and others. VNLU constantly informed its users about financial support for scientists, for Ukrainian startups, giving opportunities for taking part in international contests, internships, receiving grants, stipends, work opportunities in the EU, etc. Due to the statewide martial law implementation, VNLU was able to open its doors only on 12 September 2022. However, it never stopped informing its users about the work done. All of the possible means to do so were used, for example, VNLU's official web page (<http://www.nbuv.gov.ua/>) and its Facebook page (https://www.facebook.com/Vernadsky.Library/?local_e=uk_UA). Systemised information fully highlighted the activities done in VNLU.

During the same time, the role and value of sociocultural activity increase, and its success and efficiency positively influence the role of the library in society. Such work is aimed at describing and popularization of traditional, digital information resources; information support of fundamental, applied, scientific research; strengthening of national self-identification, increasing interest in the history of Ukraine, giving the library users opportunities to realise their informational and spiritual needs [1, 2].

Special attention is paid to one of the popular today remote forms of sociocultural activity of VNLU – virtual exhibitions, which have become an important form of popularising the multiversal fund of VNLU during wartime. Exhibition activities is one of the chief sociocultural communication means. They may be categorised into book-archival and fiction-art exhibitions. Most of the book-archival exhibitions are thematically organised, they may be about the present events, dedicated to the commemoration of significant events, the commemoration of important dates, celebration of international and national holidays [3, 4].

However, the war has brought changes to the exhibition activity of VNLU in recent years. In order to inform the users about the occupational war, librarians have prepared and presented on VNLU official site digital book exhibitions, mostly on the military topics: “Education and distance learning in Ukraine under martial law (legislative, governmental, departmental documents)”, “Social and legal protection and psychological assistance during crisis situations. Recommendations and advice during wartime.”, “Military aggression of the Russian Federation against Ukraine in the context of international humanitarian law: bibliography (1954–2022.)”, “Antirussian sanctions and embargo (2014–2022) in the context of international public law and world experience”, “Anatomy of Russian-Ukrainian conflict (2014–2022) in the era of hybrid wars”, “The phenomenon of the benevolence of Canadian

Ukrainians: at the service of their own people”, “Volunteering”, “Energy security of Ukraine”, “International investments and their role in the economy development of Ukraine”, “Civil protection of the people”, “Aviaindustry of Ukraine: history and modernity.”

Commemorating the year of Russian invasion in Ukraine and the 200th anniversary of the first detailed map of Snake Island, the exposition “Snake Island. Ukraine” was held. Overall, starting in October 2022, book exhibitions of VNLU are exhibited both traditionally and digitally.

Libraries of the National Academy of Sciences (NAS) scientific research institutions have also joined this particular type of activity. For example, from late May to early June 2023 the Paton Institute of Electric Welding hosted an exhibition for defence research and projects of NAS institutions, in which VNLU participated and was awarded a Diploma of the National Academy of Sciences.

In February Ukraine commemorated the tragic one-year anniversary of the full-scale invasion. It was a dramatic and heroic year of resistance. Ukrainians have been fighting for the right to be independent, to have our own state, own history and distinctive culture. On 15 March 2023, VNLU together with Kyiv National University of Technologies and Design presented a photo exhibition of student contest works “The Date”. There were presented both on-camera and smartphone snapshots from the life of those first months of the full-scale invasion. 24 February 2022 turned from a day into a year. The exhibition hosted over 120 photos by 17 authors, students and professors of the “Artistic Photography” department. VNLU and the Professional College of Kyiv National University of Technologies and Design have had fruitful cooperation over many years. The artspace of VNLU is always open to art initiatives and is happy to host participants and visitors (<http://www.nbu.gov.ua/node/6109>).

Today the library has become a center not only of information, where you can study all publicly available reliable digital information resources, but also a space for various events. Despite the war, the library helps to develop the informational space.

During the International Scientific Conference “Library. Science. Communication. Current Issues of Preservation and Innovation of Scientific Libraries” which was held on 4th October 2023, the Poster project of the design group “Creative Resistance” was presented. It was a creative project titled “We Had War for Breakfast”. Based on the platform of the popular messenger Telegram, young graphic designers under the watchful eyes of their professors, started creating anti-war patriotic posters, sending them to the frontlines, and organised exhibitions to present all over Ukraine and abroad. They worked restlessly day and night – in bomb shelters, evacuation trains, with no central heating or electricity, after curfew, while being on the occupied territories, etc. The chief topic of their works is the heroism of AFU, the cruel and cunning nature of RF armies, the demand for support of the international community and NATO, the protection of cultural monuments, positive and negative faces of war.

An important part of sociocultural activity during wartime is cultural and art events, as they help with mental rehabilitation. This last spring the Music Hall in VNLU resumed its work. For over 30 years, various music events have been held in the reading hall of the Music funds Department of VNLU. This tradition began in 1991, and throughout 2000-2019 over 300 concerts were held.

The priority task of VNLU is making sure that its sociocultural work is what the citizens of Ukraine require in their search for information, raising the morale of society, spreading knowledge and providing free access to sources of spiritual heritage. The celebration of Vyshyvanka Day is a long-standing tradition in V. I. Vernadskyi National Library of Ukraine. Today, the full-scale invasion of the Russian Federation has consolidated people, and strengthened the love to our country, the national identity and the unity. The library staff dress every year in vyshyvankas, the traditional embroidered shirt. And just before Vyshyvanka Day, in VNLU there was presented an exhibition of the unique art style of Petrykivka painting: “Petrykivka - the soul of Ukraine”. Petrykivka painting is a Ukrainian decorative and ornamental folk painting, which developed in Dnipropetrovsk region in Petrykivka village over a century ago. Petrykivka painting is listed in the List of intangible cultural heritage list of UNESCO.

Art has always played an important role in cultural development and it has always showcased the morale of the nation. So it is no coincidence that on 9th June 2023 the exhibition titled “Colours of Life” was presented in VNLU, as it is a major cultural institution and an intersection point of the past and present. The exhibition showcased 42 paintings in different art styles. Their authors are Anna Estet, Anastasia Osmolovska, Anastasia Samburska, Katrin Savych, Tosia Kravtsova, Natali Kato, Zhenia Machkovska, and Nadia Khart. The artists hold a dialogue with the viewer, telling them about complex matters that need thinking over through striking colourful art pieces.

Today the sociocultural activity of the library is in the era of developing new concepts and models for more active communication with society; the search for new forms of effective knowledge propagation, scientific achievements, useful information, the development of better communication between society members; and their involvement into the network of traditional and digital library communication [5].

Overcoming major challenges and threats, even in wartime, VNLU still remains the heart of intellectual freedoms and civic activism, a leader of national ideas and European values, a centre for science, culture and education; its mission is the same – to protect the national heritage it stores (manuscripts, printed and digital books, audio and visual media). “The chief task lies in safeguarding this heritage, in physical and digital media, as it is the heritage of many generations of Ukrainian people, and to make it accessible to all the readers, and to integrate into the worldwide informational networks” [6].

V. I. Vernadskyi National Library of Ukraine is open for cooperation and aid. This is largely facilitated by the implementation of new information technologies

and the high professional level of employees. It is important to note that under martial law VNLU functions as a digital institution, continuing the scientific research work, scientific information, scientific publishing, sociocultural and library works, and it spreads important information. Under such hard conditions, the library is a vital institution both for the state and the people as a scientific informational and sociocultural center, developing traditional and implementing innovative activity directions.

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EARTH SCIENCES

LITHO-FACIAL ANALYSIS USING BOREHOLE METHODS IN DETERMINING SEDIMENTARY CONDITIONS

Bayramova Ilhama Ilham,

Phd student, Researcher assistant,

Azerbaijan State Oil and Industry University

Haciyev Kanan Vafadar,

master student, Azerbaijan State Oil and Industry University

Badalov Rahman Qadir

master student, Azerbaijan State Oil and Industry University

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Abstract

90% of extracted oil-gas condensate is made up of productive layer sediments. A more detailed study of these sediments is of great theoretical and important practical importance. For this reason, studying its characteristics, determining the composition, conditions of formation, and origin of the collected sediments is one of the main issues. All natural events (catastrophes) have a unique effect on the sediment accumulation process. Through facies analysis, it is possible to recreate the depositional conditions. At the same time, facies analysis allows determining the development process of rocks with different lithological composition, especially rock-collectors, as well as places rich in minerals.

Keywords: geophysical methods, litofacies, sedimentary, facies analysis, well logging.

Purpose of the work

Facies analysis is understood as a set of studies that serve to study the conditions of sedimentation. The subject of facies analysis is the facies understood as a depositional environment, young or old, manifested in sediment or rock. A complex of genetic traits is used to restore the deposition conditions. Facies are divided into 3 broad and large-scale groups: continental, transitional and marine facies group. These large facies groups, in turn, are divided into different macrofacies (alluvial) and facies (colluvial and delluvial). Facies, in turn, can be divided into microfacies (proluvial).

Core materials are the main source of geological information about the deep layers of the Earth's crust. However, in practice, the core is taken not from the entire well wall, but only from the intervals where the productive layers can be opened, depending on the interval, the core removal is rarely 100%, and the diameter is not larger than 2.5-5 cm. At the same time, soft, semi-soft and strongly cracked rocks are generally not preserved in the core.

Finally, it is not always possible to raise it from the necessary interval, when they are taken and brought to the surface of the earth, the properties of the rocks and the fluids absorbed in them change clearly, so the results of the analysis of core and mud do not give adequate ideas about the geological section.

At the same time, the mining-geophysical studies carried out in practically all wells are used to determine the individual layers and their properties with sufficient accuracy, to study their distribution, change in thickness, washings, inconsistencies, etc. allows to determine.

In modern times, geological models based on geological-geophysical data are of great importance in forecasting the reserves of the field. Paleosedimentation, changes in facies conditions, and investigation of

the period of sediment accumulation are involved in the construction of more accurate geological models. The lithological composition, structure and conditions of formation of rocks are interrelated and characterized by qualitative and quantitative characteristics. The physical properties of rocks can be measured directly by rock samples or distance borehole methods. As a result, the parameters of the physical fields contain a lot of geological information, including the depositional conditions of the rocks. Also, complex borehole methods are closely related to genetic types of facies, development of post-sedimentary processes, selection of productive reservoirs in cross section. The main purpose of well logging is to obtain a geological description of the section, to study the structure of the field, to conduct regional studies, to calculate reserves and to help geologists to control the development of the field.

In 1984, V.S. Muromcev investigated the forecasting of lithological oil-gas traps in terrigenous reservoirs by applying borehole methods. The scientific work in which the facies models of sandy deposits are comprehensively analyzed has been published. Also, a local prediction method of oil and gas lithological traps based on facies analysis of terrigenous rocks using SP, GR curves is also proposed here.

Considering the variety of facies conditions and the limitations of generalized forms of SP (GR) curves, it is possible to interpret them in a certain sequence. Initially, the facies group of the studied sediments (continental, transitional, marine) is determined. Then, the condition of the sediment flows is determined according to the forms of the SP (GR) of the considered group, and the analysis is carried out on the basis of logging. Based on the analysis of the wells, a spatial distribution model of facies conditions is selected. When choosing this model, the comparison of the facies in the collection conditions with the core material should be taken

into account. As a result, this analysis allows not only to study the relationship of sediment accumulation conditions detected during drilling with the area, but also to explain the formation conditions of facies based on the well data.

Research methodology

These forms that we have mentioned have been analyzed by many scientists. As a result of the analysis, a special template was developed, which revealed the variation and shapes of the anomaly values of those curves. The most used are the forms of the curves developed according to D.A.Bush and O.Holt, which have funnel-shaped, cylindrical and bell-shaped shapes. Also, these curves are divided into 2 groups, smooth and toothed. The shapes of these curves also

provide information about the conditions of sediment formation.

These received curves were analyzed by V.M. Seyidov and a general form was prepared, whose forms are given in figure 1. Here, there is a SP (GR)-curve with a funnel-shaped shape No. 1 and No. 2, characterized by the regression process that took place in the sea. Curves 3 and 4 have a cylindrical shape, indicating that the process of accumulation of sediments occurs with high intensity and stability. During such a process, a large amount of sand flows into the basin. Forms 5 and 6 of the curve noted in the logging curves are called bell-shaped curves and are associated with the process of sea advance.

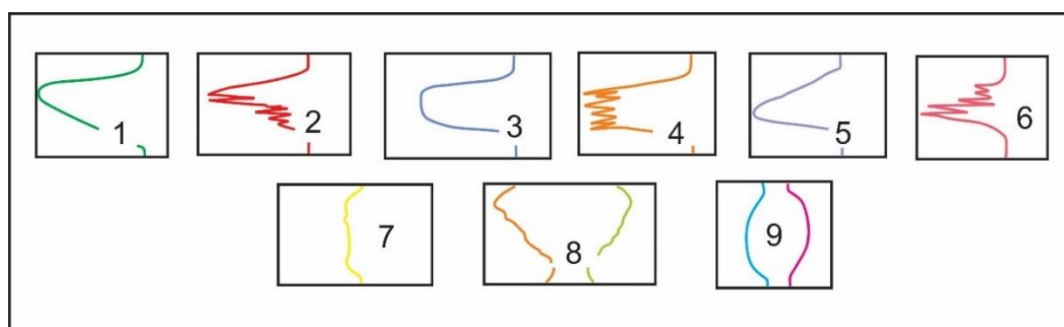


Figure 1. Classification of SP (GR) curves against sediments.
1,2-hybrid; 3,4-cylindrical; 5,6-bell; 7-line; 8-fall; 9-bumpy

Also, the fact that the SP (GR) curves are jagged (2,4,6) or smooth (1,3,5) means that the sediment accumulation process is stable or unstable in the part in front of the curve.

Curves number 7, 8, 9 are called linear, concave and convex shapes, respectively. The linear form means that there are no transgression or regression events in the sea, and that the process of sediment accumulation is taking place outside the coast. Sedimentary and depressed shape indicate the parts where the amount of clay material increases (SP and GR curves are characterized by the maximum value in front of the clay layers).

Figure 2. a, b shows an example of structural deltas caused by the influence of channel processes in the distribution of sandy and clayey sediments. In these

deltas, the influence of channel processes prevails. The formation of deltas is related to the activity of river systems as well as the swell and surge of the sea.

When deltas are formed, differences between them arise due to the dominance of wave processes in the distribution of terrigenous material. As a result, the sand cover of the deltas becomes wider. Deltas are characterized by block and bell curves in SP and GR diagrams. Bars and cover deltas are funnel-shaped in SP and GR curves. Sediment between delta channels is represented by sandstones, siltstones and argillites.

Disruptive, sickle-shaped deltas (Fig. 2. c, d) distribution of terrigenous material is related to the activity of swelling and retreating of the sea. They are characterized by a funnel-shaped shape in SP and GR curves.

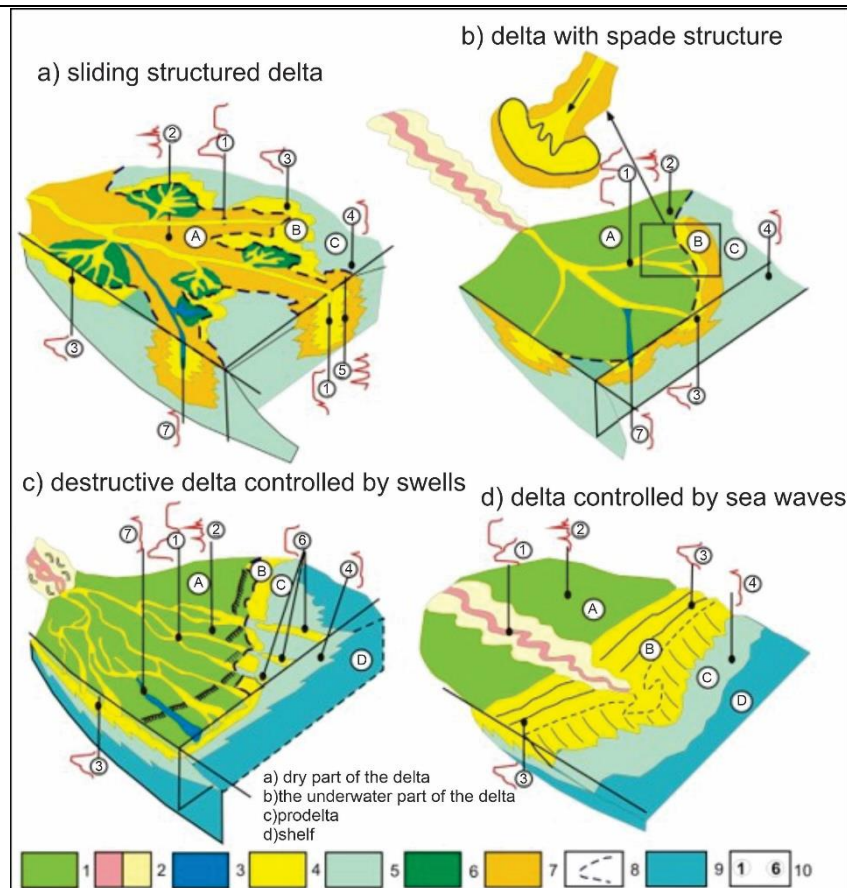


Figure 2. Facies interpretation of SP curves for delta sediments

1-dry part of the delta plain; 2-sandy sediments of the river bed; 3-remaining channel clay deposits; 4-sand deposits of delta channels; 5-siltstone sediments; 6-shore sediments; coverage of 7-delta channels; 8 the coastline of the sea; 9-shelf silts; 10-genetic interpretation of SP curves-(1-delta channel; 2-sediments between channels; 3-river mouth of delta channels; 4-delta front sediments; 5-delta channel surroundings; 6-sandy part of swell flows; 7-residue delta channel)

Based on mine geophysical data, the facies characteristics of delta channel deposits and sediments separating them are similar to structural deltas.

As for the parameters of the continental group, the facies elements of the listed depositional-hydrodynamic models of the coastal and delta plains separately

have a certain spatial position and an individual shape of the SP (GR) curve. The results of the facies analysis of the wells allow to completely reconstruct the sedimentation model and study the formation conditions, which allows for more efficient exploration of oil and gas reservoirs. (Figure 3)

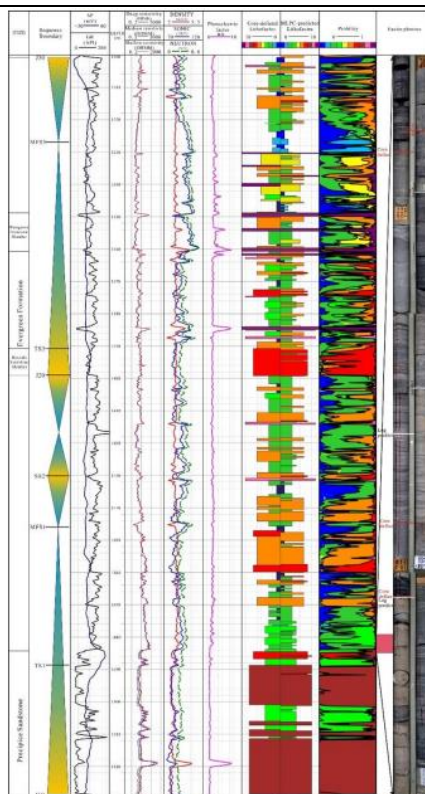


Figure 3. Determination of facies based on the shape of complex logging curves

Calculation results

As we mentioned, the change of various rock petrophysical quantities (porosity, permeability, clay content, oil saturation) along the depth depends directly on the conditions of sediment accumulation.

In the table, the results of the change of a number of petrophysical quantities according to the results of SP curves in the conditional X well of the Pirallahi field

are given. Also, their lithology and oil-saturation characteristics were determined by applying borehole methods

According to the results of the interval SP curves, which is the object of the study, 12 intervals were separated and their lithological composition was considered. As a result of the study, it was determined that the section consists of about 53% clayey sandstone, 46% clay, and 1% pure sandstone. Their oil and gas saturation was also determined.

Layer groups	Selected interval, m	SP	Kpor	Kclay	Ko.sat	Saturation characteristic	Litology
QD (1047.0-1378.0)	1280.4-1289.3	4,61	0,185	0,363	0,57	Oil-gas	silty clayey sandstone
	1297.5-1300.9	4,32	0,214	0,354	0,535	Alternation of clays and oil-gas sandstones	silty clayey sandstone
	1335.6-1337.1	4,45	0,223	0,356	0,53	Oil-gas	sandstone silt clay
	1372.2-1375.9	4,06	0,221	0,314	0,576	Oil-gas	sandstone silt clay
QA (1378.0-1675.0)	1379-1383.9	4,23	0,209	0,319	0,504	Oil-gas	sandstone silt clay
	1436.3-1439.4	3,74	0,227	0,25	0,534	Oil-gas	sandstone silt clay
	1463.9-1468.3	2,79	0,217	0,148	0,776	Oil-gas	sandstone with siltstone
	1489.0-1491.0	3,35	0,203	0,205	0,648	Weak residual oil-gas	sandstone with siltstone
	1502.2-1515.0	2,51	0,216	0,118	0,773	Oil-gas	sandstone with siltstone
	1545.6-1554.3	2,52	0,229	0,081	0,858	Oil-gas	sandstone
	1280.4-1289.3	2,72	0,194	0,113	0,655	Weak residual oil-gas	sandstone with siltstone
	1297.5-1300.9	2,14	0,211	0,077	0,853	Oil-gas	sandstone

Conclusions

Given the variety of facies conditions, the interpretation is carried out in a certain sequence. Sediment accumulation conditions are determined based on the shapes of various logging curves.

The facies analysis method conducted in deep drilling wells is one of the most common and accurate types of research. This method is based on the study of SP or GR core data. Comparisons made with borehole methods allow not only to study the relationship of sediment accumulation conditions detected during drilling with the area, but also to explain the formation conditions of facies based on well data.

Thus, improper assessment of facies indicators and lack of a sedimentation model in the formation of productive layers leads to the drilling of unfounded wells and the violation of the operational sequence of layers in the fields. The application of modern logging methods creates opportunities for the search for hydrocarbon resources in the field and the successful implementation of exploration works.

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**LAND TURNOVER OF THE BAIKAL REGION:
ELEMENTS OF AGGLOMERATION****Rogova Marina Vladimirovna***PhD of Geography,**V.B. Sochava Institute of Geography SB RAS**664033, Russian Federation, Irkutsk**Ulan-Batorskaya Str.1*[DOI: 10.5281/zenodo.10401890](https://doi.org/10.5281/zenodo.10401890)**ЗЕМЕЛЬНЫЙ РЫНОК БАЙКАЛЬСКОГО РЕГИОНА:
ЭЛЕМЕНТЫ АГЛОМЕРАЦИИ****Рогова М.В.***Кандидат географических наук**Институт географии СО РАН им. В.Б. Сочавы**Лаборатория георесурсоведения и политической географии**664033, Россия, г. Иркутск**ул. Улан-Баторская, 1***Abstract**

The paper reveals the study features and inter-municipal differences in the land market of the Baikal region and constituent entities of the Russian Federation (Irkutsk Region, Republic of Buryatia and Transbaikalian Territory). The classification of municipalities according to the level of intensity of land turnover (from low to high) is shown. The main directions of development of agglomeration processes in the Baikal region are highlighted.

Аннотация

В статье раскрыты особенности изучения и межмуниципальные различия земельного рынка Байкальского региона и входящих в него субъектов РФ (Иркутская область, Республика Бурятия и Забайкальский край). Показана классификация муниципальных образований по уровню интенсивности земельного оборота (от низкого уровня к высокому). Обозначены основные направления развития агломерационных процессов в Байкальском регионе.

Keywords: land market, land turnover, municipalities, classification, agglomeration, center – periphery**Ключевые слова:** земельный рынок, земельный оборот, муниципальные образования, классификация, агломерации, центр – периферия

Введение и постановка проблемы. Изучение сферы земельных отношений и земельного рынка, в том числе, позволяет выявить и описать многие социально-экономические процессы и явления. Изучение интенсивности земельного оборота позволяет не только раскрыть многие черты регионального земельного рынка, но и более обоснованно судить о масштабах роста городских агломераций, процессах урбанизации и субурбанизации.

Основной подход, применяемый в общественной географии при изучении рынков, заключается во взгляде на рынок как на территориальную общественную систему с опорой на сегменты, отличающиеся условиями сбыта товаров и услуг [1]. Схожей формулировкой придерживается С.А. Гуров, согласно которому подход сегментации предполагает выделение частей геопространства, характеризующихся пространственными отличиями экономических, социальных, демографических и других критериев, имеющих отношение к рынку [2]. Особую сложность для изучения этих критериев представляют удаленные транзитные регионы, через которые осуществляется как внутренний, так и внешний поток миграции, и добавляются факторы приграничного и трансграничного положения территорий. Одним из таких насыщенных по разнообразию и

сложности миграционных потоков является Байкальский регион, включающий в себя три крупных субъекта РФ (Иркутская область, Республика Бурятия и Забайкальский край). Они характеризуются удаленностью муниципальных образований от центров субъектов, а, следовательно, сложностью для исследований и типизации. Типологические закономерности развития земельного рынка изучаются с помощью концепции экономико-географического положения отечественной школы общественной географии [3], а также концепции близости, подробно рассмотренной отечественными авторами Н.Ю. Замятиной, А.Н. Пилясовым [4] и концепции периферийности, рассмотренной, в частности, Т.Е. Дмитриевой [5]. В зарубежной географии развитие получили схожие с ними концепции близости “proximity”, о которой в контексте агломераций одним из первых писал В. Audretsch [6], а позднее М. Porter [7]. А также концепция удаленности “remoteness” М. Berman [8], Р. Boschma [9]. На примере разных регионов России можно наблюдать, что земельный оборот активизируется вблизи крупных транспортных артерий, промышленных и инфраструктурных узлов, объектов туризма и рекреации. Подобные территориальные структуры приобретают ключевое значение для процессов

географической и социальной мобильности, урбанизации и субурбанизации. Среди отечественных исследовательских работ по данной тематике можно отметить труды О.Ю. Голубчикова, А.Г. Махровой, Н.А. Фелпс [10], Т.Г. Нефедовой, Н. Е. Покровского, А.И. Трейвиш [11].

Однако для таких субъектов РФ, как Забайкальский край, площадь которого превышает 431,8 км², или, Иркутская область, площадь которой составляет 774,8 км², сложно собирать данные по удаленным от региональных центров городам и районам. Информация о проведенных там земельных сделках зачастую оказывается неактуальной. Несовершенство институциональных механизмов, транзакционные издержки, теневые сделки – все это затрудняет исследования локальных земельных рынков. Тем не менее изучение интенсивности земельного оборота и сравнение его активности с социально-демографическими данными способно выявить вполне реалистичную картину развития регионального земельного рынка.

Объект и методы исследования. В работе были применены статистический и типологический методы исследования. Информационной базой для исследования земельного рынка послужили данные по земельному обороту, опубликованные на портале Росреестра с 2017 по 2022 годы. Были собраны

и рассчитаны данные по 98 муниципальным образованиям по количеству и площади сделок на землях населенных пунктов и сельскохозяйственного назначения. Объектом исследования является земельный рынок Байкальского региона на региональном (регион и входящие в него субъекты РФ – Иркутская область, Республика Бурятия и Забайкальский край) и муниципальном уровнях.

Результаты и обсуждение. В разных работах авторы определяют период исследований, исходя из личных возможностей и субъективной оценки рынка. В ряде публикаций российских авторов период для возможных аналитических обобщений составляет не менее 4 лет [12; 13]. Примерно те же сроки наблюдений мы находим у зарубежных авторов [14; 15]. Выбор периода наблюдений для данной работы был основан на имеющихся данных Росреестра с 2017 по 2022 гг. Данный период отличается неравномерностью развития, в том числе за счет пика пандемии Covid-19 и связанных с ней ограничительных мер в 2020-2021 годы. Для выявления пространственной дифференциации земельного оборота была выполнена классификация среднегодового количества сделок по муниципальным образованиям от максимального к минимальному значениям (табл.).

Таблица

Классификация муниципальных образований Байкальского региона по среднегодовому количеству сделок с земельными участками (2017–2022 гг.), ед.

Классы по среднегодовому количеству сделок, ед.	Муниципальные образования (районы и городские округа)
800 и более	Иркутское районное МО, г. Улан-Удэ
400–800	г. Иркутск, Читинский, Усольское районное МО
200–400	Черемховское районное МО, Тайшетский, Баргузинский, г. Черемхово, Тулунский, Иволгинский, Шелеховский, МО г. Усолье-Сибирское, г. Чита, Эхирит-Булагатский район, Слюдянский, Кабанский, Агинский, Заиграевский, Боханский
100–200	Куйтунский, Петровск-Забайкальский, Карымский, Селенгинский, г. Тулун, Аларский, Ангарское городское МО, Кяхтинский, Красночикойский, Хилокский, Заларинский, г. Петровск-Забайкальский, Братский, Осинский, Зиминское городское МО, Борзинский, Нерчинский, Северобайкальский, Шилкинский, Оловянинский, Зиминский
50–100	Улетовский, Тарбагатайский, Прибайкальский, Нижнеудинский, Чернышевский, Усть-Кутский, Сретенский, Нукутский, Хоринский, Ононский, г. Свирск, г. Северобайкальск, Качугский, Чунское районное МО, Баяндаевский, Мухоршибирский, Еравнинский, Забайкальский, Приаргунский, Могойтуйский, Курумканский, Тункинский, Бичурский, Джидинский, Могочинский, Дульдургинский
0–50	Усть-Удинский, Ольхонское районное МО, Александрово-Заводский, г. Усть-Илимск, Кижингинский, Казачинско-Ленский, Закаменский, Кыринский, Тунгокоченский, Баунтовский, Муйский, Нижнеилимский, Газимуро-Заводский, Краснокаменский, Нерчинско-Заводский, Жигаловский, Усть-Илимский, Балаганский, Балейский, Акшинский, МО г. Бодайбо и района, Киренский, МО г. Братска, Катангский, Шелопутинский, г. Саянск, Калганский, Окинский, Каларский, Мамско-Чуйский, Тунгиро-Олекминский

Максимальные показатели сделок наблюдаются в Иркутском районе, что объясняется близким расположением к областному центру и, следовательно, более интенсивным ростом пригородной зоны. Для него также характерны примерно одинаковые цифры распределения сделок по годам за рассматриваемый период. Это касается и тех районов, чье экономико-географическое расположение, а также природно-климатические условия более благоприятны. Некоторые районы обеспечивают не только стабильный, но уверенный прирост количества сделок (Баяндаевский, Заларинский, Шелеховский). И наоборот, районы, удаленные от областного центра, характеризуются как территории низкого уровня рыночной активности населения, что демонстрирует нам рынок продаж земельных участков. Это касается в первую очередь районов с крайне низкими показателями сделок (Бодайбинский, Мамско-Чуйский), а также районов с незначительной динамикой их прироста (Катангский, Киренский, Усть-Кутский).

Согласно закономерности, выявленной на примере районов Иркутской области, сделки имеют стабильный характер прироста в районах, тяготеющих к региональному центру. В Республике Бурятия к таким районам относятся Иволгинский, Заиграевский, Кабанский и Селенгинский. Исключение составляет Баргузинский район, хотя и приравненный к группе районов Крайнего Севера, но с максимальными значениями сделок за рассматриваемый период времени. Район не имеет на своей территории крупных городов, а его единственное городское поселение Усть-Баргузин концентрирует около трети населения – 7785 чел. Однако, несмотря на удаленность от промышленных центров и железнодорожных путей сообщения, интерес к земле здесь объясняется расположением района на побережье оз. Байкал и соответственно рекреационными возможностями. Низкая платежеспособность населения компенсируется преобладанием ипотечных сделок, район демонстрирует самый низкий показатель продаж.

Высокие значения количества сделок характерны в районах, прилегающих к основным транспортным путям. Это трансграничный Кяхтинский район, через который проходит Монгольский тракт и Северобайкальский район с Байкало-Амурской железнодорожной магистралью. К этой же группе отнесены Турунтаевский и Хоринский районы, также относительно недалеко расположенные от основных транспортных коридоров. Наименьшими значениями продаж отличаются отдаленные труднодоступные районы (Окинский, Закаменский, Баян-Уровский, Бичурский, Кижигинский).

В классификации районов Забайкальского края по количеству сделок с земельными участками выделяется региональный центр – г. Чита. Для северных удаленных территорий края характерны минимальные значения сделок земельного оборота. Увеличение количества сделок происходит в приграничных районах Забайкалья (Красночикойский, Хилокский, Петровск-Забайкальский районы, г.

Петровск-Забайкальский) и в зоне территориального влияния центра субъекта (Агинский, Читинский районы). В динамике сделок по годам обращает на себя внимание рост сделок в приграничных районах (Краснокаменский, Кыринский, Нерчинско-Заводский, Приаргунский) к концу наблюдаемого периода. Об использовании приграничных районов юго-восточного Забайкалья как ресурсной базы для китайских бизнесменов упоминает А.Н. Новиков [16].

Пространственное распределение показателей земельного рынка в целом подчиняется ведущему центростремительному направлению роста агломераций и внутрирегиональной миграции населения. Отмечаются искажения этого вектора роста агломераций в трансграничных и приграничных районах Республики Бурятия и Забайкальского края, а также в районах Иркутской области и Республики Бурятия на побережье крупнейшего водного объекта региона – оз. Байкал. Наиболее выраженными направлениями роста агломерации в субъектах Байкальского региона можно считать 4 вектора:

1) Вектор в направлении от центра к периферии, характерный для центров большинства субъектов РФ и крупных городов – центров агломераций. Для этого вектора характерно разрастание агломераций по линиям уже существующих транспортных маршрутов.

2) Векторами, имеющими региональную специфику, можно считать направление вдоль осевых транспортных линий региона – транссибирской и Байкало-Амурской железнодорожной магистрали и федеральной трассы «Байкал». Для большинства муниципальных образований Иркутской области для этого вектора характерно субмеридиональное направление, а для муниципальных образований Республики Бурятия и Забайкальского края – субширотное.

3) Вектор, направленный к основному объекту рекреации региона – побережью оз. Байкал. Для Иркутской области характерно юго-восточное направление вектора, для Республики Бурятия – северо- и северо-восточное, что обусловлено географическим положением озера по отношению к центрам субъектов.

4) Вектора субмеридионального направления от центров субъектов к приграничным территориям (Кяхтинский район Бурятии и Борзинский и Забайкальский районы Забайкалья) вдоль трансграничных транспортных маршрутов.

Заключение. Выполненная классификация основных показателей земельного оборота позволяют выявить и дифференцировать территории разной степени интенсивности развития земельного рынка и направления векторов агломерационного роста. Показатели рыночных сделок отображают результаты социальной мобильности населения и выявляют территории, дифференцированные по плотности этих показателей. Для удаленных районов периферии и полупериферии характерен сниженный землеоборот, который компенсируется активными процессами разрастания пригородов регионального

центра – как центра внутрирегиональной и межрегиональной миграции населения. Отдельно росту пригородов способствует также всеобщая автомобилизация населения.

В целом в Байкальском регионе преобладает поток мигрантов из периферии в центр, однако из-за наличия крупных месторождений и промышленных городов, расселение здесь приобретает характер трудовой миграции. Это в некоторой степени сдерживает процесс тотального исчезновения малых городов, однако тенденция на постепенное стягивание населения к крупным городам с периферии региона преобладает.

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ECONOMIC SCIENCES

CHARACTERISTICS OF MODERN TYPES OF CRYPTOCURRENCIES

Adamova Karine

PhD, Associate Professor,

Department of Financial Markets and Financial Engineering,

Financial University, Moscow, Russia

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ХАРАКТЕРИСТИКА СОВРЕМЕННЫХ ВИДОВ КРИПТОВАЛЮТ

К.Р. Адамова

*к.э.н., доцент Департамента финансовых рынков
и финансового инжиниринга,*

*Финансовый Университет при Правительстве Российской Федерации,
Москва, Россия*

Abstract

The nature of cryptocurrency consists of a technical and financial component. It has a complex multi-level classification system based on a variety of mechanisms with different functions. Certain characteristic features make it possible to classify cryptocurrencies depending on the purpose of creation, degree of activity, type, type of regulation, innovation, recognition by the state, type of creator. The distribution of cryptocurrencies into classes/subspecies/categories allows them to be classified depending on the mining method; generation system; encryption algorithm; emission parameter; price dynamics; purpose and type of creation. Understanding the essence of the classification of cryptocurrencies will allow them to be integrated into the financial system and legislative norms for the development of the digital asset market.

Аннотация

Природа криптовалюты состоит из технической и финансовой составляющей. Она обладает сложной структурой многоуровневой системой классификации, основанной на множестве механизмов с разными функциями. Определенные характерные признаки позволяют классифицировать криптовалюту в зависимости от цели создания, степени активности, вида, типа регулирования, инноваций, признания государством, типа создателя. Распределение криптовалют на классы/подвиды/разряды позволяет классифицировать их в зависимости от метода добычи; системы генерации; алгоритма шифрования; параметра эмиссии; динамики котировок; назначения и типа создания. Понимание сути классификация криптовалют позволит интегрировать их в финансовую систему и законодательные нормы для развития рынка цифровых активов.

Keywords: digital assets, tokenization, distributed registries, smart contracts, stocks, blockchain, cryptocurrency, USDT, BUSD, USDC, mining

Ключевые слова: цифровые активы, токенизация, распределенные реестры, смарт-контракты, акции, блокчейн, криптовалюта, USDT, BUSD, USDC, майнинг

The relevance of this work is due to the high importance of studying the problems of pricing in the cryptocurrency market, which have received their rapid development against the background of a combination of fairly soft monetary policy of key central banks during the coronavirus pandemic, active search for profitability by investors under sanctions restrictions, as well as the needs of individuals and legal entities in instant payments. After all, the purpose of creating cryptocurrencies, as a decentralized type of digital currency, using cryptography as security and control over the creation of new units, is to provide a convenient means of payment, potentially attractive from an investment position. As well as giving cryptocurrencies an anonymous character, allowing them to circumvent regulatory restrictions by eliminating intermediaries, which include banks and payment systems, and transferring the verification function of transactions to a distributed ledger system.

The classification criteria of cryptocurrencies are quite variable, but first you need to determine the classification levels that K.O. Korchagina suggests for consideration [1]:

- The 1st level of classification of types of cryptocurrencies is represented by a division into types depending on certain characteristic features;
- The 2nd level of classification of types of cryptocurrencies is represented by grouping or distributing cryptocurrencies of one type into classes, subspecies or categories.

Let's consider the classification of types of cryptocurrencies depending on certain characteristic features.

1. A.S. Abramov suggests distinguishing cryptocurrencies depending on the purpose of creation, highlighting [2]:

- targeted cryptocurrencies characterized by an implementation process related to the focus on the final result (the purpose of creation may be fraud, pursuit of

financial interest (investment cryptocurrencies), experimental goals (testing new technologies), etc.);

- non-targeted cryptocurrencies characterized by the creation process occurring as a result of a technical failure (an example is the creation of forks (clones) - offshoots from the original digital currencies with certain changes in functions).

2. N.V. Anokhin and A.I. Shmyreva classify cryptocurrencies depending on the degree of activity, highlighting [3]:

- active cryptocurrencies that have not reached the upper limit of the issue, acting as potentially promising types for investment (there is a demand for cryptocurrency);

- inactive cryptocurrencies characterized by reaching the upper limit of issuance, lack of support from developers or the community, which do not cause investment attractiveness on the exchange (there is no demand for cryptocurrency).

3. M.S. Bondarev classifies cryptocurrencies depending on the type, calling [4]:

- original cryptocurrencies, the creation process of which at the time of development is characterized by the use of original source code other than previously implemented cryptocurrencies;

- forks (clones), which are a type of cryptocurrency, the creation process of which is due to a technical failure or the use of existing source code of another cryptocurrency.

4. A.V. Voloshin and A.E. Guselnikova distinguish cryptocurrencies depending on the type of regulation, the central administrator, offering for consideration [5]:

- a centralized system characterized by the administrator's right to regulate and make changes to the issuance process in order to control cryptocurrencies (examples include cryptocurrencies USDT, BUSD, USDC);

- a decentralized system (distributed system) characterized by the absence of a central regulatory body or other body with a management mechanism (examples include cryptocurrencies Bitcoin and Ethereum).

5. E.N. Gavrilova and A.S. Demjanjuk supplement the classification with an innovation-dependent criterion [6]:

- innovative cryptocurrencies, the creation of which is based on previously unrealized technologies;

- non-innovative cryptocurrencies, the creation of which is based on the use of previously implemented technologies.

6. D.A. Durdyeva and A.A. Trapizonyan expanded the approach to classification by the criterion of recognition by the state, the presence of current legislation defining the status of a particular cryptocurrency, highlighting [7]:

- a regulated cryptocurrency, the status of which is determined and fixed by the regulatory legal acts of a particular state;

- an unregulated cryptocurrency, the status of which is not determined and is not fixed by the regulatory legal acts of a particular state.

7. I.A. Emelin divides the cryptocurrency depending on the type of creator who provided the development and implementation, highlighting [8]:

- an author's cryptocurrency that was created by a specific individual, organization, or government;

- an anonymous cryptocurrency, the authorship of which was not confirmed at the time of creation;

- a cryptocurrency that was created as a result of a technical failure, in other words, in the process of diverging the block chain.

The second direction of classification should be called the types of cryptocurrencies.

1. F.P. Kichedzhi and M.Z. Tsiperson distinguish cryptocurrencies depending on the mining method [9]:

1.1. Cryptocurrency can be mined through the use of a technical method (mining). The method consists in using the computing power of technology to maintain a distributed platform, as well as create new blocks for a fee. Mining can only be carried out in networks with the Proof-of-Work (PoW) algorithm. A large number of miners, acting independently of each other, take part in the creation of each new block. An alternative algorithm can be called Proof-of-Stake (PoS). It is characterized by the creation of a new block by one validator, which is randomly selected among all validators of the network, but taking into account the available amount of cryptocurrency. In this case, cryptocurrency mining is carried out by stacking. The following types of cryptocurrencies can be mentioned as examples: Bitcoin, Dogecoin, Monero.

Depending on the number of participants, you can select:

- independent mining, when the number of participants does not exceed one, its own equipment is used, and the profit goes to one miner;

- joint mining (mining with the help of pools – a common fund), when the number of participants is more than one, technical computing abilities are accumulated in a single system, and profits are distributed among all participants according to the contribution to the computing power of the pool;

- cloud mining, when the mining process is carried out by a third-party organization that provides its own computing power for leasing, but performs operations on behalf of the client.

Depending on the equipment used for mining, there are:

- mining carried out using GPU (graphics processing unit) - graphics processors;

- extraction carried out using the CPU (central processing unit) - the central processor;

- mining carried out using ASIC (application-specific integrated circuit) - specialized integrated circuits;

- extraction carried out using FPGA (field-programmable gate array).

1.2. Cryptocurrency is mined using the financial method through the use of classical financial instruments and purchase and sale transactions. Ethereum, Solana, Toncoin can serve as an example. The following methods are distinguished:

- an investment method that allows you to purchase cryptocurrency on exchanges using fiat money;
- a currency method that allows you to exchange cryptocurrency for other types of cryptocurrencies.

2. A.V. Kononov suggests classifying cryptocurrencies depending on the generation system, methods of protecting distributed systems from entering false information (creating fake transactions and blocks) [10]:

- POW is a generation system, the principle of which is the need for the requesting party to perform some computational actions that protect the distributed system from external attacks;
- POS is a generation system based on the principle of having a larger unit of account of the total number of cryptocurrencies;
- a hybrid system involving the use of several generation systems (mainly POW and POS) at the same time, as well as alternately;
- the use of other systems, examples of which may be Proof-of-Burn, Proof-of-Capacity, etc.

3. K.O. Korchagina considers it important to classify depending on the implemented encryption algorithm - methods of converting an array of data in the blockchain system, which may differ in mathematical properties and algorithmic features (examples are: bit depth, computational complexity, etc.). The choice of a specific hashing algorithm is determined by the specifics of the tasks set, which allows you to distinguish [11]:

- cryptocurrencies using the same type of encryption system implementing the same encryption algorithm (for example, SHA-2 or Scrypt);
- cryptocurrencies that use a mixed encryption system that implements two or more encryption algorithms at the same time.

4. M.E. Kosov suggests classifying cryptocurrencies depending on the emission parameter, distinguishing [12]:

4.1. Cryptocurrencies by volume of issue:

- with a limited issue, having a certain upper limit on the issue, limited by technological solutions (an example is Bitcoin);
- without limitation of emissions that do not have an upper limit of output by implemented technological solutions.

4.2. Cryptocurrencies by type of issue, depending

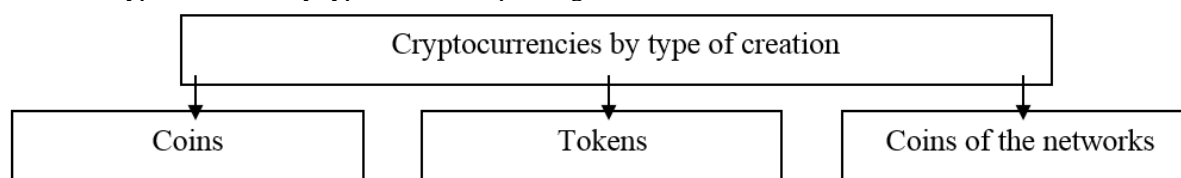


Figure 2 – Types of Cryptocurrencies

Source: developed by the author

Cohens work on the basis of their own blockchain, the main purpose is the ability to be a means of payment and serve as a substitute for the traditional financial system (examples may be Bitcoin (BTC), Litecoin (LTC), Monero (XMR), etc.).

Tokens are cryptocurrencies that operate on the basis of another blockchain, since they do not have their own. They are the largest group in terms of the number

on the speed of coin generation, highlighting:

- ordinary issue, the issue of which is determined by the efforts of the community generating the cryptocurrency, and does not depend on the administrative resource;

- accelerated (one-time) issue, when the type of issue that is used, for example, for ICO, is characterized by the generation of coins by a regulatory administrative resource.

5. M.A. Chistyakov classifies types of cryptocurrencies depending on the dynamics of quotations, highlighting [13]:

- stablecoins, which are cryptocurrencies whose value is linked to a specific fiat currency (dollar, euro, etc.) or a physical asset (gold, silver, etc.); an example would be the USDT stablecoin, linked to the US dollar;
- traditional cryptocurrencies, the value of which is not tied to anything, is determined by the characteristics of the project, volatility is not limited (an example is Bitcoin);
- new crypto projects – new tokens that have high volatility, can show rapid growth and decline in short time intervals (an example is the AxieInfinity game coin (AXS)).

6. K.D. Shilov additionally spills types of cryptocurrencies depending on the purpose [14]:

- replacing traditional currency in the digital world (for example, stablecoins that are linked to real money);
- payment and reward system (for example, project tokens that are created as currency in online games);
- calculations in the crypto world, representing the widest group of cryptocurrencies;
- others, among which you can distinguish meme currencies that have or do not have their own blockchain (for example, Dogecoin).

All the types of cryptocurrencies discussed above are the basis of the most popular classification, which was described in their work by M.R. Safiullin, L.A. Yelshin and A.A. Abdukaeva [15]. According to the authors' approach, cryptocurrencies are divided into three categories: tokens, coins and coins of networks (Figure 2).

of crypto assets, as they require less effort to create. They work on the Ethereum and BNB SmartChain networks; act as the right to own something. They distinguish:

- stablecoins (centralized (USDT, USDC, BUSD, TEUR), decentralized (DAI, MIM, LUSD), algorithmic (FEI, FRAX, UST), commodity (PAXG, XAUT));

- tokens of exchanges (centralized exchanges (BNB, LEO, OKB); decentralized exchanges (UNI, CAKE, CRV));
- application tokens are coins of gaming platforms, meta universes and other projects (AXS, SAND, GMT);
- tokens – do not have their own blockchain, they can be supported by different networks and blockchains.

Network coins powered by smart contracts are a small group of cryptocurrencies in which platform networks create coins to perform the function of internal payments. Examples of this group of crypto assets: represented by: ETH - coin of the Ethereum network; SOL - coin of the Solana network; BNB - coin of the BNB Smart Chain network; TRX - coin of the Tron network; DOT - coin of the Polkadot network, etc. [16]

In general, the classification of types of cryptocurrencies is presented in Table 2.

Table 2

Types of cryptocurrencies

Classification criteria	Types of cryptocurrencies
1. Depending on the purpose of creation	Targeted and Non-targeted cryptocurrencies
2. Depending on the degree of activity	Active and Inactive Cryptocurrencies
3. Depending on the type	Original cryptocurrencies and forks (clones)
4. Depending on the type of regulation	Centralized and Decentralized Cryptocurrencies
5. Depending on the innovation	Innovative and non-innovative cryptocurrencies
6. Depending on the recognition by the State	Regulated and Unregulated Cryptocurrencies
7. Depending on the type of creator who provided the development and implementation	An author's, anonymous, cryptocurrency created as a result of a technical failure
8. Depending on the extraction method	Through the use of mining (independent, collaborative, cloud), using the financial method (investment, currency)
9. Depending on the generation system, methods of protection of distributed systems	POW - generation system; POS - generation system; hybrid system; other
10. Depending on the implemented encryption algorithm	Cryptocurrencies using the same type and mixed encryption systems
11. Depending on the emission parameter	Cryptocurrencies by volume of issue (with and without limitation); by type of issue depending on the speed of coin generation (regular, accelerated)
12. Depending on the dynamics of quotations	Stablecoins, traditional and new crypto projects
13. Depending on the purpose	Replacing the traditional currency in the digital world; payment and reward system; settlements in the crypto world; other
14. Depending on the type of creation	Coins, tokens, coins of networks

Source: compiled by the author

Thus, it can be concluded that the nature of cryptocurrency consists of a technical and financial component. It has a complex multi-level classification system based on a variety of mechanisms with different functions. Certain characteristic features make it possible to classify cryptocurrencies depending on the purpose of creation, degree of activity, type, type of regulation, innovation, recognition by the state, type of creator. The distribution of cryptocurrencies into classes/subspecies/categories allows them to be classified depending on the mining method; generation system; encryption algorithm; the issue parameter; the dynamics of quotations; the purpose and type of creation. For integration into the financial system of the Russian Federation, there are prerequisites - classification parameters that meet the requirements of implementation in the Russian Federation - the presence of a goal, activity status, regulated by legislation with a centralized management system, if there is an officially registered author or developer. This tool is innovative, so its implementation will be accompanied by the development of the financial and technological industries, and the synergy of these areas will create prerequisites for the large-scale development of other industries.

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CORPORATE GOVERNANCE IN THE CHEMICAL INDUSTRY TAKEN INTO ACCOUNT OF THE DEVELOPMENT OF THE DIGITAL ECONOMY**Bibutova Shakhlo Sadullayevna***independent researcher of the Tashkent State University of Economics*[DOI: 10.5281/zenodo.10401922](https://doi.org/10.5281/zenodo.10401922)**КОРПОРАТИВНОЕ УПРАВЛЕНИЕ В ХИМИЧЕСКОЙ ОТРАСЛИ С УЧЁТОМ РАЗВИТИЯ ЦИФРОВОЙ ЭКОНОМИКИ****Бибутова Шахло Саъдуллаевна***независимый соискатель Ташкентского государственного экономического университета***Abstract**

The article examines the issue of corporate governance in the chemical industry, taking into account the development of the digital economy. As you know, the chemical industry is considered one of the important and highly profitable sectors of the economy, and, therefore, all the possibilities of digital corporate governance solutions in this industry have a special place in the economy. In addition, attracting investors and developing digitalization in the chemical industry helps improve the corporate governance system, which indicates the relevance of this topic.

Аннотация

В статье рассматривается вопрос о корпоративном управлении в химической отрасли с учётом развития цифровой экономики. Как известно, химическая отрасль считается одним из важных и высоко прибыльных сфер экономики, и, следовательно, все возможности цифровых решений корпоративного управления в данную отрасль имеет особое место в экономике. К тому же привлечение инвесторов и развитие цифровизации в химической отрасли способствует совершенствованию системы корпоративного управления, что является и говорит об актуальности данной тематики.

Keywords: digitalization, chemical industry, corporate governance, sustainable development, competitiveness.

Ключевые слова: цифровизация, химическая отрасль, корпоративное управление, устойчивое развитие, конкурентоспособность.

Introduction.

It is important to note that the development of the chemical industry plays an important role in improving the living conditions of people around the world. In 2021, the volume of chemical production in Uzbekistan increased by 6.1% due to the application of modern management approaches at chemical industry enterprises. Developed countries showed growth of 3.1%, and developing countries - by 7.2%.

Currently, improving the enterprise management system in the chemical industry and increasing competitiveness have become pressing issues. In the conditions of modern market relations, the active development of industrial sectors, the production of competitive products and the organization of a flexible management system capable of adapting to a changing environment are important. It is necessary to create corporate forms of management, change management methods and leadership styles, as well as introduce digitalization into the management system. It is important to use a management model that allows you to develop management decisions in a timely, fast and efficient manner in modern industrial structures. The new development strategy of Uzbekistan for the period from 2022 to 2026 highlights priorities including the development of the chemical industry, as well as increasing the volume of chemical production to 2 billion US dollars by increasing the level of natural gas processing from 8% to 20%. To effectively implement these priority tasks,

it is necessary to improve enterprise management systems.

Theoretical aspects of the research.

Corporate governance in the chemical industry, taking into account the development of the digital economy, has several theoretical aspects that are worth considering.

Digital transformation: The development of the digital economy provides the chemical industry with new opportunities to improve production processes, optimize management and increase efficiency. Digital transformation includes the adoption of new technologies such as the Internet of Things (IoT), artificial intelligence (AI), data analytics and process automation.

Innovation Management: The evolving digital economy requires companies in the chemical industry to proactively manage innovation. Corporate governance should help create a culture of innovation and encourage and support research and development of new products, processes and business models.

Risk management: In the digital economy, new types of risks arise related to cybersecurity, data protection and privacy. Corporate governance must pay particular attention to managing these risks and implementing appropriate safeguards.

Data management: The digital economy provides companies in the chemical industry with vast amounts of data. Corporate governance must include effective data management, collection, storage, analysis and use

for making management decisions and optimizing business processes.

Supply Chain Management: In the digital economy, there is integration and digitalization of supply chains. Corporate governance should pay attention to optimizing and automating procurement, logistics and inventory management processes using digital technologies.

Cybersecurity. With increasing dependence on digital technologies and interconnected systems, cybersecurity is becoming a critical aspect of corporate governance. Chemical companies need to implement strong cybersecurity measures to protect their sensitive data, intellectual property and operational infrastructure from cyber threats. This includes creating secure networks, implementing encryption protocols, conducting regular vulnerability assessments, and training employees on cybersecurity best practices.

Compliance and Regulatory Requirements. The digital economy brings new regulatory challenges and compliance requirements to the chemical industry. Corporate governance must place particular emphasis on understanding and complying with relevant laws, regulations and industry standards relating to data privacy, intellectual property rights, environmental protection and product safety. Compliance systems must be integrated into the corporate governance framework to ensure ethical and responsible behavior in the digital environment.

Talent management and professional development. The digital transformation of the chemical industry requires a skilled workforce capable of leveraging technological advances. Corporate governance must include talent management strategies that attract, develop and retain employees with digital competencies. This may include upskilling existing employees, developing a culture of continuous learning, and partnering with educational institutions or technology providers to address skills gaps.

Stakeholder involvement and transparency. In the digital age, stakeholders including customers, investors, regulators and communities have increased expectations of transparency and engagement. Corporate governance must include open communication, stakeholder dialogue and transparent reporting practices.

The use of digital communication channels and technology can facilitate effective stakeholder engagement and enhance trust in the chemical industry.

Ethical considerations. The digital economy raises ethical questions and challenges that need to be addressed within corporate governance. Chemical companies must develop ethical principles and codes of conduct governing the use of digital technologies, data analytics and artificial intelligence. Ethical considerations may include data privacy, algorithmic bias, responsible deployment of artificial intelligence, and the ethical implications of new technologies.

Cooperation and partnership. The digital economy encourages collaboration and partnerships between industry players, technology providers and research institutions. Corporate governance should promote a culture of collaboration and explore opportunities for strategic alliances, joint ventures and knowledge sharing. Collaborative initiatives can spur innovation, accelerate digital transformation, and more effectively address industry-wide challenges.

By incorporating these aspects into their corporate governance practices, chemical companies can navigate the complexities of the digital economy, unlock new opportunities and achieve sustainable growth while maintaining ethical standards and meeting stakeholder expectations.

Analysis and result.

To invest or not to invest in digitalization for the sake of growth and efficiency is now a rhetorical question for chemical industry players. Digital technologies have become an integral part of the value chain. As the global industry recovers from the impact of the pandemic, chemical industry players have increased investments in digitalizing their operations. As of 2022, digital transformation is the second most important capital issue for chemicals companies worldwide, according to the survey. Recent uncertainty caused by the pandemic and geopolitical issues has led to supply chain constraints and material and labor cost inflation, which is holding back chemical industry growth and profitability. They have also prompted chemical industry players to accelerate the digitalization of all functions, with more than 40% of chemical industry companies reporting the disruptive or disruptive impact of digitalization over the past three years.

Table 1

Status of digital projects in the chemical industries¹

Volume	2020	2022
0-25%	6	4
25-50%	16	10
50-75%	41	34
More than 75%	37	52

The chemical industry contributes nearly \$6 trillion to global gross domestic product and supports an estimated 120 million jobs worldwide. No one knows exactly how many chemicals are used in industrial and consumer products, but the number is likely in the hundreds of thousands. These diverse substances include

polymers and plastics, adhesives and coatings, specialty electronic materials, and flavors and fragrances. This pace of digitalization is expected to continue as more than 65% of chemical industry participants expect digitalization to impact their business in more disruptive or disruptive ways.

¹<https://cefic.org/app/uploads/2021/12/Economic-Analysis-of-the-Impacts-of-the-Chemicals-Strategy-for-Sustainability-Phase-1.pdf>

Table 2

The impact of digitalization on operational competitiveness in the next three years²

	Name	Percent
1.	Supply Chain Planning	68
2.	Sales and order management	67
3.	Purchase	67
4.	Customer service	65
5.	Production and quality management	65
6.	Logistics and distribution	65
7.	Sustainability Area 3	55
8.	Sustainability, area 1 and area 2	52

As the need for an online model for both business operations and customer interactions grows, chemical industry players have witnessed maximum progress in digitalization of administrative functions and customer interactions since 2020. Additionally, with technologies such as automated chemical synthesis and digital tools, 80% of chemical industry companies are expected to move towards this direction.

With recent geopolitical turmoil and fluctuating fuel prices, supply chain constraints have become a key challenge for the global chemicals industry. Given the volatility, it remains a key application area that benefits enormously from digitalization and that digitalization has greatly impacted their supply chain planning over the past three years, with more than two-thirds of survey respondents believing similar impacts will continue over the next three years. As the need for more sustainable supply chains grows, chemical industry players are seeing value in using digital tools to estimate demand, track raw materials to sources, real-time order tracking, automation in warehouses and ports for sorting and security, and optimizing supply networks.

As companies digitize their operations, the risk of cybercrime against the business becomes an inherent concern. As a result, digital or cybersecurity is one of the topics most widely adopted among chemical industry players, especially in the case of basic and petrochemical companies with their huge manufacturing plants.

A wide range of technologies improve the efficiency of chemical functions, from research and development through the value chain to customer service and support. In this dynamic environment, the preference and potential of any particular technology depends on the immediate needs and priorities of organizations. In 2020, chemical industry players' capabilities were heavily focused on improving and integrating data analytics (42%), while according to the 2022 survey, it was more widespread - falling to 35% for data analytics and increasing to 30 % for digital security (from 26% in 2020). However, despite this decline, improved data analytics (35%) and integration (30%) are among the areas of high potential for chemical industry players, followed by digital security (30%), as chemical industry players face increasing challenges, such as data theft and malware, which can not only compromise sensitive data but also stop operations.

At the dawn of Industry 4.0, cost reduction was

perceived as one of the key benefits of digitalization. However, chemical industry players have moved away from this and have benefited from digitalization not only through cost reduction, but also through electronic networks (53%) and customer centricity (51%) - a trait needed to develop a sustainable business in difficult times³.

As chemical industry players explore all the possibilities of digital solutions for their business, new challenges arise. The lack of qualified personnel was a key problem in 2020 for 47% of survey respondents; however, in the current survey, just over a third said it was a problem. Companies currently face challenges in creating a reliable technical infrastructure (40%), meeting investment needs (38%) and developing secure systems (38%).

Conclusion.

Overall, corporate governance in the chemical industry must be adapted to the demands of the digital economy. This includes the adoption of new technologies, risk management, legal compliance, talent development, transparency and ethical standards. Businesses that successfully integrate digital solutions and innovation into their operations can reap significant benefits and achieve sustainable growth in today's chemical industry.

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SYSTEMATIC REVIEW OF THEORETICAL APPROACHES TO ASSESS THE FINANCIAL CONDITION OF ENTERPRISES AND SIGNS OF ECONOMIC INSOLVENCY

Sharipova Zebo Bekmurodovna

*Kimyo Interantional University in Tashkent
Head of the "Management and Marketing" department.*

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Abstract

World financial crises have increased the number of bankruptcies in numerous countries and has resulted in a new area of research which responds to the need to predict this phenomenon, not only at the level of individual countries, but also at a global level, offering explanations of the common characteristics shared by the affected companies. Nevertheless, few studies focus on the prediction of bankruptcies globally. The aim of this paper is to conduct a literature review of corporate bankruptcy prediction models, on the basis of the existing international academic literature in the corresponding area. It primarily attempts to provide a comprehensive overview of literature related to corporate bankruptcy prediction, to investigate and address the link between the different authors (co-authorship), and to address the primary models and methods that are used and studied by authors of this area previously.

Keywords: bankruptcy, financial condition, economically insolvency.

Introduction

The deepening of the level of integration in the world economy in recent years has made it necessary to study more widely the factors affecting the financial condition of industrial enterprises, the organization and effective management of production in line with growing market demands. Nowadays, the rapid implementation of determining the financial condition of enterprises prevents them from becoming economically insolvent. This allows them to expand their activities using their own resources. It is almost impossible to increase the share of the real sector in GDP without improving the financial condition of enterprises. Software for assessing the financial condition of enterprises and identifying signs of economic insolvency provides practical assistance to financial managers of enterprises, their superiors in effectively monitoring the financial condition of enterprises.

Over the past 50 years, bankruptcy prediction has been a field of increasing interest to researchers all around the world. Many academic studies have been dedicated to exploring a corporate failure prediction model with the best accuracy. Since the breakthrough bankruptcy prediction model was introduced by Altman in 1968, a large body of research focuses on the prediction of corporate financial distress. In most cases, authors tend to use the ultimate failure (bankruptcy) as the dividing line when they distinguish the failed and non-failed firms. The exact definition of financial distress is not determined yet. From the perspective of theoretical analysis, financial distress has different degrees (Bruynseels & Willekens, 2012). Mild financial distress may be reflected as temporary cash flow difficulty, such as the concepts like insolvency, default and etc. The most serious one is called the business failure, or bankruptcy (Sun, Li, Huang & He, 2014). Business failure leads to the discontinuity of the firm's operation, and it has a significant effect on anyone who is related to the firm (creditors, stockholders, suppliers, among others). Consequently, the establishment of reliable business failure prediction models is of importance to

the current corporate firms (Zopounidis & Doumpos, 1999).

This study has been conducted based on research primarily using the database Scopus, considering the time frame from 1968 (the year when Altman published the Z-score model) to 2017. Twelve keywords (six primary and six secondary) were used to carry out the present literature review: Bankruptcy, Failure, Default, Distress, Early-warning, Insolvency, Score, Indicator, Ratio, Model, Prediction and Forecast. The outcome was a total of 36 combinations of keywords being used in this study so as to search the literature for framing the concept of bankruptcy prediction.

The main purpose of this study is to obtain a broader idea of the bankruptcy prediction concept, through identifying, critically evaluating and integrating findings of all relevant and high-quality studies using Scopus database. Furthermore, the trend of the development of bankruptcy prediction studies and the co-authorship among the main researchers in this area should be shown as well.

Other additional objectives are as follows:

- To observe the evolution of papers published during the years 1968-2017. (It should be noted that the year 2017 in this paper refers to a review done up to 31 December 2017)
- To identify the most frequently cited papers
- To identify the main journals in relation to the studied research field.
- To show the co-authorship among the main researchers in this area.
- To identify the most frequently used and studied models and methods in this area.

The literature review of bankruptcy prediction theories

In the literature, various authors define differently the failure of business in their studies. Dimitras, Zanakakis and Zopoudinis (1996) indicates that in the past and current investigations in business failure prediction area, scholars usually do their researches by studying some particular aspects or stages of business failure

process depending on their own experience or interests, without or with little reference to the theoretical framework. It causes that the literature of business failure is highly fragmented, as well as the ambiguity of the definition of business failure. According to Balcaen and Ooghe (2006), the criterion of failure is chosen arbitrarily in historical studies, whether a juridical definition of failure, namely bankruptcy (Altman, Marco & Varetto, 1994; Hillegeist, Zanakos & Zopoudinis, 2004; Wilson & Sharda, 1994; Fletcher & Goss, 1993; Lee, Han & Kwon, 1996), or a financial distress definition is used (Pan, 2012; Jones & Hensher, 2004; Sun & Li, 2008; Xiao, Yang, Pang & Dang, 2012).

The latter can also be described as failure-related events such as insolvency (Langford, Iyagba & Komba, 1993; Lepetit & Strobel, 2013; Jackson & Wood, 2013), default (Tserng, Chen, Huang, Lei & Tran, 2014; Peresetsky, Karminsky & Golovan, 2011), and etc. Meanwhile, Altman and Hotchikiss (2006) also comment that there are basically four genetic terms to describe those unsuccessful business enterprises which are failure, insolvency, default and bankruptcy.

According to the economic criteria, failure is interpreted by Altman and Hotchikiss (2006) as the realized rate of return on invested capital which is dramatically and continually lower than prevailing rates on equivalent investments taking risk into consideration. Insolvency takes place when the liabilities of a firm are greater than its assets. It makes a firm be incapable to meet its current obligations, sending a signal of a lack of liquidity (Altman & Hotchikiss, 2006). Default, literally occurs when a firm fails to fulfil an obligation, especially to pay a loan or appear in a low court. Using more corporate terms, default happens when the debtor violates a condition of an agreement with a creditor and can be the grounds for legal action. (Altman & Hotchikiss, 2006) Altman and Hotchikiss (2006) state that there are two types of bankruptcy. The first refers to the net worth position of an enterprise. The second type which is more observable refers to the firm's formal declaration in a federal district court, accompanied by a petition either to liquidate its assets or attempt a recovery program. While Ross, Westerfield and Jaffe (1999) concluded by summarizing the previous studies that there are three types of bankruptcy: legal bankruptcy, which literally means that the company goes to court for a declaration of bankruptcy; technical bankruptcy, which describes the situation that a company cannot fulfill the contract on schedule to repay principal and interest; and accounting-bankruptcy, which refers to the situation when a company is simply showing negative book net assets. Other authors investigate early warning signals which provides forecasting of bankruptcy risk of firms (Korol & Korodi, 2011). The word early warning was used originally in the military area, but now this concept is widely applied in some other fields such as: macroeconomics, business administration, environmental monitoring, and etc. Therefore, early warning of business failure is also an important term in the research field of bankruptcy prediction.

Since Altman published one of the most well-known bankruptcy prediction models in 1968, a multitude of bankruptcy prediction models have flooded the

literature (Gissel, 2007). It not only means the increasing number of papers published, but also the variety of the models used for business failure prediction. Thanks to the development of statistical techniques and information technology in recent years, more and more different predictive methods have been applied in order to establish a bankruptcy prediction model with a better accuracy. Altman's model in 1968 is a five-factor multivariate discriminant analysis model. According to Gissel (2007), the primary methods that have been used for model development are multivariate discriminant analysis (MDA), logit analysis, probit analysis, and neural networks. Especially from the 1990's, due to the fact that scholars are becoming more interested in artificial intelligence technology, neural network has become one of the most widely used promising tools. Applying this method, studies carried out by Tam and Kiang (1992), Altman et al. (1994), Wilson and Sharda (1994), Fletcher and Goss (1993), Lee et al. (1996) have had great influence on later research related to business failure prediction. Furthermore, Pan (2012) intended to optimise General Regression Neural Network model applying algorithm and obtained a good convergence results which indicates the good prediction capability of the model.

At the same time, there are also other methods based on machine learning and artificial intelligence adopted by many authors in bankruptcy prediction area, such as rough set (Beynon & Peel, 2001; McKee, 2003; Xiao et al., 2012; Wang & Wu, 2017), case-based reasoning (Li & Sun, 2009; Li & Sun, 2011), support vector machine (Lin, Yeh & Lee, 2011; Li & Sun, 2012; Kim, 2011; Chandra, Ravi & Ravisankar, 2010) and so on. Rough set theory has been applied to a wide variety of financial decision analysis problems and it was created originally for dealing with the problem of apparent in discernibility between objects in a set. It has had a reported bankruptcy accuracy ranging from 76% to 88%. Case-based reasoning, as an effective and easily understandable method for solving real-world problems, has become a vital methodology in the current business failure prediction area due to its simplicity, competitive performance with modern methods, and ease of pattern maintenance (Lin et al., 2011). Support vector machine, arose from the area of statistical learning theory and was applied into business failure prediction for the first time in 2005 (Shin, Lee & Kim, 2005; Min & Lee, 2005), and proved to be superior to the performance of artificial neural network. (Kim, 2011). Since there is an increasing number of papers published related to business failure prediction from year 2000 and some other authors shed light on carrying out overviews or comparison of the business failure prediction models. Hillegeist et al. (2004) compare two accounting-based models, Altman's (1968) Z-score and Ohlson's (1980) O-score, with a market-based model developed by themselves based on Black-Scholes-Merton optionpricing model, showing that the latter can provide significantly more information than the former two. Balcaen and Ooghe (2006) undertake an overview of classic statistical methodologies in the recent 35 years, in order to understand their features as well as their related problems.

This monumental research task has generated a wide variety of models, supported in turn by very diverse methodologies. One of the paths initially taken by the literature was the development of models that had been built from a sample of companies belonging to several sectors and which, therefore, could be considered as off-center models (Casey and Bartczak, 1985; Odom and Sharda, 1990; Altman et al., 1994; Wilson and Sharda, 1994). The development of these off-center models has been important throughout time, predominantly those built using samples of medium and large companies from different sectors (Charalambous, Chatitou and Kaourou, 2000; Chen, Härdle and Moros, 2011; Sangjae and Wu, 2013). The literature on bankruptcy prediction also highlights the development of models based on samples of companies belonging to specific sectors of activity, which have been called centered models. The most popular of the centered models is the one used for credit institutions (Santomero and Vinso, 1977; Martindel- Brio and Serrano-Cinca, 1995; Alam et al., 2000). Another of the most popular centered models has been used for industrial companies (Altman, 1968; Diamond, 1976; Appetiti, 1984; Zavgren, 1985; Grover, 2003). Recently, models have also been developed focusing on companies from other sectors, such as Internet companies (Wang, 2004), hospitality companies (Park and Hancer, 2012; Fernández, Cisneros and Callejón, 2016), agricultural companies (Mateos-Ronco et al., 2011), construction companies (Gill de Albornoz and Giner, 2013), and commercial and service companies (Keener, 2013).

Over the past two decades, research on financial stress and solvency risk has begun to allow for more precise analysis thanks to the emergence and further development of artificial neural networks, machine learning, and artificial intelligence. In particular, Odom and Sharda for the first time used the Artificial Neural Network (ANN) methodology to predict the bankruptcy of American companies using the same financial indicators as in Altman's research. Their results showed a higher accuracy compared to the Multiple Linear Discriminant Model (MDA). Over time, many studies have confirmed that ANN methods are effective methods for identifying financial distress and bankruptcy risk from logistic regression and MDA.

Financial statement analysis is an integral and important part of the broader field of business analysis, and business analysis is the process of evaluating a company's economic prospects and risks. It includes analysis of the company's business environment, its strategies, financial position and performance. Business analysis is useful for a wide range of business decisions, such as whether to invest in stocks or debt securities, whether to lend through short-term or long-term loans, how to value a business in an initial public offering (IPO), and how to evaluate restructuring, including mergers, acquisitions acquisition and allocation.

Financial statement analysis is the application of analytical tools and techniques to general purpose financial statements and related data to derive ratios and conclusions useful in business analysis. Financial state-

ment analysis reduces reliance on guesswork and intuition when making business decisions. As a result, it reduces the uncertainty of business analysis. However, this does not reduce the need for expert opinion, but instead creates a systematic and effective basis for business analysis. Proper analysis and interpretation of data is critical to good business analysis. This is the role of financial statement analysis. Through it, the analyst better understands and interprets both qualitative and quantitative financial data, so that reliable conclusions can be drawn about the company's prospects and risks.

A detailed analysis of the literature on bankruptcy prediction allows us to observe the existence of a definite pattern regarding the building of off-center models as opposed to centered models, with the former being much more numerous than the latter. However, it is not possible to draw a definite conclusion on the superiority of one type of model over another (Bellovary, Giacomo and Akers, 2007). The absence of a practical conclusion on the superiority of a centered model over an off-center model may be due to the fact that one type of model and another could not be compared homogeneously due to the disparity of methodologies, approaches, available databases, time periods and countries, among other issues. Therefore, the existence of this gap in the literature, which does not make it possible to elucidate the superiority of off-center models over centered models, is an important research issue that this work seeks to solve. To this end, this work has selected different samples of Spanish companies that were and were not in bankruptcy in the 2010-2015 period.

As can be seen from the preceding section, the prediction of business insolvency is an area which has been extensively studied over time, although the majority of existing studies are characterised by their reference to a specific industry or a determined country, with very few global studies; that is, those using companies from different countries as a reference.

Among the studies that are global there are, in turn, different focuses, and not all of them focus exclusively on the concept of bankruptcy. The objective of a large part of these studies has been to check the effectiveness of the different prediction models. Thus, (Pindado et al., 2008) developed a model to estimate the probability of financial difficulties using technical panel data. This study used the data from a sample of firms from the G-7 countries to obtain an indicator of the probability of financial difficulties that includes the specific nature of each firm. (Chen et al. 2011), used a sample of Polish and Australian firms, proposing a bankruptcy prediction model based on the diffuse adaptation method of k-nearest neighbour. Their results confirmed that the proposed model allows the identification of the most significant financial ratios.

The proposed model managed to correctly predict 92.5% and 92.1% of the training and testing samples, respectively, using financial information from the two-year period prior to bankruptcy. Their conclusions suggest that European industrial firms that are less capitalised, that fail to generate sufficient resources to meet their short-term financial debt, that have low profitability and that are small in size have been most likely to

suffer bankruptcy in the current financial crisis. (Tsai et al 2014), with firms from Australia, Germany and Japan, performed a comparative study of the effectiveness of different classifiers, such as MLP, SVM and DT, on the basis of well-known combination methods such as voting, bagging and boosting. The results show that DT combined with boosting is the technique that offers the greatest accuracy. (Liang et al 2015) used a sample of Taiwanese and Chinese firms and researched the effect of the selection of the prediction models' variables using different classification techniques such as MDA, t-test, Logit, genetic algorithms and particle swarm optimisation. The results demonstrated that no single best methodological combination exists. (Ferreira et al 2016) used hazard models in order to ascertain which factors determine a greater probability of financial distress for small and medium sized firms in Europe, and suggest that the location and number of shareholders are important indicators. Other international studies have focused on studying the financial difficulties of banks in different countries. For example, (Chauhan et al 2009) apply NN to a sample of US, Turkish and Spanish banks, using the data management group method. (Maghyreh et al 2014) and (Betz et al 2014) apply Logit for banks in countries of the Gulf Cooperation Council and Europe, respectively.

Lastly, only two studies have had as their objective the comparison of models created for specific regions of the world (Korol T 2013). The paper focused on studying industrial firms in financial difficulties in the United States, Europe and Asia (Laitinen et al 2000). To do this they used Logit and corresponding data one year before the situation of financial difficulty of the companies. Their conclusions indicate that regional models are superior to global models and that the differences between the regional models constructed are related to factors such as imports and exports between the countries, labour conditions and the macroeconomic setting. The study by Korol (2013) uses companies in the legal position of bankruptcy and compares the effectiveness of different prediction models between two regions, namely Latin-America (Mexico, Argentina, Brazil, Chile and Peru) and Central Europe (Poland). He builds a bankruptcy risk model with a time horizon of two years, using MDA, DT and NN, and a set of 14 financial ratios as possible predictive variables. He reached the conclusion that type I errors are greater in the Latin- American firms than the European firms, and that DT is the model which is most effective in both samples.

The above research also has other shortcomings. Firstly, global bankruptcy prediction models barely exist. The aforementioned study by Korol (2013) compares the predictive power of different techniques in two regions, but does not construct a global model capable of predicting in the different regions of the world. Similarly, the study by Platt (2008), although it tests the accuracy of a global model in different regions, does so from a wider perspective of financial distress that covers companies in financial difficulties but fails to focus on bankrupt companies. And secondly, there is a need for a precise evaluation of global models using procedures that value not only the adjustment of the

model but also its complexity. The bankruptcy prediction models for Asia mainly consist of three variables: Earnings/ Total assets, Retained earnings/Total assets and Total debt/Total assets. As such, they select as the best bankruptcy predictors the variables that refer to profitability and debt. In the case of the models for Europe, the significant variables turned out to be Earnings/ Total assets, Current assets/Current liabilities, EBIT/Total assets, Total debt/ Total assets and Current assets/Total assets. Hence, the aspects of profitability, debt and liquidity turned out to be more important when predicting bankruptcy in European firms.

For the models constructed with American companies, the significant variables refer to liquidity, profitability, efficiency and debt. More specifically, the following variables were chosen: Working capital/Total assets, EBIT/Total assets, Sales/Total assets, and Total debt/ Total assets.

The global models are formed by the variables Current assets/Current liabilities, Working capital/Total assets, EBIT/Total assets, Sales/Total assets, Total debt/ Total assets, and Current assets/Total assets. These global models also cover aspects of liquidity, profitability, efficiency and debt, but the set of variables for t-1, t-2, and t-3 do not coincide with any of the regional models.

All of the models constructed attain a high percentage of accuracy (greater than 80%). Moreover, both the Omnibus test and the Hosmer and Lemeshow test, and the R2 indicate that the goodness-of-fit of the estimate of these is acceptable. The area beneath the ROC curve (in all cases very close to 1) confirms that the four models correctly classify bankrupt firms and non-bankrupt firms.

In all of the models, were selected number of criterias: Working capital/Total assets, EBIT/Total assets, Current assets/ Total assets, and Region. As such, in addition to the geographical location, the aspects of liquidity and profitability are also represented.

Conclusions and Implications

The recent Our evidence helps to explain that the globalisation process extends from the financial characteristics of firms to the factors that cause bankruptcy. These conclusions may be important when minimising the cost of constructing bankruptcy prediction models, given the existence of explanatory financial variables which are common to the most important regions in the world. In addition, and due to the power of generalisation demonstrated by the global model, we emphasise the need for multinational firms to manage their own bankruptcy prediction models, applying them to clients, suppliers and the firms in which they have holdings. Lastly, the existence of a global model for bankruptcy prediction can also meet the requirements of International Standards on Auditing with respect to the going concern principle, which proposes the use of feasibility models for firms in order to support auditors' opinions in the context of risk assessment.

Like all research, this study has some limitations, mainly the availability of firms data in emerging countries. Given that it is research undertaken from a global perspective, it requires a much greater scope of information in comparison to other studies performed in this

field. In addition, future research could set an approach to investigate which macro conditions affect the behavior of the financial variables that have proved as good predictors bankruptcy in this paper. Finally, to increase the generalizability of the results, data from other firms (i.e., small and medium-sized enterprises) should be included.

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HISTORICAL SCIENCES

OTTOMAN EMPIRE: THE IDEOLOGY OF THE OPPOSITION CONSTITUTIONAL MOVEMENT (60s OF THE 19TH CENTURY)

Safrastyan Ruben

*Prof. Dr., Counselor of Director, Institute of Oriental Studies,
National Academy of Sciences of the Republic of Armenia,
24/4 Marshal Baghramyan Ave., 375019,
Yerevan, Armenia*

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OSMANISCHES REICH: DIE IDEOLOGIE DER OPPOSITIONELLEN VERFASSUNGSBEWEGUNG (60er JAHRE DES 19. JAHRHUNDERTS)

Safrastyan Ruben

*Prof. Dr., Direktor des Instituts für Orientalistik,
Nationale Akademie der Wissenschaften der Republik Armenien,
24/4 Marschall Baghramyan Ave., 375019,
Eriwan, Armenien*

Abstract

The article examines the main provisions of the ideology of the first Turkish constitutionalists. Particular attention is paid to analyzing the views of their leader, the famous publicist and poet Namik Kemal.

Zusammenfassung

Der Artikel untersucht die wichtigsten Bestimmungen der Ideologie der ersten türkischen Konstitutionalisten. Besonderes Augenmerk wird auf die Analyse der Ansichten ihres Anführers, des berühmten Publizisten und Dichters Namik Kemal, gelegt.

Keywords: The opposition constitutional movement, "New Ottomans", Christians, Muslims, Tanzimat

Stichwörter: Die oppositionelle Verfassungsbewegung, "Neuen Osmanen", Christen, Muslime, Tanzimat

Die oppositionelle Verfassungsbewegung ergab sich aus der geheimen Gruppe der "Neuen Osmanen", die im Jahre 1865 in Konstantinopel gegründet wurde. Am Anfang ihrer Tätigkeit waren seine Mitglieder unter dem Einfluss der extrem anti-christlichen und radikal muslimischen Ideen von Scheich Ahmet, der die anti-Tanzimatische Verschwörung leitete, die als "Kuleli Ereignis" bekannt war. Die Führer der "Neuen Osmanen" schätzten die Handlungen der Verschwörer hoch ein. Namik Kemals Ideologe (1842-1888) bemerkte in der "Hürriyet" Zeitung (von ihm veröffentlicht), dass Ahmet und seine Freunde "den Staat zu retten" versuchten [1].

Offensichtlich beeinflusste dies die Herankommensweise der Verfassungsrechtler über die nationale Frage, die in den ersten Jahren ihrer Tätigkeit formuliert wurde. Sie sahen die nationale Frage als rein religiös. Der ganze komplizierte Komplex der politischen Probleme, die sich aus der extremen Großmachtpolitik des Reiches gegenüber den christlichen Nationen ergaben, wurden von ihnen als ein Konflikt zwischen Islam und Christentum charakterisiert.

Basierend auf die Ideen von Scheich Ahmed vermuteten die "Neuen Osmanen", dass angeblich die Rechte der Muslime in Folge der Tanzimatreformen beschränkt wurden, während die Christen unheimlich große Privilegien bekamen. Sie bezeichneten die Hatt-i Hümayun von 1856, die den Beginn der zweiten Phase

der Tanzimat bekannt machte, als "Firman auf Privilegien" [2]. Sie schrieben, dass in der Epoche des Tanzimats das Ziel der Politik der Hohen Pforte auf die "Erfüllung der Befriedigung der Christen" gerichtet war, weshalb die Muslime angeblich in der Position einer "verfolgten Gemeinschaft" erschienen [3]. Aus diesem Grund erklärten sich die Neuen Osmanen, nach der "Muhbir" Zeitschrift, die auch zu den "Neuen Osmanen" gehörten, als Verteidiger der Rechte der "gedemütigten" Muslime des Reiches zu sein [4].

Die "Neuen Osmanen" verstanden die Kernziele der Politik der Tanzimat Führer zu den christlichen Untertanen nicht, sie erkannten die Tatsache nicht, dass diese Politik die Integrität des Reiches mit neuen, flexiblen Mitteln erhalten sollte. Sie hielten Ali Pascha und Fuat Pascha für "Verräter", da sie, wie der Redakteur der "Hürriyet" Namik Kemal schrieb, im Jahre 1856 den "berühmten Firman auf Privilegien" veröffentlichten, der den Christen "zu Paschas, zu namhaften und ehrenwerten Menschen machte" [3].

In diesen Jahren wurde die Haltung der "Neuen Osmanen" in Richtung der christlichen Bürger durch extreme Intoleranz gekennzeichnet. Der preußische Diplomat A. Mordtmann, der einige von ihnen genau kannte, schrieb später, dass die Mitglieder dieser Organisation außer der Entfernung von Ali Pascha und der Abschaffung der Neuheiten nach dem europäischen Modell, die in der Tanzimat Periode verwirklicht

wurden, "eine unverhüllte Unterdrückung der christlichen Untertanen des Sultans organisierten" [5, 66]. Insbesondere qualifizierten sie die Zwangsannahme der Satzungen der armenisch-apostolischen und der griechisch-orthodoxen Millets von der Hohen Pforte, als schädliche Innovation. Wie bekannt war, hatte die Annahme dieser Konstitutionen eine gewisse positive Wirkung auf den Zustand der unterworfenen Nationen, aktivierte ihr Sozialleben und schritt ihr politisches und nationalistisches Bewusstsein fort. Das war das, warum die "Neuen Osmanen" die Maßnahmen der türkischen Regierung verurteilten. Später sprach Namik Kemal aus dem gleichen Grund gegen Ali Paschas Erlaubnis auf die Trennung der Bulgaren von der griechischen Kirche [6, 150].

Die feindselige Haltung gegenüber der nationalen Befreiungsbewegung der christlichen Völker war schon immer für die Führer der "Neuen Osmanen" charakteristisch. Am Anfang der Bewegung nahm sie eine äußerst verschärfte Form an. Zu dieser Zeit begannen ihre öffentlichen Aktivitäten des Namik Kemal und seine Freunde als Politiker nicht so erfahren, um ihre wahren Absichten zu verschleiern. Außerdem waren sie, wie oben schon erwähnt wurde, unter dem Einfluss der Ideen von Scheich Ahmet.

Die damaligen Ansichten der "Neuen Osmanen" zeigten sich in komprimierter Form gegenüber der nationalen Befreiungsbewegung der Christen in der Position, die sie im Jahre 1866-1869 gegenüber dem nationalen Befreiungskampf der Griechen aus der Insel Kreta annahmen.

Auf den Seiten der Presse der "Neuen Osmanen" wurde viel Platz für die Kreta Frage gegeben. In den Publikationen wurde die Idee vorgebracht, dass die Unterdrückung der Revolte von großer Bedeutung für die Zukunft des Osmanischen Reiches wäre. Die "Muhbir" bemerkte sogar, dass die "Unabhängigkeit des Osmanischen Reiches" davon abhinge [7]. Sowohl die "Muhbir" als auch die "Tasfir-i Efkâr" (bearbeitet von Namik Kemal) kritisierten streng, ihrer Meinung nach, die übermäßig "weiche" Haltung der Hohen Pforte zu den Rebellen. Ali Paschas Politik über die Kreta Frage qualifizierten sie als "pro-christlich", und bezeichneten ihn als Verräter. Ihre Haltung diente als Hintergrund für das satirische Gedicht "Zafer-Name", geschrieben vom renommierten Dichter und berühmten Figur der Bewegung der "Neuen Osmanen", Ziya Pascha (1825 bis 1880). Hier kritisierte und verspottete er Alis Politik der "Zugeständnisse" gegenüber den Kreter Rebellen [8].

Namik Kemal schlug in der "Tasfir-i Efkâr" vor, das "Prinzip der gewalttätigen Kraft" für die Politik der Zugeständnisse zu ersetzen und alle Christen, die auf der Insel leben, zu vertilgen. Nach seiner Meinung war das der einzige Weg um den "Frieden" auf Kreta wiederherzustellen. Er schloss selbst die kleinste Möglichkeit der Zugeständnisse an Christen aus [9]. Eine intensive anti-griechische Kampagne wurde von der "Tasfir-i Efkâr" in Zusammenhang mit der Krise in Kreta ins Leben gerufen. Die Griechen, die in der Hauptstadt lebten, wurden von ihm für "das Singen der anti-türkischen Lieder, um andere Christen gegen der

"Millet des Islams" anzustiften, verantwortlich gemacht [6,59]. Namik Kemal forderte die Regierung auf, Strafmaßnahmen gegen die osmanischen Griechen zu unternehmen, und sie aus dem Land zu verbannen [6,62]. Die "Muhbir" veröffentlichte Materialien zur Unterstützung der Muslime in Kreta [10].

Unter den Oppositionellen platzte ein Sturm der Wut aus, als die Hohe Pforte zwangsläufig die Zitadelle von Belgrad an Serbien übergab, und die Unabhängigkeit von Montenegro anerkannte. Ali Suavi schrieb in der "Muhbir": "Unsere Vorfahren vergossen Blut, um jeden Zentimeter dieses Landes zu erobern, während wir, ihren anrühigen Söhnen, Schritt für Schritt alles zurückgeben".

Diese politischen Zwangszugeständnisse von der Hohen Pforte, dessen Gründe, die allgemeine Schwächung des Reiches und der Niedergang der militärischen Macht waren, wurden von den "Neuen Osmanen", wie Zugeständnisse an "Ungläubigen" wahrgenommen, als Anerkennung der Schwäche der Muslime vor Christen. Sie strebten den kriegerischen Geist der Muslime mit militärischen Aufrufen gegen die christliche Welt durch die Veröffentlichung literarisch-publizistischen Arbeiten, zu wecken. Namik Kemal schrieb in seiner populären publizistischen Arbeit "Traum": "Unser Prophet diene der Welt mit seinem Dolch. Auch wir müssen diesen Weg gehen ... Wir wollen versuchen zu beweisen, dass wir zur osmanischen Nation gehören, die die ganze Welt vor ihr vor Angst zum Zittern zwingt ... Lassen Sie uns Giaurs unsere Macht zeigen, um den Propheten dieses Vergnügens zu bereiten" [9, 42].

Früher klangen solche Themen in den Werken von Ibrahim Schinasi. Er verherrlichte den kriegerischen Geist der "echten Türken", ihre Siege über Giaurs [11, 17]. Er gründete die erste militärische Zeitung, die "Cerride-i Askerie" in der türkischen Geschichte. In seinen Artikeln lobte er die osmanischen Türken, die militärischsten Menschen der Welt, in der jeder Vertreter von ihm ein Krieger und Sohn eines Kriegers ist [11, 32-33].

Ganz am Anfang ihrer Tätigkeit handelten die "Neue Osmanen" durch die Verfassungsverkündung für die Lösung des nationalen Problems. Übrigens wurde vermutet, dass die Einheit der multikonfessionellen und multiethnischen Bevölkerung des Reiches somit zu gewährleisten möglich wäre. Halil Scherif Pascha, ein hochgeborener Ägypter, der sich an die "Neue Osmanen" anschloss, entwarf ein Flugblatt, das behauptete, dass "die Verfassung die Autorität des muslimischen Staates wiederherstellen wird ... mit Ende der politischen und sozialen Unterschiede zwischen Muslimen und Nicht-Muslimen" [12, 65]. Wie die zitierte Stelle beweist, wird das muslimische Bild des Staates nicht nur unverändert bleiben, sondern auch durch die Verfassungsverkündung seine Autorität noch weiter verstärken.

Neben Halil Scherif Pascha, nahm ein weiterer prominenter Aristokrat aus Ägypten, Mustafa Fazil Pascha, der Bruder des ägyptischen Khediven Ismail Pascha, in der Bewegung der "Neuen Osmanen" teil. Am Anfang des Jahres 1867 wurde sein offener Brief an Abdul Aziz in den europäischen Zeitungen gedruckt

[13, 68-78]. Seine Analyse enthüllte folgende Wahrnehmung des Autors: "Die glorreichen Zeiten", wenn "die Gründer des Reiches", die Türken und ihre unterworfenen Völker in Harmonie lebten, blieben in der Vergangenheit. Jetzt zeigen die christlichen Nationen Ungehorsam, rebellieren gegen den Sultan. Der Grund ist, außer den Provokationen der europäischen Staatsmacht, die schlechte Regierungsführung der osmanischen Herrscher. Sowohl Muslime als auch die Christen sind wütend. Dennoch ist die Situation der Muslime deutlich schlechter, da sie nicht so viele Privilegien genießen, und nicht so viele Verteidiger wie die Christen haben. Um den Staat vor dem Untergang zu retten, schlägt der Autor vor, ein respektables, "freies und gerechtes" System zu schaffen, das ein Ende der Unterdrückung setzen würde, alle Erwartungen der Untertanen, unabhängig von ihrer Religionszugehörigkeit erfüllen würde, und die ehemalige Harmonie zwischen ihnen wiederherstellen würde [13, 70-72].

Insgesamt ist der Unterschied zwischen den Ansätzen von Mustafa Fazil Pascha und von den anderen "Neuen Osmanen" nicht groß. Mustafa Fazil Pascha, genau wie sie, betonte die intensivere Unterdrückung der Muslime gegenüber Christen, schlug vor, alle Privilegien, die sie angeblich genossen, zu vernichten. Zur gleichen Zeit machte er auf folgenden Umstand aufmerksam, dass im offenen Brief nichts über die Beibehaltung der Scharia als Grundlage der staatlichen Ordnung des Osmanischen Reiches erwähnt wurde. Umgekehrt machte er geltend, dass die Religion nicht die politische Grundlage für einen Staat sein sollte. Diese Idee widersprach völlig dem Hauptbegriff der "Neuen Osmanen": "Wenn unser Staat (d.h. das Osmanische Reich - R.S.) mächtig sein möchte, so soll sie die Scharia folgen, und weiterhin, als islamischer Staat bleiben" [14].

Das Konzept des Patriotismus, das von Mustafa Fazil Pascha vorgeschoben wurde, war mehr verweltlicht, es basierte eher auf nationalistische Stimmungen, als auf religiöse. Er schrieb öfters über die "Gefühle der Erhabenheit, die typisch für die türkische Rasse" und nicht für die nicht Muslime im Allgemeinen sind. Fazil Pascha unterschied sich von den anderen Führern der "Neuen Osmanen", die am Anfang ihrer Tätigkeit im Namen der gesamten muslimischen Millet, und nicht nur im Namen des türkischen Volkes, sprachen.

In der Tat hatten die "Neuen Osmanen" am Anfang ihrer Tätigkeit in der embryonalen Form zwei Interpretationen des türkischen Nationalismus formuliert: Einer von ihnen legte mehr Wert auf den Islam, als ihre Grundlage, während die Basis für die anderen die Idee der Nation war, obwohl die endgültige Begründung fehlte.

In diesen Jahren wurden die Ansichten der "Neuen Osmanen" am umfassendsten in Namik Kemals offenen Brief an den Herausgeber der Pro-Regierungszeitung "Gazette du Levante", ausgestellt in Konstantinopel, angegeben [6, 183 -187, 290-291]. In der Tat kennzeichnete es die grundlegenden Bestimmungen des Programms der "Neuen Osmanen".

Im Brief war die ganze Aufmerksamkeit auf die national-konfessionelle Frage gerichtet, die hauptsächlich als konfessionelles Problem betrachtet wurde. Der Autor sprach im Namen der Muslime, die, wie er es ausdrückte, "die vorherrschende Millet des Reiches" waren. Schon übliche Argumente der "Neuen Osmanen" wurden in Bezug auf angeblich privilegierten Status der Christen gebracht. Obwohl Kemal zugeben musste, dass den Nicht-Muslimen "bestimmte Rechte" genommen wurden, die, seiner Meinung nach, durch den Schutz der Großmächte kompensiert wurden, durch Entlassung aus dem Militärdienst. Bei den Ideologen der "Neuen Osmanen" löste der Wunsch der Christen, in Staatsführung teilzunehmen, speziellen Wut aus. In Anerkennung der Notwendigkeit von Reformen forderte Namik Kemal auf, sie sowohl bei den Muslimen als auch bei den Nicht-Muslimen umzusetzen, anstatt sich auf eine bestimmte Millet zu konzentrieren, wie die Regierung dies zuvor getan hatte, die eine pro-christliche Politik führte.

In dem Brief wurde zum ersten Mal das oberste Ziel der "Neuen Osmanen" bei der Lösung der nationalen Frage eindeutig erklärt. Namik Kemal schrieb: "Jetzt über den wichtigsten Aspekt der Frage. Die "Gazette du Levante" schreibt über die Notwendigkeit der Zusammenführung aller Völker unseres Reiches. Wir erkennen diese Notwendigkeit!" [6, 186].

Obwohl die "Neuen Osmanen" die nationale Politik der Führer von Tanzimat, Ali Pascha und Fuat Pascha, heftig kritisierten, stimmten sie jedoch mit seinem Hauptziel zu, die Notwendigkeit der Zusammenführung der Völker des Reiches herbei zu führen. Der Brief sagte nichts über die Mittel, um dieses Ziel zu erreichen, er bemerkte nur, dass es keine Möglichkeit für die Christen gestattet, in das Regierungssystem des Staates einzutreten.

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JURISPRUDENCE

THE MECHANISM OF VICTIM RECOGNITION IN GEORGIAN CRIMINAL PROCEEDINGS AND ITS COMPLIANCE WITH INTERNATIONAL STANDARDS

Khatia Tandilashvili

Visiting Professor,

Grigol Robakidze University

Tbilisi, 3 Irina Enukidze, 0159

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Abstract

Today, at the international level, significant attention is paid to crime victims' rights. Since the 20th century, various international and European organizations, such as the United Nations, the Council of Europe, and the European Union, have adopted a number of international instruments. All of them stipulate that victims should have access to the criminal justice system without any barriers. The precondition for accessing criminal proceedings is to be recognized as a victim. This paper will first analyze international and European standards regarding victims' recognition, then examine Georgian legislation and practice, and finally, conclude whether the Georgian legislation and practice comply with international and European standards.

Keywords: crime victims, recognition as a victim, criminal proceedings, international and European standards, Georgian legislation and practice.

Introduction

One of the core victim needs is to have access to justice. This need is reflected in all international legal instruments addressing victims' rights. Article 4 of The Declaration of Basic Principles of Justice for Victims of Crime and Abuse of Power sets forth that victims should be 'entitled to access to the mechanisms of justice and to prompt redress [...]' [1]; Recital 9 of the EU Directive of 2012 on Establishing Minimum Standards on the Rights, Support and Protection of Victims of Crime, and Replacing Council Framework Decision 2001/220/JHA (the EU directive) emphasizes that sufficient access to justice should be provided to protect them from secondary and repeat victimisation, from intimidation and from retaliation [2]. Article 3 (1) of the Recommendation CM/Rec(2023)2 of the Committee of Ministers to member States on Rights, Services and Support for Victims of Crime (the 2023 recommendation) encourages member states to investigate barriers preventing victims' access to the criminal justice system [3].

Being recognized as a victim is a prerequisite for accessing justice and serves as the foundation for all other rights. It represents the fundamental token of treating victims with respect and dignity. Consequently, in the context of criminal procedures, a victimized person should be acknowledged as a person with its rights and standing in the criminal proceedings [4, p. 80]. This approach is laid down in all international and European legal instruments related to victims' rights. Therefore, this paper will first analyze international and European standards regarding crime victims' recognition, then examine Georgian legislation and practice, and finally, conclude whether the Georgian legislation

and practice comply with international and European standards.

International and European standards

In 1985, the Council of Europe adopted the Recommendation on the Position of the Victim in the Framework of Criminal Law and Procedure [5], and in 2000, *Brienen* and *Hoegen* conducted research on the implementation of the said recommendation in 22 European countries. One of the topics they studied was when an individual should be recognized as a victim. They discussed three models: 1. recognition from the moment they report a crime; 2. recognition from the moment they obtain a formal position and role; 3. postponing recognition until the accused has been found guilty [6, p. 30].

According to the third model, a victimized person is considered to be an alleged victim throughout the entire proceedings. This approach is related to the principle of the presumption of innocence, according to which the defendant is considered innocent until proven guilty by law. Considering the defendant as innocent is required to protect their rights and interests and to enable them to properly exercise their rights. However, the use of the 'non-victim' presumption will not put victims in a better position. Vice versa, it will adversely affect their legal standing. Therefore, this model should be declined [6, p. 30].

According to the second model, the recognition of victims should depend on their formal role, such as participation as an auxiliary prosecutor or a civil party in criminal procedures. Only after gaining this status will they be able to exercise their rights. This model leads to several problems in practice. For instance, victims

are not informed of their rights at the moment of reporting a crime. Moreover, if victims are not provided with information about their rights, it increases the risk of not obtaining the formal role in the criminal process. Consequently, *Brienen* and *Hoegen* concluded that this model as well does not fulfill the needs and interests of crime victims and should be rejected [6, p. 30].

Brienen and *Hoegen* suggest that the first model — recognizing a person as a victim from the moment they report a crime — is the best model because it ensures the highest level of protection for victims' rights and interests. Besides, it increases the likelihood of them being informed about their rights and staying updated on essential developments. This model also enhances victims' ability to properly assert their rights. It is worth noting that the recommendation of 1985 supports the same model [6, p. 30].

The same approach is enshrined in the EU directive. Specifically, Recital 19 states that 'a person should be considered a victim regardless of whether an offender is identified, apprehended, prosecuted, or convicted.' To prevent secondary victimization, the EU directive mandates that all individuals victimized by crime should be recognized as victims without difficulty and afforded the opportunity to exercise their rights [7, p.10]. Failure to recognize a person as a victim can result in secondary victimization [8, p. 105]. Furthermore, Article 3 of the EU directive requires states to ensure that victims have the right to receive information from the first contact with a competent authority. The directive emphasizes that the right to information is a precondition for victims to exercise other rights outlined in the directive. Therefore, recognizing someone as a victim from the moment the crime has been committed can ensure the enjoyment of other rights.

This principle is reiterated in the 2023 recommendation of the CoE that has been recently adopted and replaces the 2006 Recommendation on Assistance to Crime Victims. It should be noted that the 2023 recommendation was adopted because of the urgent necessity to furnish member States with guidelines and general principles aligned with the Council of Europe standards, keeping pace with international advancements [9, Background]. Under Article 2(5), a person should be considered to be a victim from the moment they were victimized, and the exercise of their rights should not depend on whether the perpetrator is identified, apprehended, prosecuted, or convicted. Currently, a number of member States link crucial victim rights, including information rights, to the victims' formal status in criminal proceedings. Their formal status may vary, such as being a party in criminal proceedings, serving as witnesses, or having other legal entitlements stipulated by national law that allow active participation. This poses a substantial obstacle to victims in accessing these rights. To enhance the breadth of rights as per the Recommendation, member States are advised to apply most rights without reliance on such a formal role. It is recommended that an individual be recognized as a victim, irrespective of whether they filed a formal complaint, but rather based on the moment they experienced a criminal offense [9, §43].

Furthermore, the literature is very clear on this matter. Generally, from the victims' point of view, the recognition procedure is considered humiliating, demonstrating mistrust toward, and disrespect for victims. It can cause much more harm than involving imaginary victims in criminal proceedings. The existence and involvement of a small portion of imaginary and self-styled victims can be tolerated and balanced at the expense of a larger number of real victims [10, pp. 21-22].

Georgian legislation and practice

Under the Georgian legislation, a person victimized by a crime is not considered to be a victim immediately after the crime has been committed. They attain a victim status only after being officially recognized as such by the prosecutor. Under Article 56(5) of the Criminal Procedure Code of Georgia (CPCG), 'if there are appropriate grounds for recognizing a person as a victim or as a legal successor of the victim, the prosecutor shall issue a decree on his/her own initiative, or upon the filing of the relevant application by that person. [...]'. Once the person is granted victim status, a prosecutor, or upon their instructions, an investigator, explains to them all the rights provided for by the CPCG. Additionally, only the person recognized as a victim can exercise the rights defined in the CPCG. Therefore, recognition as a victim is a precondition for enjoying other rights. If a person is not granted the victim status, they remain entirely excluded from criminal proceedings and cannot exercise the rights enshrined in Article 57 of the CPCG, such as the right to information, the right to review the materials of the criminal case, etc.

The mechanism of recognition as a victim should be criticized from various perspectives. First, it is inconsistent with international and European standards. Every legal instrument discussed above explicitly states that criminal justice system should be accessible for victims and the states should eliminate all barriers preventing victims' access to it. All victimized persons should be treated as victims right from the moment a crime has been committed. The mechanism of recognition as a victim violates human dignity. According to Article 1 of the Universal Declaration of Human Rights, 'all human beings are born free and equal in dignity and rights' [11]. Therefore, victims have the right to be treated with dignity and respect in criminal proceedings. Human dignity entails acknowledging victims as autonomous persons in criminal proceedings. The mechanism applied in Georgia risks that some victims will not be recognized as such and cannot enjoy their rights.

The phrase 'appropriate grounds' in Article 56(5) causes confusion and leads to inconsistent practices. It is unclear what is meant by 'appropriate grounds,' resulting in varied approaches used by prosecutors. This inconsistency leads to the non-recognition of many victimized individuals, leaving them excluded from criminal proceedings. Sometimes, the prosecutors recognize persons as victims several months after launching an investigation, leaving victims excluded during crucial stages [8, pp.106-108].

The Public Defender of Georgia considers this issue one of the most problematic aspects in criminal proceedings. According to the Public Defender's reports, in some cases, the victim is recognized as soon as the alleged crime occurs, but in most instances, recognition occurs after receiving expert opinions and, in some cases, only following the initiation of criminal prosecution. Consequently, year after year, numerous citizens approach the Public Defender, claiming victimization from specific criminal acts. However, the official victim status is often delayed for them, leading to a lack of information about the ongoing investigation. As per the Public Defender's recommendation, it is crucial to ensure the prompt recognition of victims at the early stage of the investigation, without unnecessary delay [12, pp. 127-128]. Additionally, critics are expressed by organizations representing victims in the criminal cases. For instance, the Georgian Young Lawyers' Association (GYLA) states that the rate of granting the victim status to those who have experienced ill-treatment is relatively low. Out of 10 cases handled by the GYLA, only two persons were recognized as victims [13, p. 6]. The Georgian Democracy Initiative (GDI) provides that victims' participation in the investigation and access to case materials constitute a significant problem. Out of 38 cases handled by the GDI only 6 persons were granted the victim status. [14, p. 27].

Despite these loopholes, some positive tendencies are noticeable. The Special Investigation Service, which investigates violent crimes and cases of ill-treatment committed by officials [15], adopted a Guideline on Familiarization with the Criminal Case Materials and Providing Information to the Victims of Ill-treatment in 2022. The document was crafted relying on recommendations and analyses of practices from the European Court of Human Rights, and the approval of the Guideline followed a process of discussion and the exchange of opinions and recommendations on the document with human rights organizations, the Office of the Public Defender, and representatives from academia. This is the first time an investigative agency allows individuals without victim status to access and review the materials of a criminal case. This guideline will be applied to cases in which law enforcement officers are accused of violence and ill-treatment [16].

Another significant achievement is visible in the work of the prosecution. In December 2022, the Council for Reviewing Complaints of Victims of Life Infringement cases was established within the General Prosecutor's Office of Georgia. It deals with cases of the violation of life that resulted in the death of a person. The purpose of the council is to hear victims' complaints and make just decisions. In this way, an effective justice system will be ensured [17].

Conclusion

Based on the comparison of the Georgian legislation and practice with international and European standards, it can be stated that the Georgian legislation and practice do not comply with international and European standards. Under Georgian legislation, crime victims do not have free access to the criminal procedures. The mechanism of victim recognition leads to

the violation of victims' dignity, causes their secondary victimization, and deprives them of the possibility to participate in criminal proceedings. Therefore, it is of paramount importance to amend the legislation and abolish the current mechanism. This amendment will have two positive outcomes: first, victims will have access to the criminal justice system without barriers, and secondly, it will lead to consistent prosecutorial practice.

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MATHEMATICAL SCIENCES

THE SYSTEM FOR FORECASTING THE ENERGY CONSUMPTION OF BUILDINGS OF VARIOUS PURPOSES

Duka Olha,

Master's degree holder

National Technical University of Ukraine "Ihor Sikorsky Kyiv Polytechnic Institute"

37 Beresteyskyi Prospect, Kyiv, 03056

Danilov Valeriy

Ph.D. Professor of the Department of Mathematical Methods of System Analysis of the National Technical

University of Ukraine "Ihor Sikorsky Kyiv Polytechnic Institute"

37 Beresteyskyi Prospect, Kyiv, 03056

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СИСТЕМА ПРОГНОЗУВАННЯ ЕНЕРГОВИТРАТ БУДІВЕЛЬ РІЗНОГО ПРИЗНАЧЕННЯ

Дука Ольга

Магістр,

Національний технічний університет України

«Київський політехнічний інститут імені Ігоря Сікорського»

03056, м. Київ, Берестейський проспект, 37

Данилов Валерій

д.т.н. професор кафедри математичних методів системного аналізу

Національний технічний університет України

«Київський політехнічний інститут імені Ігоря Сікорського»

03056, м. Київ, Берестейський проспект, 37

Abstract

Electricity is an integral part of modern life and important for the economy of the whole world, including Ukraine. In the near future, electricity is expected to replace other energy sources as the primary source for use in homes, businesses, and transportation. For effective and correct forecasting, it is advisable to create a System for forecasting energy consumption of buildings of various purposes. The purpose of the research is to develop a system for forecasting the energy consumption of buildings of various purposes using machine learning methods. The object of the study is a data set describing the parameters of buildings, meter readings and weather data from meteorological stations. The subject of the research is machine learning methods and models for forecasting the energy consumption of buildings of various purposes. The result of the research is a system that performs energy consumption forecasting using machine learning methods. Theoretical and empirical research methods were used in the research.

Анотація

Електроенергія є невід'ємною частиною сучасного життя та важливою для економіки усього світу, у тому числі України. Очікується, що в найближчому майбутньому електроенергія замінить інші джерела енергії як основне джерело для використання в будинках, на підприємствах і у транспорті. Для ефективного і правильного прогнозування доцільно створити Систему прогнозування енерговитрат будівель різного призначення. Метою роботи є розробка системи прогнозування енерговитрат будівель різного призначення методами машинного навчання. Об'єктом дослідження є набір даних, що описує параметри будівель, показники лічильників та погодні дані метеорологічних станцій. Предметом дослідження є методи та моделі машинного навчання для прогнозування енерговитрат будівель різного призначення. Результатом дослідження є система, що виконує прогнозування енерговитрат із застосуванням методів машинного навчання. У роботі було використано теоретичні та емпіричні методи дослідження.

Keywords: machine learning, energy consumption, forecasting, RMSLE, energy consumption analysis.

Ключові слова: машинне навчання, енергоспоживання, прогноз, RMSLE, аналіз енерговитрат.

1. Вступ

Електроенергія є невід'ємною частиною сучасного життя та важливою для економіки усього світу, у тому числі України. Очікується, що в найближчому майбутньому електроенергія замінить інші джерела енергії як основне джерело для вико-

ристання в будинках, на підприємствах і у транспорті [1]. Це підкреслює, наскільки важливо правильно прогнозувати споживання електроенергії, оскільки воно має великий вплив на багато операційних і бізнес-операцій. Електроенергія стає головним аспектом нашого повсякденного життя.

Надзвичайний попит на електроенергію прискорюється останнім часом потужним економічним розвитком і швидкою урбанізацією. Прогнозування попиту на електроенергію стає критичним в електричному секторі, оскільки воно служить основою для прийняття важливих рішень у сфері експлуатації та управління енергосистемою. Через спад економічного розвитку, а також відносно помірну температуру в багатьох великих країнах світовий попит на енергію зріс меншими темпами в 2019 році порівняно з останніми роками (+0,7% порівняно із середнім показником 3% на рік у рік період 2000–2018 рр.) [1].

Незважаючи на це, глобальний попит на енергію впав до 2,5% у першому кварталі 2020 року, незважаючи на те, що карантинні заходи в більшості країн тривали лише близько місяця. Зміни в тому, де і як електроенергія використовувалася під час карантину, ще більше змінили структуру попиту на енергію протягом дня в певних районах, причому шаблони будніх днів тепер збігаються з моделями неділі [2]. Це ілюструє відсотковий зсув у попиті та споживанні енергії за різних умов.

За останні десятиліття попит на енергію в будівельному секторі значно зріс через збільшення кількості населення, швидку урбанізацію та соціальний попит. Будівлі зробили значний внесок у світове споживання енергії та викиди парникових газів. Таким чином, будівлі повинні бути енергоефективними та сталими. Розуміння моделей енергоспоживання в будівлях є корисним для комунальних підприємств, користувачів та керівників об'єктів, оскільки це може допомогти підвищити енергоефективність.

2. Постановка задачі

Метою дослідження є створення ефективної системи прогнозування енергоспоживання будівель різного призначення, використовуючи сучасні

методи машинного навчання. Дослідження розділене на наступні етапи: вибір моделей машинного навчання, які будуть відповідні до задачі прогнозування; вибір необхідних датасетів для проведення дослідження, визначення кореляції змінних; аналіз та обробка даних, очищення та підготовка до аналізу методами машинного навчання; проведення дослідження з використанням обраних методів шляхом створення програмного продукту; оцінка точності моделей машинного навчання, використовуючи метрику RMSLE; проведення порівняльного аналізу результатів, отриманих різними алгоритмами.

3. Опис набору даних

У задачах машинного навчання дуже важливо виконати правильну попередню обробку даних, для того, щоб результати прогнозування були максимально точними. У даній роботі використаний набір даних, зібраних Американським товариством інженерів з опалення, охолодження та кондиціонування повітря (American Society of Heating, Refrigerating & Air Conditioning Engineers; ASHRAE). Параметрами є характеристики будівель (призначення, площа, рік побудови, поверховість); показники лічильників (тип лічильника і час зняття виміру); погодні дані (температура, хмарність, тиск, напрямки і швидкість вітру).

У train наборі даних є майже 20 мільйонів значень `meter_reading`, які спостерігаються у 1448 будівлях між 1 січня 2016 року та 1 січня 2017 року; більшість з них — це спостереження за лічильниками електроенергії.

У test наборі даних є 40 мільйонів значень `meter_reading`, які спостерігалися в тих самих будівлях між 1 січня 2017 року та 1 січня 2019 року.

Під час аналізу і обробки даних створена матриця кореляції для визначення зв'язків між змінними. Матрицю кореляції можна побачити на рисунку 1:

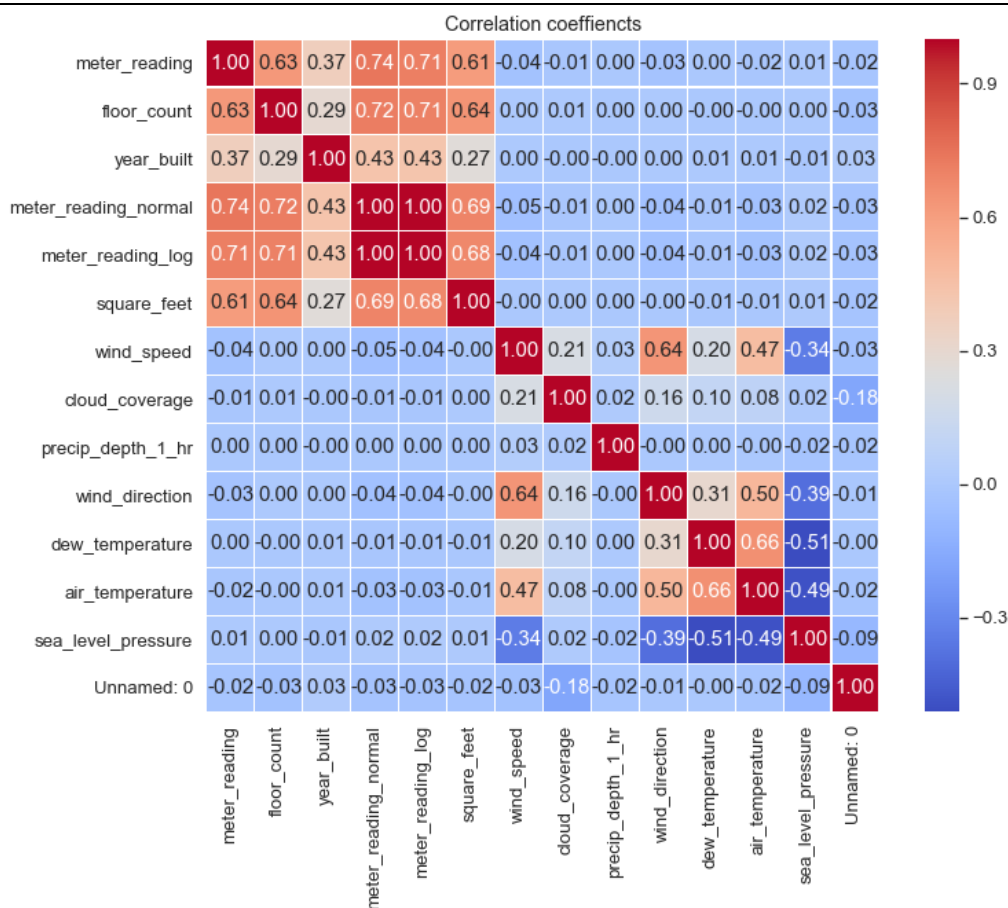


Рисунок 1. Матриця кореляції

Існує висока кореляція між наступними ознаками:

- **dew_temperature** & **air_temperature** — 0.75;
- **square_feet** & **floor_count** — 0.56;
- **site_id** & **building_id** — 0.98.

Решта ознак мають кореляцію менше 0.50.

Розмір будівлі визначає споживання електроенергії, що ми бачимо з наведеного графіка, де кореляція між квадратними футами та кількістю поверхів становить 0.56. Можна також помітити, що температура теж впливає на енергоспоживання.

4. Опис алгоритму

У цю нову еру сучасного глибокого навчання дуже спокусливо використовувати сучасну модель глибокого навчання для вирішення будь-якої проблеми. Але завжди треба враховувати вищезазначені фактори, перш ніж відразу переходити до вибору моделі на основі DL.

Очевидно, що ми маємо справу з регресією, оскільки ми прогнозуємо показання лічильників, які є реальними. Крім того, маємо приблизно 40–45 функцій, тому він потрапляє в категорію з низькою кількістю функцій. Ми маємо лише 2380 пар будівельних лічильників з даними за 1 рік для навчання, тому вибірка не є великою.

Як правило, моделі GBDT добре працюють з даними низької розмірності, хоча вони можуть зайняти багато часу через адитивну природу алгоритму.

Крім того, у нас є лише пара будівельних лічильників 2380, тому ми не повинні починати з моделі на основі DL, як LSTM.

Обрані наступні моделі машинного навчання: Decision Tree, Light Gradient Boosting Machine (LGBM), Linear Model, Ada boost, об'єднання LGBM, Ada boost, Linear Model.

Спочатку ми створюємо `y_predict`, використовуючи `train_data`. Потім розділяємо наші `train_data` на `x_train` і `x_cv` як набір для навчання та перехресної перевірки (cross-validation) за допомогою бібліотеки Scikit-Learn `train_test_split`. З цього ми створюємо `y_train` і `y_cv`. Тепер, використовуючи ці набори, запустимо різні моделі машинного навчання та зробимо прогнози для `test_data`.

Кросс-валідація (cross-validation) — це метод оцінки точності моделі машинного навчання, який використовується для зменшення перенавчання (overfitting) та недонавчання (underfitting). При кросс-валідації модель будується на частині даних, а потім оцінюється на іншій частині даних. Це дозволяє оцінити, як модель буде працювати на нових даних, які не були використані для її навчання.

Так як цільова змінна має широкий діапазон значень, то є сенс користуватися метрикою RMSLE (Root Mean Squared Logarithmic Error) (4.1):

$$RMSLE = \sqrt{\frac{1}{n} \sum_{i=1}^n (\log(p_i + 1) - \log(a_i + 1))^2} \quad (4.1)$$

де n — кількість прикладів у наборі даних;

p_i — прогнозоване значення (прогноз);

a_i — фактичне (спостережуване) значення.

Це дозволяє приділяти менше уваги великим аномальним значенням і фокусуватися на точності прогнозу в нормальному діапазоні.

Оскільки вже було взято логарифм цільової змінної, то визначається середня квадратична помилка або RMSE між прогнозованими та фактичними значеннями цільової змінної (**meter_reading**) (4.2):

$$RMSE = \sqrt{\frac{1}{n} \sum_{i=1}^n (p_i - a_i)^2} \quad (4.2)$$

де n — кількість прикладів у наборі даних;

p_i — прогнозоване значення (прогноз);

a_i — фактичне (спостережуване) значення.

5. Результати дослідження

Результат виглядає наступним чином. Ми зводимо в таблицю всі згенеровані помилки train і перехресної перевірки використаних моделей (таблиця 1):

Таблиця 1

Результати

Модель	RMSLE Train	RMSLE Test
LGBM cross-validation	0.478	0.578
Linear Model cross-validation	0.574	0.683
Decision Tree	0.786	0.823
Ada boost, Linear, LGBM	0.364	0.453

Результати прогнозу показали, що найкращою моделлю для прогнозування є ансамбль нейронних мереж Ada boost, Linear, LGBM. Вона має найнижчий показник RMSLE 0.364. Результат Ada boost, Linear, LGBM показує, що комбінація трьох моделей може дати кращі результати, ніж будь-яка з них окремо. Це можна пояснити тим, що комбінація моделей може допомогти знизити ризик перенавчання.

Decision Tree і Linear Model мають вищі показники RMSLE. Це може бути пов'язано з тим, що ці моделі не так добре справляються з нелінійною залежністю між змінними. Decision Tree має найвищий показник RMSLE.

LGBM має хороший результат. Це можна пояснити тим, що вона є високою потужністю моделлю, яка може генерувати складні прогнози. Однак, високі потужні моделі також більш схильні до перенавчання, тому важливо ретельно налаштувати гіперпараметри LGBM.

6. Висновки

Прогнозування енергоспоживання будівель за допомогою моделей машинного навчання є важливим для оцінки ефективності в контексті модернізації, вимірювання та верифікації, інтеграції відновлюваних джерел енергії, управління системами, виявлення несправностей, енергоспоживання в житловому секторі та моделювання енергетики в міському масштабі.

Висока частка енергії, що споживається в будівлях, спричинила появу багатьох екологічних проблем, які негативно впливають на існування людства. Прогнозування енергоспоживання будівель, по

суті, проголошується методом енергозбереження та покращення прийняття рішень щодо зменшення споживання енергії. Крім того, будівництво енергоефективних будівель сприятиме зменшенню загального споживання енергії в новозбудованих будівлях.

Дослідники припускають, що наявність енергетичної системи будівлі з точним прогнозуванням може заощадити від 10 до 30% загального енергоспоживання в будівлях. Без виявлення алгоритму, який може точно прогнозувати енергоспоживання будівлі, це призведе до збільшення викидів парникових газів, будівництва більш неефективних будівель, попиту на енергію та зменшення фінансових заощаджень. У даній роботі було розглянуті методи машинного навчання для прогнозування енерговитрат. Методи машинного навчання було застосовано на наборі реальних даних. Результати прогнозу показали, що найкращою моделлю для прогнозування є ансамбль нейронних мереж Ada boost, Linear, LGBM. Вона має найнижчий показник RMSLE 0.364.

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MEDICAL SCIENCES

ASSESSMENT OF PUBLIC SATISFACTION WITH THE QUALITY OF PROVIDED MEDICAL SERVICES

Kopytich A.V.,

Grodno State Medical University, Grodno, Republic of Belarus

Kanischev E.A.,

Grodno State Medical University, Grodno, Republic of Belarus

Rybalko E.I.,

Grodno State Medical University, Grodno, Republic of Belarus

Nogteva T.V.,

senior lecturer,

Grodno State Medical University, Grodno, Republic of Belarus

Khilmonchik N.E.

PhD in Medicine, associate professor

Grodno State Medical University, Grodno, Republic of Belarus

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Abstract

The health care system of the Republic of Belarus occupies a worthy place among the health care systems of developed countries of the European region. However, it is still undergoing dynamic reforms. An important indicator of the quality of medical care is patient satisfaction, which depends on the initial expectations of patients regarding the ability of health care institutions to meet their needs and increases proportionally to the rise of the level of technical equipment and professional training of the staff, which makes the satisfaction of these expectations quite a difficult task.

Keywords: quality of medical care; health care efficiency; satisfaction with medical care, public health care institution, private medical centre.

Introduction. According to the Constitution of the Republic of Belarus, every citizen has a guaranteed right to health care, including free treatment in state health care institutions. In order to improve the quality of medical care, the Government of the Republic of Belarus, the Ministry of Health and the management of health care institutions constantly monitor the quality of medical care.

The commercialization of health care inevitably exacerbates the contradiction between economic rationalism and medical humanism, the solution to which lies in ensuring medical care that has the maximum effect at a reasonable cost [1].

The greatest difficulty in assessing the quality of medical care is caused by such a criterion as patient satisfaction. The reasons are obvious: this indicator is subjective and influenced by many constantly changing factors [2].

The relevance of this study is due to the need to improve the efficiency of the health care system in terms of quality and accessibility of medical care. The observed trend of citizens' increasing appeal to private medical organizations requires an analysis of the results of the work of private and public health care institutions, and a study of patients' satisfaction with the medical services provided to them.

The purpose of the research is identifying key differences in patients' attitudes towards accessibility and

quality of medical care in state and private health care organizations in the Republic of Belarus.

Research materials and methods:

In the Republic of Belarus, as in many countries of the world, the evaluation of the quality of medical care by patients should be realized through the assessment of satisfaction with

- competence of the personnel;
- accessibility of information about diagnosis, methods of treatment, dynamics of health status and results of medical treatment;
- provision with medicines;
- conditions of medical care and technical support;
- attitude and competence of employees of the medical organization providing medical care.

To study these an anonymous survey was conducted using a questionnaire developed by the Department of Public Health and Health Care of the Grodno State Medical University. Statistical processing of the obtained data was carried out using STATISTICA-10.0 (Stat Soft Inc.) software.

Results and discussion: A total of 355 patients who had applied to the state and private health care institutions of the Republic of Belarus participated in the questionnaire survey. Of these, 49.1% were female and 40.9% were male. The distribution of the participants in terms of age is presented in Table 1.

Table 1

The distribution of the respondents in terms of age

Age	18 – 29	30 – 39	40 – 49	50 – 59	60+
Quantity, %	15,2%	20%	24,9%	13,9%	26%

The share of patients who applied for an appointment in a given health care institution for the first time in the current year was 48.4%, for the second time – 29.8%, and more than twice – 21.8%. At the same time, almost all the respondents (87.3%) applied to private medical centres for one reason or another.

92% of the respondents from among the patients of private medical centres were fully satisfied with the duration and conditions of waiting for a doctor's appointment (availability of necessary information, sufficient seats during the waiting time, availability of visual information, etc.), but 8% of the respondents could not answer this question. In public health care institutions, 46.4% of the survey participants were fully satisfied with the duration and conditions of waiting for a doctor's appointment. 23.6% of the respondents noted long queues, unclear location of offices, incorrect appointment schedule, insufficient time for one patient and, accordingly, for a conversation between the patient and the doctor. And 30% of the survey participants found it difficult to answer this question.

The attitude of medical staff to patients (friendliness, politeness, willingness to help, interest in results) in private medical centers was rated highly by 96.4% of respondents, only 1.9% gave a low rating. At the same time, 1.7% of the respondents were not able to evaluate a private medical institution according to this parameter. In state medical institutions, about half of patients (47.4%) rated the attitude of medical staff highly, 14.2% gave a low rating for this criterion. In the comments to the answers they pointed out the low interest of the doctors in the treatment of the patient, formal attitude, tactlessness, familiarity and even rudeness of the medical staff. At the same time, 38.4% of the respondents were not able to evaluate the medical institutions according to this criterion, perhaps due to the fact that they received the necessary medical care in full despite some inconveniences.

The comfort of staying in state healthcare facilities (convenience, comfort) was highly rated by 57% of patients. Almost a fifth of the respondents (19%) gave an unsatisfactory rating. In private centers, 75.9% of patients rated the comfort of their stay highly, and 2% were dissatisfied.

Assessment of accessibility and adequacy of diagnostic examinations (from the patient's point of view) in health care institutions of both forms of ownership did not differ significantly. In state health care institutions 50.7% of the respondents rated it as high. In private health centers this parameter was evaluated as high by 57.7% of the respondents.

Patients' satisfaction with the results of medical treatment also differs only slightly. In public health care institutions, slightly more than half of the respondents (53%) and in private centers, 55.9% of the respondents were satisfied with the results of medical treatment.

52.1% of the respondents were satisfied with the technical condition of the department, repair of the premises and space of the premises in public health care institutions. And in private centers their number was 58.7%.

Patients' satisfaction with sanitary and hygienic conditions in public health care facilities was 52.4%. Private medical centers were rated highly on this parameter by 64% of respondents. More than a half (53%)

of the respondents were satisfied with the provision of medicines and consumables in public health care institutions, in private centers – 73% of the survey participants.

The actions of medical staff in the performance of their duties in public health care institutions were highly appreciated by 56% of respondents. The number of satisfied patients in private medical centers slightly exceeded this indicator and amounted to 60.8%.

The level of trust in medical personnel in public health care institutions was 32.4%, while this indicator reached 74% in private centers.

In both public and private health care organizations, patients had to pay for additional treatment or diagnostic procedures in 57% and 58%, respectively.

Conclusion. Increasing public satisfaction with the possibility of receiving quality medical care is an important task of reforming the healthcare system. In the search for new approaches to improving the availability, quality and culture of medical care against the background of limited economic opportunities of health care and improvement of financial relations, the opinion of patients is one of the criteria for assessing the activities of medical institutions.

As a result of the study it is possible to conclude that satisfaction with the work of the state health care system remains at an average level.

Technical equipment of both private and public health care institutions is quite highly appreciated by the survey participants, however satisfaction resulting from the fulfillment of expectations, depends not only on the technical capabilities of modern medicine and organizational mechanisms of care delivery, but also on a multitude of cultural, psychological and social factors.

In the work of public health care institutions, first of all it is necessary to pay close attention to the problems of interaction between patients and medical personnel, since many problems of negative perception of health care institutions can be solved without significant financial investments. It is necessary to change the attitude towards the patient, to reduce the waiting time for an appointment and to solve the problem of shortage of specialists in certain medical institutions.

Private medical centers were rated higher in terms of quality of medical care. However, the high cost of services provided is a significant cause of patients' dissatisfaction.

Dissatisfaction in a number of cases with the availability and quality of medical care both in public and private health care institutions, on the one hand, dictates the need to improve the work of medical organizations, on the other hand, requires revision of doctor-patient relations, improvement of deontological literacy and professionalism of medical personnel.

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CHANGES IN IMMUNE INDICATORS IN PATIENTS WITH CHRONIC TOXOPLASMOSIS**Amirova Leyla,***Department of Immunology, Scientific Research Institute of
Medical Prophylaxis named after V. Akhundov,
Researcher***Abasova Dunya,***Department of Immunology,
Scientific Research Institute of Medical Prophylaxis named after V. Akhundov
Head of department***Gadimli Matanat,***Department of Immunology, Scientific Research Institute of
Medical Prophylaxis named after V. Akhundov
Senior laboratory assistant***Cabrayilova Esmira,***Department of Immunology,
Scientific Research Institute of Medical Prophylaxis named after V. Akhundov,
Senior laboratory assistant***Gurbanova Gunay***Department of Immunology,
Scientific Research Institute of Medical Prophylaxis named after V. Akhundov,
Senior laboratory assistant*[DOI: 10.5281/zenodo.10402034](https://doi.org/10.5281/zenodo.10402034)**Abstract**

The aim of the study was to study indicators of cellular and humoral immunity in patients with toxoplasmosis at different stages of the disease. 77 patients with clinical manifestations of exacerbation of chronic toxoplasmosis were examined. Labrinks flow cytometry CD3, CD4, CD8, IRI, CD4/CD8 ratio and concentration of serum immunoglobulins on Stat fax 4700 analyzer (IgA, IgM, IgG immunoglobulins) were determined. Group 1 included 58 patients with a transition to the latent phase of the disease (cyclic course of the manifest form of chronic toxoplasmosis), group 2 - 19 patients with re-exacerbation of chronic toxoplasmosis within a year after treatment (chronic form of toxoplasmosis). In accordance with the goals and objectives of this work, patients were examined in the dynamics of the disease: during the exacerbation period and immediately after immunomodulation. All patients received anti-inflammatory, antioxidant treatment, as well as immunomodulators. The control group consisted of 20 clinically healthy individuals.

As a result of research, it was found that during the period of exacerbation (reactivation) with a cyclical course, a statistically significant increase in the number of CD8+, as well as a decrease in the level of IgA, is observed. CD8

CD4/CD8 ratio due to increased lymphocytes, CD4+ and CD8+ decreased in all patients after immunomodulation. However, if CD4+ decreased by 5% and CD8+ decreased by 11% during the cyclic course of the disease, the opposite trend was recorded in the recurrent course: CD4+ decreased by 25% and CD8+ decreased by 10% in patients with a repeated course of chronic toxoplasmosis with uniform normalization of IgA. CD4+ increased significantly in CD8+ (30%) is accompanied by an increase. The results of the examination of patients with chronic toxoplasmosis 6 months after the course of treatment show that a course of therapy during the cyclic course of the disease leads to the transition of the disease to a chronic latent form.

Studies have shown that immune processes leading to clinical manifestations of reactivation of chronic toxoplasmosis are characterized by certain differences in patients with a persistent positive effect of immunocorrection and in patients with a repeated course of this clinical form of the disease.

Keywords: chronic toxoplasmosis, cellular and humoral immunity.

The relevance of the study of toxoplasmosis is dictated, first of all, by the fact that this pathology is associated with immunodeficiency conditions (especially with HIV infection) [1]. The long-term persistence of the pathogen is accompanied by a "floating" concentration of specific antibodies produced by a clone of antigen-specific memory B-lymphocytes. This stage of the disease is called chronic toxoplasmosis (XT) and is a natural consequence of the acute process [2, 3, 4]. A sufficient number of T- and B-memory cells determines the absence of clinical manifestations of the disease (the latent course of CT). However, in some cases (1-

5% of infected people), the latent infection is reactivated. This category includes "immunocompromised" individuals, including those with secondary immunodeficiency (HIV infection, as well as iatrogenic, uncontrolled antibacterial, cytostatic, and glucocorticoid therapy) [5.6.7

The aim of the study was to study indicators of cellular and humoral immunity in patients with toxoplasmosis at different stages of the disease.

Materials and methods. 77 patients with clinical manifestations of exacerbation of HT (reactivation of the latent form of HT) were examined. The diagnosis

was detected on the basis of clinical and laboratory data (presence of toxoplasma-specific Ig G, enzyme immunoassay ELISA, Vector-Best test system) and confirmed by the polymerase chain reaction method (PCR in blood serum)., includes determining the ratio of CD8CD4/CD8 and determination of IgA, IgM, IgG concentration of serum immunoglobulins in the blood. During the statistical processing of the obtained data, parametric statistical methods (Student's criterion), frequency analysis, and the method of calculating diagnostic value coefficients were used. All patients were divided into groups according to the effectiveness of therapy. Group 1 - 58 patients with the transition of the disease to the latent phase (cyclic course of clarity). forms of chronic toxoplasmosis), group 2 - 19 patients with re-exacerbation of HT during the next year after treatment (recurrent course of the manifest form of chronic toxoplasmosis). In accordance with the goals and objectives of this work, patients were examined in

the dynamics of the disease: during the exacerbation period and immediately after immunomodulation. All patients received anti-inflammatory, antioxidant treatment, as well as immunomodulators. Control group - 20 clinically healthy individuals.

Results. It was determined that significant changes in the studied immunological parameters occur during the exacerbation period (table 1) in patients with CT. Thus, despite the absence of significant statistical differences in patients with a cyclic course of the disease, CD8 was significantly higher in the former compared to those with relapse. Compared to indicators of the immune status in the latent form of XT, the period of exacerbation (reactivation) in the cyclic course is characterized by a statistically significant increase in the number of CD8+, as well as a decrease in the level of IgA. and a decrease in the CD4/CD8 ratio due to an increase in CD8 lymphocytes.

Table 1

Indicators of immune status during disease exacerbation in patients with chronic toxoplasmosis ($X \pm m$)

Indicators	Xmin- Xmax	Groups					
		Control		Cyclic flow		Recurrent course	
		X	$\pm m$	X	$\pm m$	X	$\pm m$
CD3+, cells/ μ l	688-1955	1321	50	1290	40	1307	35
CD4+, cells/ μ l	355-1213	784	30	907	20	814	25
CD8+, cells/ μ l	145-800	472	50	870*	50	893**	30
CD4/CD8	0.83-6.1	3.46	1.5	1.45*	1.5	1.37**	0.5
IgA g/l	1.5-2.2	1.85	0.5	0.77*	0.5	0.73**	0.5
IgM g/l	0.8-1.1	0.95	0.3	1.0	0.3	1.1	0.3
IgG g/l	4.5-8.5	6.5	1.7	7.5	0.3	8.3	0.3
IgG to T. gondii, ME/ml	0-30	15	5	17	5	19	0.5

* - $p < 0.05$, (comparison with control group)

** - $p < 0.01$ (comparison between groups with cyclic and repeated XT).

The analysis of the conducted studies (tables 2-3) shows that, in addition to the changes in the immune system common to both groups of HT patients, there were significant differences in the dynamics of the studied parameters that increased over time. Thus, CD4+ and CD8+ reduction was observed in all patients immediately after immunomodulation. However, if CD4+ decreased by 5% and CD8+ decreased by 11% during the cyclic course of the disease, repeated

the opposite trend was recorded: CD4+ decreased by 25%, and CD8+ decreased by 10%. (Table 2).

During the month, different results were obtained in the dynamics of the parameters of the immune status of the studied patients (Table 3). The number of CD4+

increased to values greater than the period of exacerbation, a further decrease in the number of CD8+ was observed, and an increase in the concentration of IgA was noted. Unidirectional dynamics of IgG concentration was noted in both groups of patients (a decrease in the number of IgG-producing lymphocytes and the concentration of specific immunoglobulins). The results of a comprehensive (clinical and immunological) examination of patients 3-6 months after treatment deserve special attention.

The results of examination of patients with manifest forms of HT 6 months after the course of treatment show that a course of therapy during the cyclic course of the disease leads to the transition of the disease to a chronic latent form.

Table 2

Indicators of immune status after treatment in patients with chronic toxoplasmosis

Indicators	Xmin- Xmax	Groups					
		Control		Cyclic flow		Recurrent course	
		X	± m	X	± m	X	± m
CD3+, cells/μl	688-1955	1319	50	1275	40	1329	35
CD4+, cells/μl	355-1213	780	30	917	20	824	25
CD8+, cells/μl	145-800	472	50	630*	50	993**	30
CD4/CD8	0.83-6.1	3.37	1.5	2.45*	1.5	2.27**	0.5
IgA g/l	1.5-2.2	1.80	0.5	0.87*	0.5	0.92**	0.5
IgM g/l	0.8-1.1	0.90	0.3	1.0	0.3	1.14	0.3
IgG g/l	4.5-8.5	5.5	1.7	7.5	0.3	8.7	0.3
IgG to T. gondii, ME/ml	0-30	13	5	17	5	21	5

*- p<0.05 (comparison with control group),

**- p<0.05 (comparison between groups with cyclic and repeated XT)

Table 3

Indicators of immune status in patients with chronic toxoplasmosis 1 month after treatment

Indicators	Xmin- Xmax	Groups					
		Control		Cyclic flow		Recurrent course	
		X	± m	X	± m	X	± m
CD-3+, cells/μl	688-1955	1641	50	1798	40	1576	35
CD-4+, cells/μl	355-1213	780	30	1010	20	978	25
CD8+, cells/μl	145-800	472	50	749	50	790	30
CD4/CD8	0.83-6.1	4.38	1.5	5.7	1.5	5.1	0.5
IgA g/l	1.5-2.2	1.77	0.5	1.7	0.5	1.95	0.5
IgM g/l	0.8-1.1	0.90	0.3	1.0	0.3	1.18	0.3
IgG g/l	4.5-8.5	6.5	1.7	8.1	0.3	8.3	0.3
IgG to T. gondii, ME/ml	0-30	15	5	17	5	26	5

Almost complete clinical remission is noted - complaints, symptoms of intoxication, manifestations of damage to the hepato-lienal system disappear, the size of peripheral lymph nodes decreases, and social adaptation of patients is restored. An increase in the concentration of Ig G tissue is detected, and the increase in CD4-lymphocytes corresponds to a proportional increase in the number of CD8-lymphocytes. Most of the investigated immunological parameters do not differ from those of latent form of XT. The long-term persistence of the pathogen is accompanied by a "floating" concentration of specific antibodies produced by a clone of antigen-specific memory B-lymphocytes. This stage of the disease is called chronic toxoplasmosis and is a natural consequence of the acute process. A sufficient number of T- and B-memory cells determines the absence of clinical manifestations of the disease (hidden course of HT). However, in some cases (1-5% of infected people), the latent infection is reactivated. This category includes "immunocompromised" individuals, including those with secondary immunodeficiency.

Results. Conducted studies show that the immune processes causing the clinical manifestations of XT reactivity are characterized by certain differences in patients with a stable positive effect of immunocorrection and in patients with a repeated course of this clinical form of the disease. Together with the currently available literature data, the results of our own research allow

us to speculate on some of the manifestations of chronic toxoplasmosis. During the recurrence of toxoplasma infection, signs of cellular immunity deficiency have been determined. The changes present, including the hyperproduction of IgM, are consistent with the presence of virus-induced immunosuppression caused by the prolonged stay of the virus in an active state. It can be assumed that in this case, the main target cells of the immunotropic effect of toxoplasma infection will be the general population of T-lymphocytes, which reflect humoral and T-cell immunity. These data indicate a violation of the antiviral defense of the body when the virus is in an active state.

Thus, the conducted studies showed the existence and nature of the relationship between the main direction and severity of immune disorders in patients and the characteristics of the clinical course of toxoplasma.

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PEDAGOGICAL SCIENCES

KAZAKHSTAN'S PERFORMANCE IN THE INTERNATIONAL PIRLS STUDY

Sailau Zhupar Baimaganbetkyzy,

Master's student of L.N. Gumilev ENU

Davletova Ainash Khaliullinova

Candidate of Pedagogical Sciences, associate professor

L.N. Gumilev ENU

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Abstract

This article analyzes the indicators and findings of the PIRLS International Reading Literacy Progress Study of Kazakhstan. Kazakhstan participated in two cycles of the PIRLS International Progress in Literacy Study. Downward dynamics was observed among the results of the study. The factors that influenced the dynamics and the order of work performance in Kazakhstan are shown.

Keywords: PIRLS, Kazakhstan, reading literacy, learning, school, grade 4.

PIRLS, the International Progress in Literacy Study, is one of the major studies of the International Association for the Evaluation of Educational Achievement (IEA). Conducted every five years since 2001 by the TIMSS International Study Center and Boston College's PIRLS, PIRLS is a global standard for assessing trends in fourth graders' academic achievement [1].

The PIRLS survey measures students' reading literacy levels. Through a comprehensive study, countries will be able to gain information about students' academic literacy and identify weaknesses. The PIRLS study has also influenced many countries, forcing them to change their educational process.

Kazakhstan has been participating in the PIRLS study since 2016. During these years, influenced by the research, it has played a crucial role in modernizing Kazakhstan's education system. It has allowed the country to obtain reliable data on the reading skills of fourth-

graders, including educational inequalities and the impact of contextual factors on student performance. This data helps the country identify the strengths and weaknesses of its education programs and provides insights into the development of new teaching methods and technologies to improve students' learning skills. The 2016 PIRLS National Report provides key recommendations for improving the quality of elementary language and literature education. Subjects in the PIRLS format have been introduced in the curriculum of a number of schools. In addition, based on the results of international comparative studies, the Ministry of Education has set a number of tasks for the formation of school-library activities to increase students' interest in learning and support learning [2].

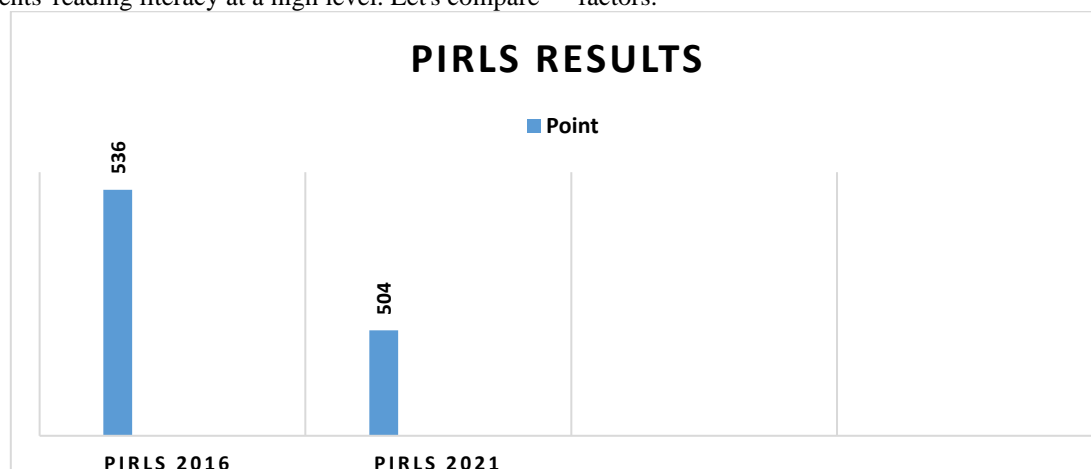
The educational objectives of the subjects "Kazakh language and literature" and "Russian language and literature" in Kazakhstan today meet the criteria of the evaluation concept of the study.

Learning objectives for the subject "Kazakh language and literature"/"Russian language and literature", grade 4	PIRLS assessment framework
- Finding information (text, feelings, diagrams, table, map, chart)	• Finding information given in explicit form
- formulating conclusions; - predict the development of the story from the beginning or end of the text; - determine the author's attitude to a character, compare his or her own and the author's assessment; - determine the theme and main idea on the basis of text analysis; - compare the actions of characters by analogy/contrast, clarify one's opinion with words and sentences in the text;	- formulate direct conclusions; - formulate conclusions to compare, describe, and predict; - explain and combine ideas and information to determine the main idea; - recognize the overall message or theme of a text; - compare textual information; - connect and explain the events of a story and describe the reasons for characters' actions and feelings;
- compare a character's actions and behavior with their own life experience; - describe character, experiences, identify the author's ways of creating them; - recognize in the text a comparison, image, epithet, hyperbole, metaphor and use them in speech;	- understand the meaning of certain features of language (e.g., metaphor);
- distinguish polysemous words, phraseological phrases, understand their role in a certain context and use them in speech [3].	- Evaluate the purpose of adding a particular element to a conversation [4].

This indicates that there has been a change in the education system since the 2016 PIRLS study. The learning objectives allow students to improve their reading literacy and prepare for the PIRLS study.

However, these changes are not enough to show students' reading literacy at a high level. Let's compare

Kazakhstan's performance in the two PIRLS surveys. On a point scale, Kazakhstan dropped by 32 points compared to 2016. In the ranking of countries, Kazakhstan in 2021 fell 11 positions lower than in 2016. The existence of such an indicator is influenced by many factors.



PIRLS 2021 assessed reading comprehension according to the PIRLS 2021 Learning Assessment Framework (Chapter 1 in the PIRLS 2021 Learning Assessment Framework). The PIRLS Learning Assessment Framework is updated each cycle to ensure that research on learning and educational development remains at the forefront through checks by the PIRLS Learning Development Group (RDG) and National Research Coordinators (NRCs). This remains relevant and relevant to PIRLS practice and teaching policy. However, PIRLS is a trend study and the underlying organization has remained unchanged throughout the cycles [5].

PIRLS 2021 incorporated two significant changes to the assessment of international learning in fourth grade: a shift to quantitative assessment and the introduction of a cohort response design.

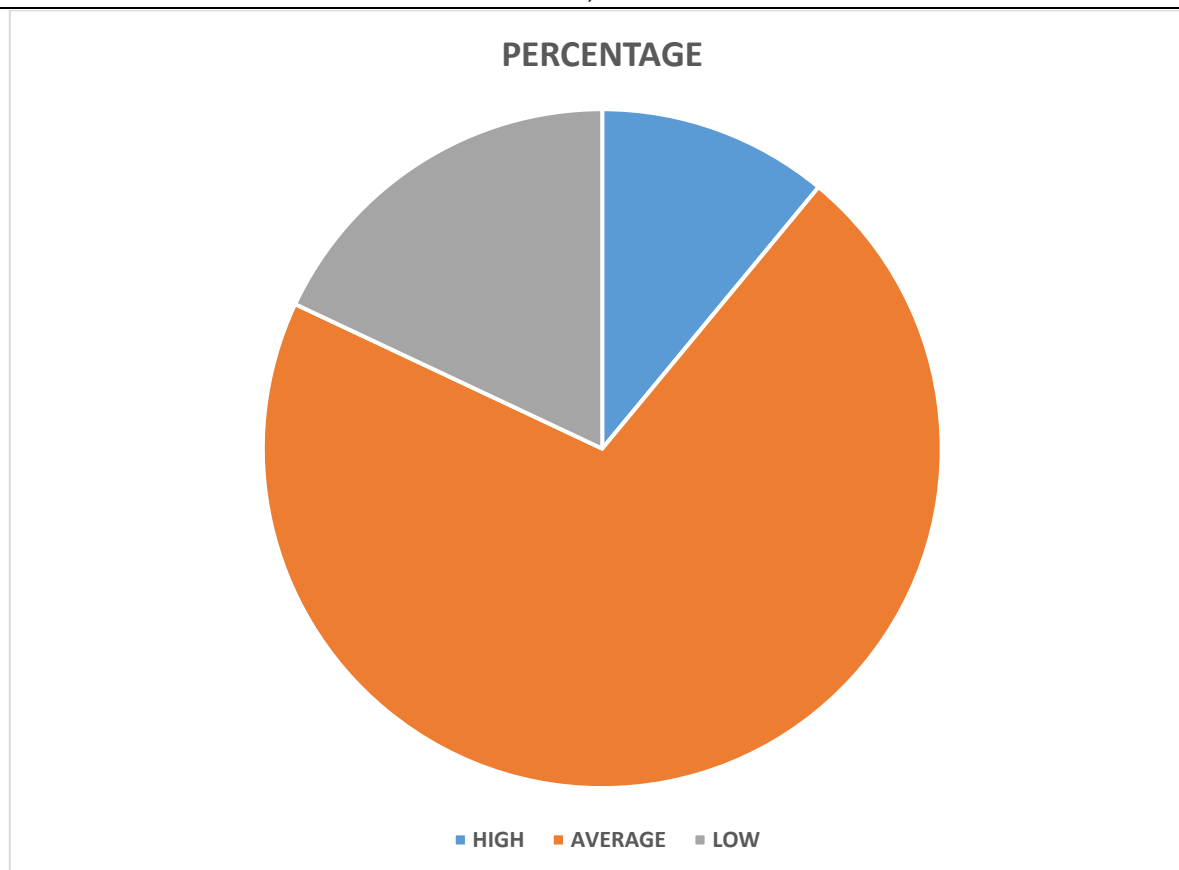
The PIRLS 2021 cohort adaptive design provides better cross-country measurement by better matching assessment complexity and student achievement levels. The cohort adaptive design is based on texts and tasks at three levels of difficulty-complex, medium, and easy-that are organized into booklets of two levels of difficulty. The more complex booklets include complex to medium texts and items, and the less complex booklets contain simple to medium texts and items. All booklets are distributed in each country, but countries with high average student achievement may provide complex booklets to a higher percentage of students (70%), while countries with low average student

achievement may provide a higher percentage of students [5].

In Kazakhstan, the concept of adaptive testing is one of the areas that is not considered, so students were not prepared for this format. The second aspect is the transition to digital assessment. In Kazakhstan, only from January 1, 2022, the subject "Digital Literacy" is introduced in the curriculum of elementary school. So it shows that computer literacy of students in the PIRLS 2021 study was very low. Students can make mistakes even pressing basic computer buttons.

PIRLS 2021 will take place during the global outbreak of the infectious disease "COVID-19". This also affected the results. The students received their education online. Until then, there was no practice of online education in Kazakhstan. This led to a decrease in the educational level of students. Lack of Internet in rural areas, insufficient funds for Internet access. Due to these inconveniences, the educational process was interrupted.

According to the UN Concept Note: Education in the era of COVID-19 and beyond August 2020, the COVID-19 pandemic caused the biggest disruption in education systems, affecting about 1.6 billion students in more than 190 countries. all continents. The closure of schools and other educational institutions affected 94 percent of the world's student population, compared to 99 percent in low- and low-middle-income countries [6].



According to the results of the PIRLS 2021 survey of Kazakhstan on the socio-economic status of the family 18% showed low social status, 71% - average social status, 11% - high level of social status. If we compare them with the UN data, we can see that in this country the average level of socio-economic conditions prevails, and this has an impact on the educational process. Having multiple children in one family and not having enough gadgets for all became a major problem during COVID-19.

Another problem that continues to hamper PIRLS research. Actual problems of native language proficiency, conscious learning of Kazakh language. "It is the duty of every citizen of the Republic of Kazakhstan to study the state language, which is a very important factor in grouping the people of Kazakhstan" [7]. Despite this, more than half of pupils in Kazakh classes cannot speak Kazakh fluently. This indicator has a great impact on students' reading literacy. One of the reasons for the spread of this situation is that all the information that children receive in the information space is in foreign languages. This is also an indicator of the lack of quality information digital base in the Kazakh language. There is no quality content in the Kazakh language, it is difficult to find interesting animations that attract the attention of students.

The reasons for the low dynamics of the current PIRLS study in Kazakhstan were mentioned. Currently works are underway to address the above issues. For example. In order to awaken students' desire to learn and turn reading into a skill. schools need to address the development of functional literacy and the development of Kazakhstani patriotism through the following important project activities:

"Book. Country. Spirit". Mass public movement "Reading Nation"; 2. "Bookcrossing". Organization of special places for book exchange; 3. "Precious Gift". Organization of a charitable campaign for voluntary delivery of books to libraries; 4. "Library - Center of Knowledge". Organization of meetings of students with library staff, literary evenings in student houses and student leisure centers [8].

In addition, in 2023-2024 academic year in Kazakhstan started the project "8 Minute Reading". The purpose of this project is to familiarize schoolchildren with reading books and to develop the child's reading literacy.

In conclusion, we note that Kazakhstan is working to improve functional literacy, including reading literacy. There are problems, ways to solve them are being considered. PIRLS, pandemic has revealed weaknesses in the sphere of education in Kazakhstan. Thanks to this, an education system corresponding to world standards will be created. Kazakhstan has learned the importance of reforming new ideas and programs in the field of education.

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DETERMINING THE LEVEL OF INTEREST IN MUSIC IN CHILDREN FROM 2 TO 3 YEARS OLD DURING INTERACTION WITH PARENTS

Skuratovich Yulia Igorevna

*postgraduate student of the Department of
General and Preschool Pedagogy,
Belarusian State Pedagogical University
named after Maxim Tank
Minsk, Belarus*

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Abstract

The article clarifies the importance of a child's musical interest. A diagnostic survey of parents of children aged 2 to 3 years is presented, revealing the level of interest in children in listening to music, which is proposed to be used by preschool teachers and music directors.

Keywords: interest in music, diagnosis of interest in music, musical perception, early age.

Musical interest is directed to the value sphere of the child's personality; it is a regulator of musical activity. Developing in early and preschool age, interest is a prerequisite for the formation of such elements of musical-aesthetic consciousness as aesthetic need, taste, ideas of beauty and contributes to the development of musical perception, the formation of the foundations of the child's musical culture. O. P. Radynova considers interest in the structure of musical-aesthetic consciousness. One of the results of the development of interest in music is the child's acquisition of initial value orientations and the development of an aesthetic attitude towards the art of music [2]. The study by O. N. Antsyrovich shows a statistically significant connection between manifestations of interest in the musical activity of children of senior preschool age with indicators of emotional responsiveness, musical thinking, and the success of children's musical activity, which allows us to consider interest as a system-forming quality in the structure of the foundations of a child's musical culture [1].

We have developed a diagnostic questionnaire for parents of children aged 2 to 3 years, which reveals the level of interest in children in listening to music. The questionnaire was developed in the online service for creating feedback forms Google Forms. Access link – <https://forms.gle/f7mtGjCEqvY8P2E19>. Parents need to go through it using technical devices, answering questions. The questionnaire consists of the following questions and suggested answers:

1. What importance do you attach to the problem of developing musical perception in your child?

a) Developing my child's musical awareness is important to me. I believe that developed musical perception sets the preconditions for the development of all musical abilities. In turn, musical abilities are closely related to mathematical, sensory and others, which also confirms the importance of developing musical perception.

b) I believe that developing a child's musical perception is not so important compared, for example, with speech and mathematical development.

c) I consider the development of musical perception unnecessary for my child.

2. Do you purposefully listen to music with your child?

a) Yes, we purposefully listen to music with our child.

b) No, we don't listen to music on purpose. However, we periodically turn on background music.

c) No, we don't listen to music on purpose, because we don't like doing it.

3. How often do you purposefully listen to music with your child?

a) We purposefully listen to music with the child every day or every other day.

b) We purposefully listen to music with the child once a week or month.

c) We purposefully do not listen to music with our children.

4. Does your child enjoy listening to music?

a) Yes, the child always listens to music with pleasure (even sings along and/or dances).

b) The child does not always listen to music with pleasure (from time to time he is indifferent to listening to music).

c) No, the child does not experience pleasure from listening to music (negative emotions arise when listening to it).

5. Does the child himself ask to turn on music in his free time, during games?

a) Yes, the child often asks to turn on music in his free time, during games.

b) The child himself does not ask to turn on the music due to undeveloped speech.

c) The child does not express a desire to turn on music in his free time, during games.

6. Are you developing an interest in music in your child?

a) Yes, I am developing an interest in music. We listen to music together, talk about it, play children's musical instruments, etc.

b) No, I don't develop an interest in music because I don't have knowledge about organizing this process.

c) No, I don't develop an interest in music, because I don't think it's necessary.

7. Does anyone purposefully engage in musical activities with the child (except for music classes in a preschool educational institution)?

- a) Yes, the child attends special classes.
- b) No, they do not purposefully engage in musical activities with the child, because there is no opportunity.
- c) No, I don't purposefully engage in musical activities with the child, because I don't think it's necessary.

8. Do you and your child attend children's plays and musical performances? If so, what is the child's attitude towards them?

- a) Yes, we do. The child enjoys going to children's plays and musical performances.
- b) Yes, we do. However, the child does not like attending these events (he begins to cry and be capricious a short time after the start).
- c) No, we don't visit because we don't want to.

The answers are subject to quantitative processing. For each answer under the letter «C» the subject receives 0 points; for answers with the letter «B», the subject receives 1 point; for each answer under the letter «A», the subject receives 2 points. Children who received 0-5 points have an insufficient level; a level close to sufficient refers to children with 6-11 points; children who score 12-16 points have a sufficient level.

In 2021, we tested this questionnaire for 47 parents. A sufficient level is typical for 9 respondents – 19%, a level close to sufficient for 31 respondents – 66%, an insufficient level belongs to 7 respondents –

15%. Analyzing the results of a survey of legal representatives of pupils, we drew attention to the fact that the majority of parents purposefully do not listen to music with children: 35 respondents (74%) spoke about the use of music as a «background». When listening to music purposefully or «in the background», 40 children (85%) do not always perceive it with pleasure (they are periodically indifferent to listening to music). The majority of parents do not develop an interest in music in their children: 39 respondents (83%) do not have knowledge about the organization of this process, which reflects the need to carry out work on their musicolological education.

This diagnostic questionnaire to determine the level of interest in listening to music in children aged 2 to 3 years is proposed to be used by subjects of the educational process (preschool teachers and music directors), because It is on the interest of the students that their further musical development and education depends.

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PHILOLOGICAL SCIENCES

THE MAIN TOPIC OF THE REPRESENTATIVES OF THE GERMAN-AZERBAIJANI EXILE LITERATURE

Muslumova Ofelya Surxay qızı

PhD in philology,

Ganja State University

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DAS HAUPTTHEMA DER VERTRETER DER DEUTSCH-ASERBAIDISCHANISCHEN EXILLITERATUR

Muslumova Ofelya Surxay qızı

PhD in Philologie,

Staatliche Universität Ganja

Abstract

In this article, the author talks about the typological similarities of German-Azerbaijani emigration literature. It also talks about the life and work of representatives of both literatures, about the difficulties of their life during emigration. The author describes the agonizing pain and longing for the Motherland, the painful and bitter life in exile of these figures.

As the author describes, figures in German emigration literature of this period warned all of humanity about the fear of an approaching war and called everyone to be vigilant. Despite all the tragedies of the German people in this period, the best works of German literature were created during these 12 years, which were included in the treasures of world literature. The main theme of both literatures, as the author notes, is the Motherland and its freedom. All writers dreamed of seeing their country free. The lines of both literatures are united by peace, equality, and the idea of countries living together in a peaceful atmosphere. Significant sons of Azerbaijan have great merits in the literary and cultural life of the country, such as M. Rasulzade, A. Ildirim, G. Baykara, D. Hajibeyli and many others, as the author notes, declared the struggle of "invincible Azerbaijan" to the whole world. Many prominent writers, including Thomas Mann, Heinrich Mann, B. Brecht, L. Feichtwanger, B. Kellerman, H. Hesse and others, created works that were able to reveal the strong will of the people to whom they belonged, the sense of responsibility for people Fate of humanity, of National Socialism, they revealed the inner face of German fascism, how dangerous it is for humanity, for the people and at the same time for the world. They risked their lives to raise the alarm to save humanity.

Zusammenfassung

In diesem Artikel beschreibt der Autor prominente Vertreter beider Literaturen, ihr Leben und Wirken in der Auswanderung und die Schwierigkeiten, die sie bei der Auswanderung erlebten. Der Autor erzählte von den bitteren Schicksalen der Vertreter beider Literaturen, die in der Emigration lebten, voller Sehnsucht und Leid für das Vaterland. Wie der Autor feststellte, warnten die deutschen Denker dieser Zeit die gesamte Menschheit vor dem bevorstehenden Krieg und forderten sie zur Wachsamkeit auf. Trotz aller Tragödien, die das deutsche Volk widerfahren, schufen sie in diesen zwölf Jahren so beispielhafte Werke deutscher Literatur, wie sie es waren in die Schatzkammer der Weltliteratur aufgenommen. Das Hauptthema der deutschen und aserbaidischen Auswandererliteratur ist das Vaterland und seine Freiheit.

Wie der Autor betonte, hatten die Vertreter beider Literaturen zeitlebens den Wunsch, ihr Heimatland frei und unabhängig zu sehen, und die Linie beider Literaturen verbindet die Idee von Frieden, Gleichheit und friedlichem Zusammenleben der Länder. In allen Fällen wurde das Ziel, die nationalen moralischen Werte der Völker, denen sie angehören, sowie der Völker der Welt zu schützen, in Richtung der Ideen aserbaidischen und deutscher Schriftsteller aufgegeben. Wie der Autor beschreibt, erklärten seine wertvollen Söhne, darunter M. Rasulzadeh, A. Ildirim, H. Baykara, C. Hajibeyli und andere, die große Beiträge zum literarischen und kulturellen Leben des aserbaidischen Volkes geleistet haben, das „unumkehrbare Aserbaidisch“. Krieg für die ganze Welt, obwohl er im Exil lebte. Viele prominente Schriftsteller, darunter Thomas Mann, Heinrich Mann, B. Brecht, L. Feichtwanger, B. Kellerman, H. Hesse und andere, schufen Werke, die den starken Willen der Menschen, denen sie angehörten, das Verantwortungsbewusstsein für die Menschen offenbaren konnten Schicksal der Menschheit, des Nationalsozialismus, enthüllten sie das innere Gesicht des deutschen Faschismus, wie gefährlich er für die Menschheit, für das Volk und gleichzeitig für die Welt ist. Sie riskierten ihr Leben, um Alarm für die Rettung der Menschheit zu schlagen.

Keywords: German, Azerbaijani, migration literature, typological resemblances, outstanding thinkers

Schlüsselwörter: deutsch, aserbaidisch, Migrationsliteratur, typologische Ähnlichkeiten, herausragender Denker

Die Geschichte der Kämpfe der Vertreter der deutsch-aserbajdschanischen Exilliteratur gegen den Krieg, Ungerechtigkeit und Despotismus ist sehr alt. Der hervorragendste Literaturforscher, der Professor des Instituts für Weltliteratur namens A.M.Gorki der Akademie der Wissenschaft von Russland J.B. Borev hat

die Grundmerkmale der Exilliteratur so gekennzeichnet:

- a) Sie steht zum Verhältnis der Struktur und Gesetze ihrer Heimat an der Seite der offenen Opposition
- b) Immer oder manchmal drückt sie bisschen schwächer die Schmerzen des Lebens
- c) Sie ist mit der Gegend der Heimat nicht direkt, sondern mit den Erinnerungen im Gedächtnis verbunden und ist vom modernen Leben ihres eigenen Volks in Bezug auf Zeit und Raum getrennt
- d) Sie fühlt im Voraus die historischen Veränderungen in ihrer Heimat
- e) Sie ist zur Zweisprachigkeit oder zwei Kulturen (z.B. das Schaffen von V. Nabokov), oder wenigstens einer Sprache durch eine andere Sprache oder zur Bereicherung der nationalen Kultur mit der Kultur seines Aufenthaltsland geneigt.
- f) Sie beobachtet ihre Heimat vom Innen und Außen.
- g) Schlägt Brücke zwischen den Ländern, Völker und Kulturen.[7]

Diese gezählten allgemeinen Eigenschaften gehören sowohl der deutschen als auch der aserbajdschanischen Exilliteratur und natürlich jede von dieser Literatur unterscheidet sich nach ihren ähnlichen und unterschiedlichen Merkmalen. Die allgemeinen ähnlichen Merkmale dieser beiden Exilliteratur assoziieren bestimmte Punkte, z.B. Den Wunsch seine Heimat frei, unabhängig und in der Ganzheit zu sehen! Die Stelle des aserbajdschanischen Exils in der nationalen Geistlichkeit, Kultur und Wissenschaft blieb lange Zeit aus den Augen, es wurde sehr wenig über die Gründe unseres Exils, von den wichtigsten Wellen, schöpferischen Menschen gesprochen. Das aserbajdschanische Exil war eine Glaube Einheit der Menschen, die mit ihren Heimatsboden eng verbunden waren, obwohl sie ein Exilleben führten, vergaßen sie nie und nirgends ihre Heimat und glaubten an die glückliche Zukunft und Freiheit ihrer Heimat und kämpften tapfer um ihre diese Ideen. In dieser Glaube Einheit stand an der vorderen und wichtigsten Reihe ihre Kultur und Literatur. Die hervorragendsten Vertreter der aserbajdschanischen Exilliteratur waren Mähämmäd Ämin Räsulsade, Mirsä Bala Mähämmädsade, Abdulvahab Jurdsever, Ähmad Dschäfäroglu, Ali bey Hüsejnsade, Hüsejn Bajkara, Gurban Said, Kärüm Ödär, Almas Ildyrym, Dschejhun Hadschibejli, Abaj Dagly, Ümmulbanyn, Sämäd Agaoglu und viele andere. Diese Emigranten haben in ihrem wissenschaftlichen und literarischen Schaffen nationales Ideal und Bewusstsein belebt. Sie haben in der Fremde mit den rechtvollen Gefühlen mit einer Sehnsucht nach ihrer Heimat, ein mit Mühe und Leid volles bitteres Leben gelebt. Nach uns bekannten Gründen wurde die Erforschung der aserbajdschanischen Exilliteratur nur in den Jahren der Souveränität von

Aserbajdschan möglich. Asis Mirachmadov, Bekir Nebijev, AlchanBajramoglu, Abid Tahirli, NikburDschabbarly, ÄbülfäsGarajev und die anderen haben in ihren Erforschungen von anderen Vertretern der Exilliteratur gesprochen.[2] Noch in den 70-80 Jahren des XVIII. Jahrhunderts entstand im feudalen Deutschland literarische Bewegung „Sturm und Drang“ als Protest gegen den Despotismus. Die bedeutendsten Vertreter dieser Bewegung waren J.W.Goethe, F.Schiller, H.Heine und die anderen. Sie haben in ihren Werken die Ideen des geistlichen Kampfes in die Literatur mit großer Meisterhaft gebracht. Der große lyrische Dichter H.Heine verließ seine Heimat wegen seiner politischen Gedanken und der ernsten Kontrolle der deutschen Zensur. Als er in Paris lebte, drückte er in seinem Gedicht „In der Fremde“ seine Sehnsucht, Liebe und seinen Schmerz nach seiner Heimat so aus:

Ich hatte einst,
Ein schönes Vaterland
Der Fichtenbaum
Wuchs dort so hoch,
Die Veilchen nickten sanft,
Es war ein Traum.[5]

Im Werk „Faust“ von J.W.Goethe, dass man die Enzyklopädie des deutschen Lebens nannte, äußerte der alte Faust seine Meinung so: „Der Grund des Lebens ist die mutige Arbeit und die gründliche Gewähr der Freiheit und des Fortschritts die Tapferkeit des Schaffens für Nutzen des Volkes (28, 8).Der von Goethe und Schiller begonnener literarischer Kampf um die Freiheit und den Fortschritt zeigte sich sehr aufschlussreich in der Literatur der 1900-1945 des XX Jahrhunderts. Es ist nicht zufällig, dass diese Periode nicht nur in Deutschland, sondern im ganzen Europa in eine sehr komplizierte historisch-gesellschaftliche Aufregungen geraten war. Die progressiven deutschen Literaturschaffenden dieser Periode warnten die Menschen von herannahendem entsetzlichem Krieg, vor den unendlichen Tragödien und riefen sie zur Wachsamkeit, zur Verantwortung für das Menschheitsschicksal. Die Katastrophen des deutschen Volkes in den Jahren 1900-1945 brachten viele Probleme sowohl in der Entwicklung der deutschen Literatur, bereicherte als auch die deutsche Literatur mit den zahlreichen Themen. Die kennzeichnenden Merkmale der deutschen Literatur in diesen Jahren waren scharfe Erhöhung der sozialen Aktivität, die direkte Verbindung mit den politischen und ideologischen Kämpfen u.a. [6] Der große deutsche Schriftsteller T.Mann nannte das „die Forderung des Tages,.. Aber infolge dieser Ereignisse entwickelten sich die deutsche Ideenwelt und die deutsche Literatur. Die sozial-politischen Aufregungen, Erschütterungen in den Jahren 1914-1923 erweckten bei den deutschen Philosophen und Schriftsteller über die Zivilisation, den Zusammenbruch der Idealen des XIX. Jahrhunderts, einen aufgeregten Streit mit dem Untergang von Europa verbundene Gedanken, den der alten Welt und seine Durchsetzung von neuen erleuchteten in ihren Romanen vom problematischen Aspekt die Schriftsteller, wie T.Mann, H.Hesse, B.Brecht u. a. „Was gibt der Exilliteratur eine unumstößliche Kraft? „ Solche eine Vorstellung darüber- ein Wort. Das Wort ist eine

Waffe, die im Dienste der Menschheit steht. Die verschiedenen Gruppen und Strömungen vereinigten sich nach diesem Streben zu dem kämpferischen Zugeständnis losen Humanismus“ – so schrieb Frans Weiskopf.[5] Obwohl mit entstandenem Zustand verbunden der größte Teil der deutschen Schriftsteller durch die ganze Welt zerstreut waren, lebte die deutsche Literatur immer mehr. Das waren nicht einfach „Massen von literarischen Emigranten“, sondern aber „Exilliteratur“. In diesen zwölf Jahren entstanden solche Vorbilder der deutschen Literatur, dass sie zum Weltliteraturschatz einbezogen wurden. Durch ihre leidenschaftliche Vergesellschaftung, Intensivität der literarischen Suche, reichliche Genre und nach dem Meisterschaft Niveau kam die Exilliteratur in Verzug von den hervorragenden Perioden nicht der existierenden langjährigen deutschen Literatur. Anfang des XX. Jh. besonders in den Jahren 1900-1945 vereinigten sich die Freiheitsideen des nationalen Freiheitskampfes der aserbajdschanischen Literatur mit der deutschen Literatur. In diesen Jahren standen M.Ä.Räsulsade, A.Ildyrym, A.Baydschan, A.Dagly, H.Baykara, K.Jajtschyly und viele andere mit der Repression des russischen Imperialismus Auge ins Auge. Nichts und niemand konnte sie von ihren Ideen wenden. Infolgedessen wurde zum ersten Mal im Osten eine demokratische Regierung errichtet – Aserbajdschanische Volksmacht. Nach zwei Jahren wurde diese Macht gestürzt, aber die Freiheits- und Souveränitätsideen lebten ewig in den Herzen von jedem.[1] Obwohl aserbajdschanische Schriftsteller ins Gefängnis geworfen und erschossen wurden, sangen sie ihre Freiheitslieder bis zum letzten Atem. Die Mitglieder der politischen Parteien führten illegale Tätigkeit, aber bald sahen sie, dass diese Tätigkeit unmöglich ist und zwar ihre Meinungen nicht veröffentlichen können, deshalb wurden sie gezwungen, sehr weit von seiner Heimat zu leben.[8]

Seit Jahrhunderten schuf das aserbajdschanische Volk ein sehr reiches und eigenartiges wissenschaftlich-literarisches Erbe sowohl in seinem Land, als auch sehr weit von seiner Grenze. Die wichtigsten politischen Prozesse, die in der Geschichte des Volkes geschahen, die Freiheits- und Souveränitätskämpfe, Eroberungskriege und bewaffnete Streike verursachten in verschiedenen Perioden dem starken Emigrationsstrom aus Aserbajdschan. Die aserbajdschanische Exilliteratur existierte und lebte nicht nur im XX. Jh. sondern auch in früheren Perioden stellten diese Literatur die mächtigsten Gelehrten, Künstler dar. Im XX. Jahrhundert nach der Verstärkung und Formulierung nationalen Bewusstseins und nationalen Staatsordnung Traditionen entfernte sich diese Exilliteratur von scholastischen Sitten und Ost-islamischen Grenzen und richtete sich völlig zu Aserbajdschan. Die erste Periode der aserbajdschanischen Exilliteratur beginnt in den Jahren 1909-1910 während der Stalypinrepression. Das Emigrationsschaffen von Ähmadbey Agaoglu, Älibey Hüsenjadä und wieder in die Heimat zurückgekehrte Mähämmäd Ämin Räsulsade trifft gerade zu dieser Periode.[3] Die nächste Periode der aserbajdschanischen Exilliteratur beginnt nach dem Sturz der Aserbajdschanischen Volksmacht, d.h. vom April 1920. In der deutschen und aserbajdschanischen Exilliteratur war das

Hauptthema **Heimat** und ihre Freiheit. Die Vertreter dieser Literatur lebten ihr ganzes Leben nur mit dem Wunsch ihrer freien Heimat und die meisten von ihnen konnten nicht mehr in ihre Heimat zurückkehren, doch setzten sie diesen Kampf bis zum Ende ihres Lebens. Das Schicksal der Vertreter der beiden Literaturen war sehr bitter und traurig. Eine Hauptidee verbindet diese beiden Literaturen und diese Idee ist die Rettung der Menschheit von der Gefahr und Leiden und gleichzeitig war mit dem Freiheitskampf verbunden. Die Linie dieser Literaturen vereinigt den Frieden, Gleichheit, die Idee des friedlichen Zusammenlebens der Länder. Es ist nicht zufällig, dass Mähämmäd Asad bey im Jahre 1918 von der sowjetisch-bolschewistischen Empörung in verschiedene Länder, wie nach Italien, Polen und nach Deutschland emigriert hatte. Er schuf hier die besten Werke jener Zeit, wie „Erdöl und Blut im Osten“, „12 Geheimnisse von Kaukasus“, „Weißes Russland“, „Der letzte Prophet“, „Russland am Kreuzweg“, „Schach Rsa“, „Allachu-akbar“. Der Autor trat immer gegen den roten Bolschewiken und man fühlte diesen Hass in seinen Schreiben: „Mein ganzes Leben lang kämpfte ich gegen den Bolschewismus. Zum Beweis, können meine zahlreiche und über zwanzig bändige, in viele kulturelle Weltsprachen übersetzte Werke gezeigt werden. Ich beherrsche nicht nur viele europäische, muslimische, russische Sprachen, sondern auch alle Idiomen, die im Territorium von Russland gesprochen werden. Das alles bestätigt, dass ich im Kampf gegen Bolschewismus ein Fachmann bin.“[3] Gleiche Gedanken hatten auch die Schriftsteller, Publizisten, Verleger in ihrem Schaffen in den Jahren 1918-1945 des vorigen Jh. welche dem Faschismus „nein“ sagten. Wie gesagt wurde, der gemeinsamste-antifaschistische Geist vereinigt sich mit antibolschewistischem Geist unter einer Idee. Die Vertreter dieser Literatur waren sehr begabte Schriftsteller, Dichter daneben auch unversöhnliche, kompromisslose Revolutionäre und Kämpfer. In der Lage der politischen Konfrontation zwischen den Kommunisten und Faschisten drückten die Schriftsteller die Freiheitsideen und Gefühle der einfachen deutschen Bauern und deutschen Bürger aus. Sie verfluchten den Faschismus mit der Sprache der literarischen Werke. In dieser Periode wurden viele bekannte deutsche Schriftsteller, T.Mann, H.Mann, B.Brecht, L.Feuchtwanger, B.Kellermann, H.Hesse und andere als Gewissen des deutschen Volkes gewertet und schafften solche Werke, die den festen Willen ihres eigenen Volkes ausdrückten und erklärten der ganzen Welt das Innenwelt des Faschismus und Nazismus, die schreckliche Gefahr, welche sie der ganzen Menschheit bringen konnten. Wegen ihrer Warnung wurden sie verfolgt, verhaftet, ermordet oder ins Gefängnis geworfen. In dieser Zeit in verschiedene fremde Länder emigrierte progressive Menschen setzten ihre Arbeit, ihren Kampf auch hier fort. Sie zeigten eine echte Bürgerkühnheit und trotz der Folgen und Überfälle schrieben sie neue Werke.[4] In diesem Schreiben war die rechtvolle Stimme von Aserbajdschan sehr klar hörbar. Die wertvollen Söhne des aserbajdschanischen Volkes, die große Dienste im literarisch-kulturellen Leben hatten, wie M.Ä.Räsulsade, Dsch.Hadschibeyli, Hilal Münshi, H.Baykara, A.Ildyrym, K.Öder, Ä.Yurdsever und

viele andere führten ein Emigrationsleben durch die Grenzen von der Türkei, Polen, Frankreich, Deutschland, Belgien, Italien und erklärten der ganzen Welt einen Kampf, den man "unabänderliches Aserbajdschan" nannte.[2]

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STORYTELLING IN THE ENGLISH CLASSROOM: EXPERIENCE OF TRAINING SESSIONS FOR TEACHERS

Olha Sushkevych

PhD, Associate professor,

Pavlo Tychyna Uman State Pedagogical University

28, Sadova str., Uman, Ukraine

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Abstract

The paper discusses the growing significance of storytelling as a representation tool for individuals and companies, emphasizing its role in communicative success or failure. It introduces a session conducted at Pavlo Tychyna Uman State Pedagogical University and Sumy State Pedagogical University (Ukraine) in October 2023, aimed at enhancing the English teaching staff's storytelling skills. The primary objective was to develop and refine methods and techniques for working with text and components of written and oral storytelling. The focus of the sessions was on understanding crucial elements of a story, such as characters, place, events, conflict, author-audience dynamics, and their embodiment in the text.

Keywords: storytelling, classroom, educators, communicative success, communicative failure.

Nowadays storytelling has become alike a business card of a person or a company. It is a marker of failures or successes in communication (1; 2). We deal with storytelling daily starting from routine small talks about our affairs ending up with significant projects, which reveal the image of our activities and ourselves (3; 4). Respectively, the skill of developing storytelling is gradually introduced in the English classroom starting from small dialogues and narratives, and ending up

with thematic projects and stories of various genres (1). This paper presents a session specially designed for both English teaching staff to master their professional skills of facilitating and developing storytelling with the students whose level of English is advanced. This session was realized at Pavlo Tychyna Uman State Pedagogical University and Sumy State Pedagogical University named after A. S. Makarenko (Ukraine) in October 2023.



Illustration 1.

Students and staff of the Faculty of Foreign Languages (USPU) with their short stories after the training session.

The purpose of the session is to develop and improve the methods and techniques of working with text and components of written and oral storytelling.

The first step of the session procedure involves the focus on the classic structure of the story development given below. The main point is to analyze what elements are crucially important for a story and what parameters it involves (e.g. characters, place, events, conflict; the interplay of the author and audience; communicative and pragmatic embodiment of these issues in

the text, etc.). The participants of the session are suggested a range of Wh-questions to brainstorm ideas about these elements of writing (e.g. What is the life story behind the character's face? What are his biggest fears? Why are you together now? etc.). Besides, the students and staff are given a wide choice of possible places and people to choose for their stories. They also enjoy full freedom to develop the plots the way they prefer.

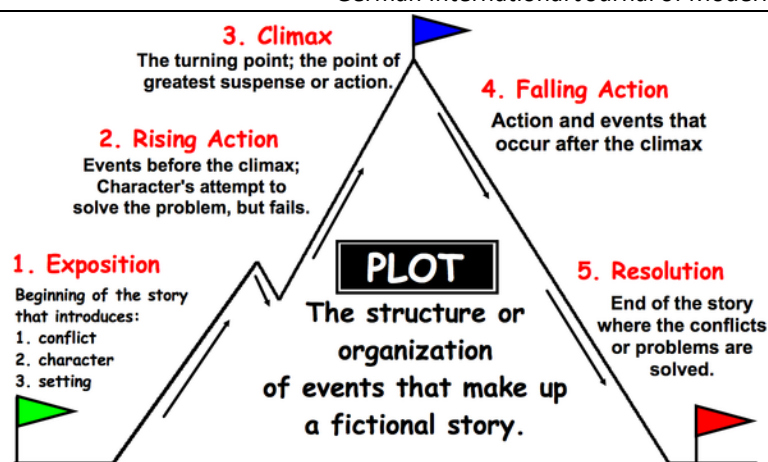


Illustration 2. The classical structure of a story

During this stage, the participants of the session are suggested to focus their attention on the creative personality of the writer, who works on a series of short stories and is currently experiencing a creative crisis. The teaching staff is asked to analyze the factors that could affect the writer's burnout, as well as how to help get out of such a crisis as if helping a student to get involved in a story development.

The second step of the session presupposes brainstorming concerning the quality and attractiveness of the story and how to facilitate the students to develop the ability to create bright characters, descriptions of the place of action / unfolding events, and dialogues between heroes. The combination of visual, oral, physical, audial, and sensual is highly recommended (i.e. some students can contribute to the story with their illustrations, others with narration, performing skills, or analysis, etc.). Thus, the participants of the seminar can be asked to choose the roles of "an illustrator", "a narrator", "a compiler of dialogues", "a historian" or "a character". According to his status, everyone has the opportunity to participate in the development of the story according to its classical structure. Thus, the students can be involved in cooperative activities and reveal their skills and abilities.

At this stage, the faculty and students have the opportunity to cooperate in the creative process of storytelling, choosing the main and secondary characters, the places where the events evolve, the main conflict and ways to resolve it, as well as participating in the creation of non-intersecting dialogues between the characters. This phase of the session reveals students' cooperative skills and teachers' ability to facilitate the whole process for the sake of creating unprecedented stories.

At the next stage, the teachers' function is to coordinate story editing, making them coherent and cohesive, and generally flow well. They joined their efforts with the students to compose a full-fledged story.

In the end, each team had the opportunity to present their story orally and act it out in front of the audience.

The session ended with a summary of the developed activities and an exchange of opinions regarding the use of the proposed activities and tasks when working with students.

In conclusion, we would like to provide the feedback received from Olena Bahatska (SSPU) after the training session, "The major goal of the master class was nothing short of ambitious – to traverse the intricate landscapes of narrative expression. In an era where storytelling has become both a timeless art and a contemporary dynamism, Olha Sushkevych posed a compelling inquiry: What differentiates a singular, monolithic narrative from the rich tapestry of poly storytelling, where multiple narratives converge and entwine? It is a question that resonates deeply with the students and scholars of English philology, who understand that the mere turn of a page can lead to the discovery of profound truths about the human experience".

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TECHNICAL SCIENCES

EMBRACING SERVERLESS ARCHITECTURE: A REVOLUTION IN COMPUTING

Gasimzade Elgun

Master of Science Candidate

Kapital Bank (Software Engineer)

Sumqayit, microregion-11, home-4, flat-17

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Abstract

In today's fast-paced world of technology, serverless architecture is redefining the way we approach computing. This article delves into the key aspects of serverless architecture, comparing it to traditional server-based systems and highlighting the benefits it offers in terms of streamlined deployment, accelerated development, and technical prowess.

Keywords: Serverless Architecture, Deployment, Development Efficiency, Autoscaling, Cost Optimization, Distributed Computing, Managed Services, Micro services, Serverful Architecture, Time-to-Market, Development Efficiency

In the fast-paced world of technology, staying ahead of the curve is a necessity, not a luxury. Embracing serverless architecture signifies a transformative revolution in computing, challenging conventions, redefining deployment processes, and pushing the development cycle to new frontiers. This is not an incremental step; it's a paradigm shift. In this article, we'll delve deep into the world of serverless architecture, where streamlined processes meet technical innovation, and time-to-market is measured in leaps, not steps.

1. Comparative analysis of Serverless and Serverful Architecture

1.1. Comparing Serverless and Serverful: The Paradigm Shift

Before we delve into the intricacies of serverless architecture, it's crucial to understand the stark contrast with traditional server-based systems. In a serverful (or server-based) setup, applications are deployed on pre-defined servers. This approach necessitates the manual provisioning of servers, meticulous configuration, and often elaborate infrastructure management. Scaling to accommodate increased traffic is a manual process, and the costs associated with maintaining these servers can be exorbitant.

In contrast, serverless architecture abstracts the underlying infrastructure, allowing developers to concentrate solely on coding. The serverless paradigm leverages microservices, which are autonomous, fine-grained functions. These microservices are independently deployable, scalable, and managed by the serverless platform. As a result, the entire deployment process is transformed. The laborious and time-consuming server provisioning and configuration of traditional systems give way to a highly efficient and rapid deployment process.

1.2. Streamlined Deployment Process: Unpacking Microservices

Before the advent of serverless architecture, deploying applications often required a painstaking, resource-intensive, and time-consuming endeavor. Developers had to wrestle with provisioning servers, configuring environments, and managing intricate network setups.

With the introduction of serverless architecture, the deployment process is revolutionized.

Microservices, the foundational units of serverless applications, are the key to this transformation. Each microservice serves a specific purpose, such as user authentication, data processing, or content delivery. These microservices are not only independently deployable and scalable, but they are also managed by the serverless platform. To put the impact into perspective, consider a scenario where a complex monolithic application would have required weeks or even months to deploy in a traditional server-based environment. With serverless microservices, this process can be completed in minutes or hours. The result is a remarkable reduction in deployment time and an exponential increase in deployment efficiency.

1.3. Analysis of Serverless vs. Serverful: The Power of Abstraction

The critical distinction between serverless and serverful architecture lies in the abstraction of infrastructure. In serverless, the cloud provider dynamically allocates resources, ensuring the application can automatically scale in response to traffic fluctuations. Manual intervention, which was once a necessity in serverful environments to adjust resources, has been eliminated. This not only streamlines the deployment process but also ensures that applications remain responsive during traffic surges without the need for manual scaling.

Additionally, in serverless architecture, there's a clear separation of concerns between infrastructure management and application development. This separation enables development teams to focus on coding and building features, while the cloud provider takes on the responsibility of managing the underlying infrastructure. In contrast, traditional server-based systems require significant effort and expertise to manage servers, networking, and system configurations.

2. The advantages of Serverless Architecture

2.1. Development Efficiency: Unleashing the Power of Code

The revolutionary impact on the development process cannot be overstated. In a serverless ecosystem, infrastructure complexities are abstracted into oblivion. Developers are free to dive headfirst into crafting code, perfecting functionality, and delivering features at an unprecedented pace. The laborious tasks of configuring servers, managing security updates, and fine-tuning network settings, which were once integral to the development process in serverful setups, have been replaced by a laser-focused approach on writing code.

The key reason behind this efficiency is the elimination of infrastructure constraints. In serverful setups, developers spent considerable time configuring servers, managing security updates, and fine-tuning network settings. Serverless architecture shifts the focus to code, reducing the time and effort spent on infrastructure management.

2.2. Autoscaling: Meeting Demand with Precision

One of the standout technical advantages of serverless architecture is autoscaling. In a traditional server-based system, scaling to accommodate increased traffic requires manual intervention, often leading to either under-provisioning or over-provisioning of resources. This approach can affect application performance and incur unnecessary costs.

Serverless platforms, on the other hand, excel at dynamic resource allocation. They seamlessly adapt to your application's needs, ensuring optimal performance and cost-efficiency. When traffic surges, serverless platforms automatically scale out to handle the increased load, and when traffic subsides, they scale in to conserve resources. This precision in resource allocation optimizes cost and ensures that your application remains responsive under varying workloads.

2.3. Cost Optimization: Pay for What You Use

In traditional server-based systems, you're tasked with the financial burden of maintaining servers, often regardless of their utilization. Whether your servers are actively processing requests or idling, the costs persist. Serverless architecture introduces a refreshing change. You pay only for the resources consumed during code execution. If your code isn't running, you're not incurring costs. This pay-as-you-go model eliminates the need to provision and maintain servers around the clock. The result is a cost-effective solution that aligns your expenses directly with the usage of your application, making it particularly suitable for workloads with variable traffic patterns.

2.4. Distributed Computing: Microservices and Fault Tolerance

The heart of serverless architecture is its reliance on microservices. These autonomous, fine-grained functions enable a distributed computing model, enhancing fault tolerance and resilience. In a traditional setup, achieving comparable levels of fault tolerance and resilience often required complex and expensive infrastructure configurations. With serverless microservices, the distribution of tasks across multiple functions and resources becomes the norm. This distribution reduces the risk of a single point of failure. Even if one microservice encounters an issue, it doesn't bring down the entire application. Instead, other microservices continue to operate independently, ensuring the application's overall stability and availability.

Conclusion

The impact of serverless architecture on the world of computing is nothing short of revolutionary. It redefines deployment processes, accelerates development cycles, and offers a host of technical advantages that make it a compelling choice for modern businesses. By embracing serverless architecture, organizations can streamline their deployment processes, enhance development efficiency, and ensure cost-effective scaling to meet evolving demands. In this age of rapid technological advancement, the future of computing is here, and it's called serverless. It's not just an evolution; it's a revolution.

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THE DISCOVERING OF CHITIN, ITS DERIVATIVES AND THEIR CHEMICAL PROPERTIES

Klishanets Alena,*Assistant Professor, Ph.D.***Stempen Igor,***Senior Lector**Yanka Kupala State University of Grodno**Ozheszko str., 22; 230023, Grodno, Belarus***Alantsyeva Tatsiana***Senior Lector**Institute for Professional Skills Upgrading and Retraining**Gagarina str., 18/2; 230011, Grodno, Belarus*[DOI: 10.5281/zenodo.10402152](https://doi.org/10.5281/zenodo.10402152)**Abstract**

Nowadays, the biopolymer chitin and its derivatives have been of certain scientific interests. Due to unique properties such as biocompatibility, biodegradability, nontoxicity, they have been applied in different fields: medicine, ecology, food industry and agriculture. All over the world, the shell of commercial crustaceans, the squid's gladius, the cuttlebone of cuttlefish, the silkworm pupa, the cockroaches, the biomass of microorganisms, diatoms, and bee-pods can serve to isolate chitin and its derivatives (chitosan, chitin-glucan complex) on the production scale. But, it has been established that the use of crustaceans as a source of chitin is very costly. At present, a negative factor is the contamination of the shells with heavy metals and other toxic waste products, which tends to increase. One of the sources of chitin and its derivatives can be the waste products of microbiological industry, in particular, *Aspergillus niger* L-4 biomass, a by-product of citric acid production. According to various sources, the cell wall of *Aspergillus niger* L-4 biomass may contain up to 30% of chitin, strongly bound to β -glucan and melanin in the chitin-glucan complex. The presence of β -glucan changes the properties of this biopolymer compared to native chitin and gives the valuable opportunities for application of chitin-glucan complex. Thus, the isolation of the chitin-glucan complex from the raw mycelium of the fungus *Aspergillus niger* requires low costs and at the same time solves a number of problems associated with the processing of the by-product. A very urgent task for the Republic of Belarus is to develop a technology for isolating the chitin-glucan complex from domestic raw materials, namely from the by-product of citric acid production.

Keywords: chitin, chitosan, chitin-glucan complex, biocompatibility, biodegradability, demineralization, deproteinization.

The excretion of radionuclides, toxic substances, pathogenic microorganisms from the human body contributes to healthy well-being and increasing lifespan. In recent years, special attention has been paid to the biopolymer chitin and its derivatives. Due to unique properties such as biocompatibility, biodegradability, nontoxicity, they have been applied in different fields: medicine, ecology, food industry and agriculture. The sources of chitin and its derivatives are the shell of commercial crustaceans, the squid's gladius, the cuttlebone of cuttlefish, the silkworm pupa, the cockroaches, the biomass of microorganisms, diatoms, and bee-pods. In the Republic of Belarus, fungi, insect scum, earthworms can serve to isolate chitin on the production scale.

One of the sources of chitin-glucan complex can be the waste products of microbiological industry, in particular, *Aspergillus niger* L-4 biomass, a by-product of citric acid production. According to various sources, the cell wall of *Aspergillus niger* L-4 biomass may contain up to 30% of chitin, strongly bound to β -glucan and melanin in the chitin-glucan complex.

The presence of β -glucan changes the properties of this biopolymer compared to native chitin. Antitumoral and wound-healing properties, ability to treat bacterial and viral diseases, ability to adsorb carcinogens, heavy and radioactive metals, ability to increase

storage period of food products are the valuable properties for application of chitin-glucan complex as an ingredient for therapeutic and prophylactic nutrition.

It has been established that in the Republic of Belarus, the use of crustaceans as a source of chitin is very costly. At present, a negative factor is the contamination of the shells with heavy metals and other toxic waste products, which tends to increase.

Thus, the isolation of the chitin-glucan complex from the raw mycelium of the fungus *Aspergillus niger* requires low costs and at the same time solves a number of problems associated with the processing of the by-product. A very urgent task for the Republic of Belarus is to develop a technology for isolating the chitin-glucan complex from domestic raw materials, namely from the by-product of citric acid production.

Chitin was first isolated by A. Braconnot in 1811 from the cell walls of mushrooms and was named "fungine". In 1823, "fungine" was renamed into "chitin" by A. Odier. Only in 1931 G. Rammelberg identified "chitin" and "fungine" and gave these substances the common name "chitin". Research of possible applications of chitin began after the synthesis of chitosan in 1859 by C. Rouget [1].

The variety of practical applications of chitin and its derivatives is illustrated by high bioactivity and de-

gree of polymerization and acetylation. Chitin exhibits high reactivity in swelled state and this state can be used to synthesise its derivatives.

Chitosan is an aminopolysaccharide, produced by deacetylation of chitin. The amount of acetyl groups can be described by the degree of deacetylation. Scientists still argue about the terms "chitin" and "chitosan" [1]. One of the important properties of chitin is polymorphism. Chitin can occur as three allomorphs, namely the α -, β - and γ -forms. According to A. Komi and R. Hamblin, the allomorphs differ in the orientation of the micro-fibrils.

It should be noted that at present chitin, which is isolated from the commercial crustaceans, has been studied to the greatest extent; because of this chitin is the most suitable material for synthesis of chitosan.

Chitin-glucan complex is a structural component of the fungal cell wall. Different species of fungi are known to have different structural compositions of chitin and β -glucan making up the chitin-glucan complex in its cell walls. Due to the existence of β -glucan and melanin, chitin-glucan complex has useful properties. The most important of them are the sorption ability towards carcinogenic agents and radioactive substances within gastro-intestinal tract [2].

An important property of chitin is its biocompatibility with human tissues, that allows to use it in medicine. Biodegradability and ability to stimulate regenerative processes in wound healing increase the possibility of chitin application in medicine. The author [3] notes that chitin has no allergic effect and is non-toxic. Moreover, an important advantage of chitin is its ability to dissolve in the human body under the influence of lysozyme, that allows its use as a surgical suture material for intracavitary operations.

Chitin and its derivatives demonstrate antitumoral and immunostimulatory properties, which allow them to be used for the production of aprotogenic surgical threads, contact lenses and skin substitutes [4].

The authors [3] have found an explanation for the ability of chitin to reduce the growth of pathogenic microorganisms through the biopolymer's property of sticking microbial cells together and facilitate the penetration of their cells. The author [3] has noted that chitin's ability to produce infinitesimal quantities of hydrogen peroxide contributes to wound healing.

However, it should be noted that the mechanism of action of chitin in human blood is not fully understood. The authors [3] have presented the summary of results of the interaction of chitosan with proteins and nucleic acids, of the antiviral and antitumoral properties of chitosan derivatives, of creation of micro- and nanoparticles of different structures, of the chitosan-containing preparations, bioresorbable surgical suture materials.

The authors [2] have considered the possibility of using chitosan in biotechnology and medicine due to such properties of chitosan as biocompatibility and biodegradability by using chitosan as a covering for wound treatment, which allows to avoid additional disinfection of the wound surface.

Hypocholesteric activity of chitosan was demonstrated in pre-clinical tests. It has been shown that the

addition of chitosan to the diet reduces levels of plasma cholesterol. Research has shown that the use of chitosan as a dietary supplement controls adiposity and can lower cholesterol levels in the blood serum, but the authors have made the important conclusion that chitosan-based supplements cannot be recommended for people with an allergy to crustaceans [5].

The amino groups in macromolecules of chitosan make it more active and reactive. Due to ability of chitosan to dissolve in dilute solutions of organic and mineral acids to form colourless viscous solutions, chitosan is used in food industry as a thickening agent, jelly-forming agent and complexing agent. This fact is analyzed in the process of protein extraction from the flushing water in the ground meat industry.

Chitosan can be used as a stabilizer, in the creation of edible packaging, for the clarification of juices, beer and wine. Low-molecular weight chitosan is used as a flocculant and clarifier for beer and wine, and high-molecular weight chitosan is used as a film forming agent for food packaging. The authors [6] recommend using of chitosan-based plastic food wrap for food packaging. As a result of studies, it was found that the use of chitosan-based plastic food wrap even with low concentrations of chitosan can inhibit the growth of pathogenic microorganisms and protect the product from the ingress of moisture.

Researchers from the US Department of Agriculture Research Center in New Orleans suggest the use of chitosan as a preservative to preserve the fresh taste of beef, because carboxymethyl chitosan is consistent with muscle proteins in meat and can bind iron atoms, preventing their reaction with oxygen [7].

As a result of experiments [8] it was found that chitin and chitosan are not inferior in their sorption capacity to other adsorbents used in wine industry, so there is a possibility of using chitin and chitosan for adsorption of phenolic compounds in white grape wine production.

In the cosmetic industry, chitosan is used as a gelation agent, film forming substance and anti-inflammatory agent. Chitosan-based shampoos give hair elasticity, help relieve static electricity due to ionic adsorption, and can be used for skin disorders. The antibacterial and hypoallergenic properties of chitosan allow the develop creams for problematic skin, and the gel-forming properties of chitosan can be used in the production of gels and mousse for hair styling.

The disinfecting properties of chitosan allow it to be used to protect fruits and vegetables from infecting agent. The methods of using chitosan for post-harvesting treatment of apples, oranges, strawberries, peaches, cucumbers in order to prevent their infection with pathogens of various kinds of rots are proposed.

The preparations based on chitin-glucan complex have been developed for pre-sowing treatment of seeds, increasing the yield and resistance of crops to diseases.

Thus, according to literature, chitin and its derivatives are unique natural biopolymers with many useful properties: biocompatibility, biodegradability, nontoxicity and bactericidal activity. These properties provide an opportunity to apply these biopolymers in all fields. But although a lot of research have been done, there are

still a lot of unresolved issues. One of the main problems is the development of scientific-methodological bases for analytical control of chitin, chitosan, its derivatives as well as products containing these biopolymers.

Currently, there are no technical requirements for raw materials for isolation of chitin and for quality characteristics of chitin in order to use it in a specific field of industry or in medicine. Moreover, the raw material base for chitin and its derivatives production is insufficiently studied, the problem of chitin and its derivatives production by ecologically clean wasteless technologies is acute, and the issue of normative and authorization documentation for products and substances containing chitin, chitosan, their modifications are also important.

The results of research of the morphological structure, chemical composition and X-ray diffraction analysis of the chitin-glucan complex obtained from a by-product of the citric acid production of *Aspergillus niger* L-4 biomass, as well as research of deproteinization and demineralization parameters of chitin-glucan complex extraction from it with the purpose of its further application in food industry and ecology have been described in [9].

According to the current epidemiological situation, it is also reasonable to extract chitosan or its modifications in order to investigate the possibility of using it as a medicine to cure the consequences of coronavirus infection.

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ELECTRIC ARC WELDING OF MAIN PIPELINES

Toirov M.Sh.,*PhD Doctor Navoi State Mining and Technology University***Karimov K.A.,***professor at Tashkent State Technical University named after I. Karimov***Mardonov B.T.***professor Navoi State Mining and Technology University*[DOI: 10.5281/zenodo.10402175](https://doi.org/10.5281/zenodo.10402175)**Abstract**

This article describes the main processing methods, materials and equipment used in welding joints of pipelines in Russia. A comparison of various types of welding performance is given. The methods of non-destructive testing of welds, and promising methods used to eliminate the detected defects.

Keywords: welding, pipeline, repair of pipelines, defectoscopy.

Today, the political and economic importance of the water, chemical and oil and gas complexes for the Republic is difficult to overestimate. The consistent development of the oil and gas industry in the Republic requires constant work to further improve pipeline systems, which are the most effective mode of transport of hydrocarbon and other raw materials and products of their processing. This task is especially relevant in light of a number of major oil and gas pipeline projects being implemented in Uzbekistan. It is known that at the present stage of development of technology for the construction of main pipeline systems, the welded method of connecting sections is the main one. The quality of welding work, along with other influencing factors, is the basis for the further safe operation of the pipeline transport system and its economic efficiency [1].

In the Republic of Uzbekistan, seamless and electric-welded (straight and spiral-seam) steel pipes are currently used for the construction of pipelines, mostly made of low-alloy steels, including thermally and thermochemically hardened grades St20, 09G2S, etc. [2]. According to instructions VSN 2-124-80 and VSN 171-84, pipelines can be laid continuously or in sections. When constructing main pipelines, a sectional laying method is used. Pipes arriving at field welding bases are connected into sections 24-36 m long, after which the sections are transported to the assembly site (route) and welded into strings. All connections on the main threads are made by butt welding; the use of backing rings is not permitted. When connecting pipes into sections, rotary joints are used; when welding sections into strands, non-rotary joints are used [3].

The use of internal centering devices makes it possible to mechanize the assembly operation more fully; in addition, the assembled joint is completely accessible for welding, allowing the root weld to be performed from start to finish without stopping or tacking, which has a positive effect on the quality of the welded joint. When connecting pipeline sections into strings, the use of pipe layers and internal hydraulic centering devices provides a high degree of mechanization of the assembly process, however, welding work is usually performed manually using electric arc welding. When assembling and welding sections at field bases, mechanized lines are used. The sections are assembled using an internal centering device, which is used as a rotator.

The root weld is performed by manual electric arc welding with coated electrodes, semi-automatic welding with flux-cored wire or in a carbon dioxide environment. After completing the root welds, the assembled section is transferred to the second stand, where the joints are finally welded by automatic machines under a layer of flux [3, 4].

According to international researchers conducted by the International Welding Institute, the following traditional arc welding processes will remain the main ones when welding in field conditions: coated electrodes; semi-automatic consumable electrode welding using solid wire and flux-cored wire; submerged arc welding; various options for electric contact welding. For welding main pipelines, special electrodes are used (YOHИ-13/45, type Э42А; YOHИ-13/55K, type Э46А; YOHИ-13/55, type Э50А; O3Л-6, type Э46; type Э50А; type Э50А, etc.), used for welding in any position and providing increased ductility, (mechanical properties of welds), impact strength and resistance of the weld metal to cracking at low temperatures (down to -40 °C).

As welding materials when making rotary joints by welding under a layer of flux, fluxes are used in accordance with ГОСТ 9087-8, АН-348А, АН-60, ОЦ-45, АН-47, АН17-М, as well as ceramic fluxes in accordance with ГОСТ 30756-2001 КБС-19 and АНФ-32 and solid welding wires in accordance with ГОСТ 2246-70 СБ-08ГА, СБ-08Г2А, СБ-10HMA, СБ-10HЮ, СБ-08MX, СБ-08ГНМ, flux-cored wires are also used like the others (for example ПП -АН24); When forming a root weld, flux-copper pads and movable flux pads are used [5].

In order to increase the productivity of pipeline laying work, the process of welding joints is divided into a number of sequential operations. For example, when making non-rotating pipeline joints, the flow-dissected method has been used, when a team of assemblers and several teams of welders are simultaneously involved. The responsibilities of the assembly team include assembling the joints using an internal centering device. Following the assemblers, each of the welding teams performs its own layer of the seam, and each of the welders performs a certain section of this layer. The free formation of the root weld is ensured by the action

of surface tension forces, therefore the highest productivity among arc welding methods is ensured when welding with solid wire in a protective atmosphere of carbon dioxide.

When welding with coated electrodes, flux-cored wire, under a layer of flux, the volume of the liquid bath is larger due to the molten slag, which means the productivity of these methods is lower. In order to ensure a high rate of welding work, gas-electric welding is performed with two or more arcs. The stability of the formation of weld metal in the lower, vertical and ceiling positions, with uniform penetration of the edges and the formation of a reverse bead on the inner surface of the joint, is achieved by cutting the edges of the joint with a blunting of 2-3 mm (bevel angle 20-250) and moving the electrode with oscillations across the seam (frequency 1,7-2,0 Hz).

When welding non-rotating joints, the current and welding speed are changed synchronously with the position of the weld pool along the perimeter of the joint. As an example, we can cite the welding mode of a fixed joint in a carbon dioxide environment using solid welding wire of the Sv-08G2S, Sv-10GSMT brands with a diameter of 1,2-1,4 mm. Root weld mode: current 150-220 A, arc voltage 20-23 V, welding speed 15-20 m/h, electrode oscillation amplitude 2,5 mm. Mode for performing a filling or facing seam: current 140-200 A, arc voltage 21-23 V, welding speed 7-15 m/h, electrode oscillation amplitude 10-14 mm. When arc welding in shielding gases, pulsed arc welding gives the best results.

Powerful thyristor and inverter arc power sources make it possible to synchronize the process of transferring metal droplets from the electrode to the weld pool

with current pulses. Inverter technology provides flexibility in arc control and metal behavior as it transfers from the electrode to the molten pool, which improves weld formation conditions, significantly reduces metal spatter and increases welding productivity. Pipeline construction experience shows that the most productive and economical welding method in the field is flash butt welding. Welded joints have the required mechanical properties, while continuous reflow takes 70-90 seconds. The power consumption for this type of welding is 2,0-2,5 kW/cm², and the heated ends of the pipes are upset at a speed of 10-15 mm/s.

TKYC type units are designed for contact flash butt welding. The main unit of stationary installations of the TKYC type is a one-piece assembly and welding head, which has a ring transformer and a mechanism for aligning the abutting edges with a hydraulic drive for clamping, melting and upsetting of pipes. Due to the high cost, the use of resistance welding machines is economically justified with a high concentration of welding volumes. Quality control of welding during pipeline construction includes: certification of welders; certification of technological maps for welding; acceptance criteria based on the results of non-destructive testing and hydraulic tests of joints; monitoring compliance with technological requirements. According to the current regulations VSN 2-124-80 and VSN 171-84, in critical areas, 100% of completed control acceptance joints (KSS) are subjected to control of welds, Fig. No. 1. In other areas, random control is allowed. The main methods of non-destructive testing used in pipeline inspection: magnetographic; ultrasonic; radiation; electromagnetic [6].

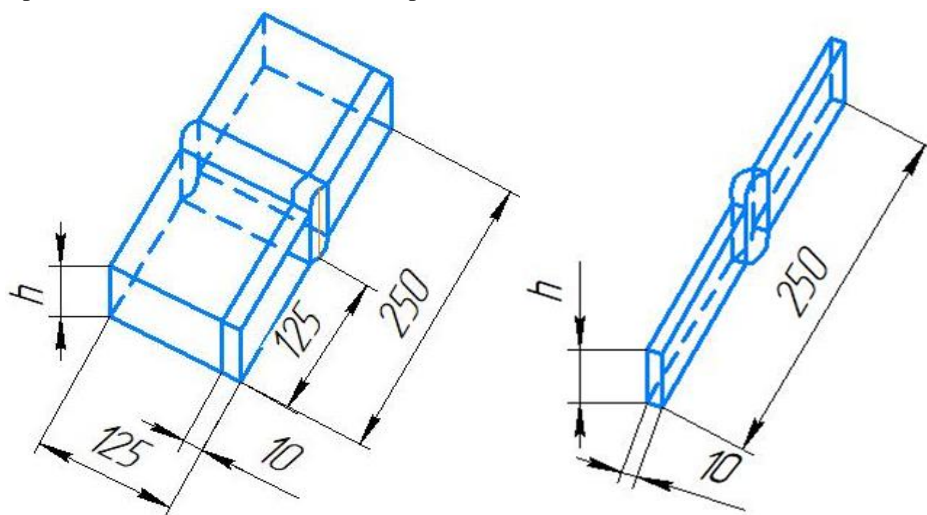


Fig.1. Sample for control delivery stick.

An obligatory element of maintenance and repair during the operation of pipelines is to determine the location of a possible defect and the degree of damage to the walls. As a result of the examination, the presence and type of detected defects are determined. On damaged pipeline sections, the following repair methods are used: welding the damaged section using electric arc welding; formation of high-strength fiberglass on the surface of the pipe, which allows you to restore the original load-bearing capacity of the pipe; the use of

overhead reinforcing elements, in which oval-shaped patches are used, with a large perimeter-to-area ratio, increases the leg and depth of penetration of the root of the seam. Methods for repairing pipelines using explosion energy are very promising. On the basis of industrial tests, a complex of technological processes and technical means for their implementation has been created. Technological processes and technical means of using explosion energy during the repair of pipelines have passed the state examination for safety of use, the

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RESEARCH OF DATA MINING METHODS

Zaman Zeynalov,*PhD., Azerbaijan State Agricultural University (ASAU),
information Technologies Department.***Ayten Aliyeva,***Ass., Azerbaijan State Agricultural University (ASAU),
information Technologies Department***Naila Hasanova,***Ass., Azerbaijan State Agricultural University (ASAU),
information Technologies Department***Shahla Babayeva,***Ass., Azerbaijan State Agricultural University (ASAU),
information Technologies Department***Aysel Xocayeva***Ass., Azerbaijan State Agricultural University (ASAU),
information Technologies Department*[DOI: 10.5281/zenodo.10402197](https://doi.org/10.5281/zenodo.10402197)**Abstract**

The article discusses data mining methods based on various research materials. Some basic methods and examples of using tools used for data mining are discussed.

Keywords: analysis, methods, data, clustering, decision tree.

Introduction.

Today, the proliferation of communication tools, simplification of their use and lower prices have led to easier access to information [1]. Against the background of the growth of information and communication technologies and improving their quality, the volume of digital information is increasing in geometric rows every year. The expansion of Internet access creates a revival in the growth of the volume of information created and collected at a really huge pace.

The expansion of the Internet and easy access to information are considered various means of distortion and analysis of information.

One such tool is data analysis methods.

Material and method.

Data analysis - the field of mathematics and computer science, engaged in the construction and study of the most common mathematical methods and computational algorithms for obtaining knowledge from experimental (in the broad sense) data; is a process of data research, filtering, transformation and modeling in order to obtain useful information and make decisions [5].

The data analysis process is divided into the following steps [6,7,8,9]:

- Identification of the problem to be solved;
- Data collection;
- Data cleaning;
- Data analysis;
- Creation of a model corresponding to the problem;
- Visualization.

Data analysis is carried out in two directions:

- qualitative analysis through interviews and observations;
- quantitative analysis - by means of surveys and experiments.

There are various methods for analyzing data. These methods can be organized as follows:

Mathematical and statistical methods: descriptive analysis, analysis of variance, regression analysis, factor analysis, discriminant analysis, time analysis;

Methods based on artificial intelligence and machine learning: artificial neural networks, decision trees (decision trees), evolutionary programming, fuzzy logic;

Visualization and graphical representation methods. Bar Chart, Bar Chart, Line Chart, Area Chart, Pie Chart, Funnel Chart, Word Cloud Chart, Word Cloud Chart, Radar Chart, Scattering Chart, Bubble Chart, Gauge, etc.

Of the methods mentioned, recent ones are data mining, which is used in a wider range.

Intelligent data analysis is becoming an increasingly relevant area of research every year in all areas of human activity: banking, insurance, government and others.

Intelligent data analysis (through or data mining) is the process of detecting in "raw" data previously unknown, insignificant, practically useful and interpreted knowledge (patterns) necessary for decision-making in various areas of human activity. This definition is considered classic, but according to the researchers, it consists of several errors:

For example, IBM SPSS ®, based on statistical analysis and surveys, allows you to build effective predictive models of past trends and make accurate forecasts. IBM InfoSphere ® Warehouse provides search, initial processing, and data source intelligence in a single package to extract information from the source database directly into the final report.

Recently, it has become possible to cluster (large-scale) data processing to work with very large data sets, which allows you to summarize the data mining results

by groups and their comparisons in an even more complex form. New tools and systems are available today, including storage and processing [5].

You can analyze various datasets, including traditional SQL databases, raw text data, key/value sets (stack), and documented databases. Clustered databases such as Hadoop, Cassandra, CouchDB, and Couchbase Server provide and support manual data access in ways that do not match the traditional table structure.

In particular, more flexible storage of the document base gives a new direction in the processing of information and complicates it. SQL databases tightly regulate the structure and strictly follow the scheme, which simplifies their queries and data analysis.

Documented databases that follow a standard structure such as JSON, or files with some machine-readable structure, are also easily processed, although work can be complicated by a diverse and variable structure. For example, in Hadoop, which processes completely "raw" data, it can be difficult to detect and extract data before processing and comparison.

The basic methods used for data mining describe the type of data mining and its recovery operation. Unfortunately, different companies and solutions don't always use the same terms, which can add to the confusion and perceived complexity.

Research of intelligent data analysis tools.

Let's look at some basic techniques and examples of using certain data mining tools [8,9,10].

Association (or relation) is probably the most well-known, familiar, and simple mining method. To define models, a simple comparison of two or more elements, often of the same type, is made. For example, by tracking their shopping habits, they can be seen also buying cream along with strawberries.

It is easy to create association or relationship-based mining tools. For example, InfoSphere Warehouse has a wizard that provides information flow configurations for creating associations.

Classification (classification) can be used to get an idea of the type of buyers, goods or objects by describing several attributes to identify a certain class. For example, cars are easy to classify (sedan, SUV, convertible), defining different attributes (number of seats, body shape, driving wheels). Having studied a new car, it can be attributed to a certain class. The same principles can be applied to recipients, such as classifying them by age and social group.

In addition, classification can be used as input to other methods. For example, you can use decision trees to define a classification. Clustering allows common attributes of different classifications to be used to detect clusters.

Clustering. By learning one or more attributes or classes, you can group individual data elements together. At a simple level, clustering uses one or more attributes as the basis for defining a cluster of similar results. Clustering is useful for identifying different data because it is related to other patterns so that you can see how similarities and ranges are consistent with each other.

Forecasting is a broad topic that ranges from predicting the bankruptcy of hardware components to detecting fraud and even predicting the company's profits. Joint data prediction with other mining methods involves trend analysis, classification, model comparison, and relationships. By analyzing past events or copies, you can predict the future.

Sequential models often used to analyze long-term data - a useful method of identifying or regularly repeating trends in such events. For example, it can be determined from information about buyers that they buy certain sets of goods at different times of the year. Based on this information, the customer's cart prediction application can automatically assume that certain items will be added to the cart based on the frequency and date of purchase [9,10].

Decision trees. The decision tree associated with most other methods (mainly classification and prediction) can be used to support the selection of specific data either within the selection criteria or within the overall structure. The decision tree begins with a simple question that has two answers (sometimes more). Each answer leads to the next question, helping to classify and identify data or make predictions.

Decision trees are often used with property classification information systems and prediction systems, where different predictions can be based on past historical experience that helped build the structure of the decision tree and produce results.

Combinations. In practice, only one of these methods is very rarely used. Classification and clustering are such methods. The classification can be further refined by clustering to determine nearest neighbors. Decision trees are often used to construct and define classifications that can be traced back to historical periods to define sequences and models [10].

Memory processing. With all basic methods, it often makes sense to record the information received and study it later. For some methods, that's pretty obvious. For example, sequential modeling and training analyze historical data from various data sources and samples for prediction purposes.

In other cases, this process may be more obvious. Solution trees are rarely installed once and are never forgotten. As new data, events, and data points are identified, additional branches or even completely new trees may need to be installed [10].

Some of these processes can be automated. For example, building a predictive model to detect credit card fraud results in determining the probabilities that can be used for the current transaction and then updating that model when new (validated) transactions are added. This information is then recorded so that a decision can be made more quickly next time.

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