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ВОЗРАСТНЫЕ АСПЕКТЫ НЕСПЕЦИФИЧЕСКИХ СИСТЕМ ГОЛОВНОГО МОЗГА ЖЕНЩИН В ДНИ С РАЗЛИЧНОЙ ГЕОМАГНИТНОЙ  
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## Pedagogical Sciences

УДК 372.851

# МЕТОДЫ ФОРМИРОВАНИЯ ИССЛЕДОВАТЕЛЬСКИХ УМЕНИЙ УЧАЩИХСЯ В СТАРШИХ КЛАССАХ ШКОЛЫ

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**Аннотация:** В статье обоснованы задачи и методы формирования исследовательских умений учащихся школы. Указано, что учебно-исследовательская деятельность понимается как активная, целенаправленная, недетерминированная учебно-познавательная деятельность, которая направлена на открытие нового для учащегося знания об объекте исследования, способе или средстве деятельности и характеризуется наивысшей степенью самостоятельности и творческим отношением к процессу исследования.

**Ключевые слова:** исследование, умение, этапы, образование, модели, система, формирование, закономерность, учащиеся, разработка, ступень.

Основная цель данного исследования заключается в разработке методики, направленной на развитие исследовательских умений учащихся, которая будет учитывать единый характер исследовательской деятельности, а также ее специфику в различных образовательных областях [1]. Задачами исследования являются:

- анализ исследовательских умений учащихся в девятом выполнении исследовательской деятельности, которая осуществляется на разном предметном содержании, а значит, отражает методологический аппарат соответствующего уровня науки;
- постепенное выделение общности и специфичности исследовательских умений, внедрение в образовательные дисциплины (естествознание, математика, информатика, языкознание, социальные науки);

Для установления определенной этапности в формировании исследовательских умений учащихся, необходимо учитывать их возраст, уровень обучения и общую направленность образования. Например, для начальной школы можно предусмотреть игровые методики, эксперименты с простыми предметами и явлениями, чтобы развить у учеников наблюдательность и логическое мышление. В основной школе можно углублять знания и навыки через проведение более сложных экспериментов, проектной деятельности и исследовательских работ. В старшей школе уже можно предложить ученикам более серьезные исследования и проекты, связанные с выбором профессиональной сферы [2].

Для построения модели развития исследовательских умений в общеобразовательной школе можно использовать интегрированный подход, который объединяет различные учебные предметы и методы обучения. Это позволит создать целостную систему развития

исследовательских умений учащихся. Для разработки модели системы средств, обеспечивающих развитие исследовательских умений учащихся, можно использовать современные образовательные технологии, включая интерактивные учебники, онлайн ресурсы, облачные сервисы и др. Это позволит создать доступные и удобные инструменты для обучения и исследовательской деятельности [3].

Наконец, разработка методики развития исследовательских умений учащихся должна базироваться на вышеперечисленных моделях и учитывать специфику предметного содержания. Важно создать систему поэтапного развития навыков исследования, начиная с базовых умений наблюдения и анализа и заканчивая созданием и реализацией собственных исследовательских проектов. Из всего сказанного ясно, что основными направлениями нашего исследования можно считать:

- изучение методологических основ исследовательской деятельности в предметных областях, соответствующих выделенным образовательным областям;
- уточнение понятийного аппарата исследования;
- изучение исследовательских умений, характерных для разных образовательных областей, и средств их формирования [4].

Главным предметом исследования являются исследовательские умения учащихся, которые формируются и проявляются в ходе исследовательской деятельности. Поэтому прежде всего необходимо было уточнить понятие «исследовательская деятельность учащихся». В связи с уточнением этого понятия нами были проанализированы следующие понятия: исследовательская деятельность; учебно-познавательная деятельность; самостоятельная деятельность; творческая деятельность.

В результате было выделено рабочее определение исследовательской деятельности учащихся, или учебно-исследовательской деятельности. Учебно-исследовательская деятельность понимается как активная, целенаправленная, недетерминированная учебно-познавательная деятельность, которая направлена на открытие нового для учащегося знания об объекте исследования, способе или средстве деятельности и характеризуется наивысшей степенью самостоятельности и творческим отношением к процессу исследования.

Основными этапами осуществления учебно-исследовательской деятельности можно считать:

- выделение или осознание проблемы исследования;
- сбор данных и их организацию;
- выдвижение гипотезы;
- проверку и обоснование гипотезы;
- формулирование выводов (результатов).

В соответствии с этим под учебно-исследовательскими умениями мы понимаем умения полностью или частично реализовывать этапы исследовательской деятельности на различном предметном содержании. Важнейшим средством развития учебно-исследовательских умений мы рассматриваем учебно-исследовательскую задачу. Учебно-исследовательская задача — это один из видов проблемных задач, требующих поиска, объяснения и доказательства закономерных связей и отношений экспериментально наблюдаемых или теоретически анализируемых фактов, явлений, процессов, в результате решения которых учащиеся открывают новое знание об объекте исследования, способе или средстве деятельности.

Учитывая последовательность общих действий, реализующих исследовательскую деятельность, можно говорить о группах общих исследовательских умений, в которых отражается содержание этой деятельности. К ним можно отнести:

- умение формулировать исследовательский вопрос или проблему: исследователь должен уметь сформулировать четкую и конкретную проблему и определить цель исследования;
- умение проводить литературный обзор: исследователь должен уметь находить и анализировать релевантные исследования и литературу по теме исследования;
- умение выбирать и применять методы исследования: исследователь должен уметь выбирать подходящие методы исследования и применять их на практике;
- умение анализировать и интерпретировать данные: исследователь должен уметь анализировать собранные данные, проводить статистические и качественные анализы, и интерпретировать результаты исследования;
- умение излагать и публиковать результаты исследования: исследователь должен уметь эффективно излагать результаты своего исследования в письменном и устном виде, а также публиковать их в научных журналах.

Эти и другие исследовательские умения играют ключевую роль в успешной реализации научных исследований и обеспечивают качество и достоверность полученных результатов. Кроме общих исследовательских умений существуют специфические, которые используются в отдельных дисциплинах или предметных областях. Например, к ним можно отнести умение устанавливать непротиворечивость свойств нового объекта построенной математической теории. Проще это умение в математике называется умением устанавливать существование объекта. Сюда же можно отнести умение реконструировать исторические события. Можно привести еще много примеров таких умений. Они обусловлены особенностями объектов определенной предметной области и методами, используемыми для их изучения[5].

Для осуществления исследовательской деятельности на основе определенного предметного содержания необходимо владеть этим содержанием. Это означает знать особенности объектов этой предметной области, представлять и уметь использовать ее методы, знать содержание важнейших понятий области и уметь ими оперировать. В связи со сказанным целесообразно выделить базовые предметные умения без которых не может осуществляться исследовательская деятельность в соответствующей области. В связи с необходимостью осуществлять в ходе исследовательской деятельности поиск информации и эксперименты с помощью различного оборудования (компьютер, физические или химические приборы), учащиеся должны владеть умениями работы с оборудованием, или инструментальными умениями.

#### Литература

1. Пидкасистый П. И. Самостоятельная познавательная деятельность школьников в обучении. М., 1980.
2. Формирование познавательной самостоятельности в процессе усвоения системы ведущих знаний и способов деятельности / Под ред. Т. И. Шамовой. М., 1975.
3. Андреев В. И. Эвристическое программирование учебно-исследовательской деятельности. М., 1981.
4. Бойцов М. И. Приобщение учащихся к исследовательской работе в обучении. М., 1975.
5. Качалко В. Б. Обучение поисковой деятельности учащихся по математике в начальной школе. М., 1972.

# Математика сабақтарындағы оқушылардың жоғары ойлау дағдыларын дифференциалдық теңдеулерді физикалық, химиялық құбылыстарды зерттеуде қолдану арқылы дамыту

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12А сынып оқушыларының мониторинг нәтижелерін талдауда жоғары ойлау дағдыларын қажет ететін оқу мақсаттарын төмен меңгергендігі анықталды. Және бұрынғы жылдардағы сыртқы жиынтық бағалаудың әр түрлі жылдардағы талдау нәтижелері оқушылардың физикалық есептерді математикалық тәсілмен шешуде қиналатындығын көрсетті. Оқушыларды болашақ практикалық қызметке дайындау мақсатында, интеграциялық есептерді шешу үшін математикалық аппаратты қолдануға бағыттайтын әрекеттер қажеттілігі анықталды. Мұндай есептер сыртқы жиынтық бағалауда үшінші компоненттерде қарастырылады. ал үшінші компонент нәтижелері орташа есеппен бірінші және екінші компонент нәтижелерінен төмен. Бұл есептер оқушылардың жоғары ойлау дағдыларын қажет етеді. Олардың ішінде зерттеу дағдыларының талдау бөлігін қажет етеді. Осы орайда кәсіби даму мақсаты ретінде «Интеграциялық тапсырмалар арқылы оқушылардың талдау дағдыларын дамыту» іс –әрекетті зерттеу мақсаты таңдалды. 12-ші сыныпта қарастырылатын «Гармоникалық тербелістің дифференциалдық теңдеулерін шығарады» оқу мақсатын қарастыратын сабақ барысында пәнаралық байланыс қарастырылады.

Бұл тақырыпты оқыту барысында физиканың 9-шы сыныптағы гармоникалық тербелістер тақырыбына сілтеме жасау арқылы тербеліс амплитудасы, жиілік, тербелістің бастапқы фазасы ұғымдарын қайталап, физика мен математика байланысын қарастыра отырып есепті жан-жақты талдауын жүзеге асыру қамтамасыз етіледі. NIS PROGRAM – физика және математиканың кіріктіріле оқытылуы жүзеге асырылуының көрінісі 12- ші сыныптың математика сабағында 9 сыныптың физика пәніндегі 9.2.5.6 -  $x=x_{\max}\sin\omega t$  гармониялық тербелістер теңдеуін білу және пайдалану; 9.2.5.7 -  $v=v_{\max}\cos\omega t$  гармониялық тербелістер кезіндегі жылдамдық және  $a=-\omega^2x$  (осы кезеңде бағаламау ұсынылған) гармониялық тербелістер теңдеуін білу және пайдалану; 9.2.5.8 - гармониялық тербелістер кезіндегі координатаның, жылдамдық пен үдеудің өзгеруін график бойынша сипаттай білу т.б. оқу мақсаттарымен тығыз байланыстылығында көрінеді. Тақырыпты оқытудың маңыздылығы сол, физикалық құбылысты тереңінен зерттеу. Ондағы басты физика заңдылықтарынан дифференциалдық теңдеудің қорытылып шығуын түсіну. Бұл макро концепт бойынша оқыту жүзеге асырылуы қажет деп шешілді. Макроконцепт бойынша оқыту оқушылардың әлемнің біртұтастығын түсінуіне көмектеседі.

Іс-әрекетті зерттеу тобындағы әріптестермен біріге отырып, гармоникалық тебелісті зерттеу арқылы және оның теңдеуін шешу барысында оқушылардың зерттеу дағдыларының ішінде талдау дағдысы дамиды деп жоспарланды. Аталған оқу мақсатының «Математика» пәні оқу бағдарламасындағы алатын орны келесідей. Вертикальды жоспарлау бойынша 11ші сыныптың Қисап1 және Қисап 2 тарауларының бірқатар оқу мақсаттарымен байланыста қарастырылады. Гармоникалық тербеліс теңдеуінің характеристикалық теңдеу түбірлері комплекс сандар болғандықтан тақырыптың алдыңғы тараудағы комплекс сандар ұғымымен сабақтастығы жүзеге асырылады. Ал гармоникалық теңдеу шешімі синус немесе косинус функциясына қосу-азайту формулаларымен жинақталатын функция болғандықтан тақырып 11-ші сыныпта қарастырылған қосымша аргумент енгізу әдісімен шешілетін тригонометриялық теңдеулермен тығыз байланысты.

Гармоникалық тербелісті сипаттайтын видео арқылы оқушылардың проблеманы анықтай білуін, оның математикалық тұрғыда сипаттай білу арқылы синтездеуді жүзеге асыруға көмектеседі. Көрсетілім барысында серіппелі маятниктың жүгінің орын ауыстыру векторы сол жүктің қозғалыс үдеуіне тура пропорционал болатындығы ең маңызды тұжырымға әкеледі. Зерттеудің осы тұсында проблемалық сұрақ қойылу жоспарланды: бұл құбылысты қандай дифференциалдық теңдеу түрінде жазуға болады? Оқушылар үдеудің орын ауыстырудың екінші ретті туындысы екенін 11-ші сыныпта қарастырған. Ньютонның екінші заңына сәйкес Гук заңы мен орын ауыстыруға әсер ететін күштерді теңестіру арқылы, үдеудің орын ауыстырудың екінші ретті туындысы екендігін ескеріп теңдеу құру қажет. Осылайша оқушылар талдай келе ізделінді дифференциалды теңдеудің нешінші ретті екендігі жөнінде қорытынды жасау оқушыларға ұсынылады. Себебі бұл гармоникалық тербелістің дифференциалдық теңдеуін құруға, ал ол өз кезегінде оқу мақсатына жетелейді. Ендігі кезекте білімді жүйелеу, талдау: құрылған дифференциалдық теңдеудің шешімі қандай болуы мүмкін деген сұраққа жауап іздеу.

Жинақтау кезеңінде физикалық есептердің дифференциалдық теңдеуін құруға бағыттайтын және оның шешімін синус немесе косинус функциясы түрінде жазу қажет, сол функцияның коэффициенті, аргумент коэффициенті, қосымша аргумент ұғымдарының қандай физикалық шама екендігін анықтауға бағыттайтын есептер қарастыру жоспарланады. Бағалау стратегиялары бағалау критерийлеріне сәйкес жоспарланады. Гармоникалық тербелістің дифференциалдық теңдеулерін шығарады оқу мақсатына жетелейтін қадамдар алгоритмі басқа қырынан қарағанда бағалау критерийлері ретінде қолданылады. Алдымен физикалық есептің теңдеуі құрылады. Теңдеудің характеристикалық теңдеуіне сәйкес шешімі анықталып, оның дербес шешімі бастапқы шарттарды енгізу арқылы табылады. Шешімді косинус немесе синус функциясы түрінде табу үшін қосымша аргумент енгізу әдісі дұрыс қолданылады. Бұл теңдеудің шешімін жүйелеп, ықшамдап жазу үшін қажет. Және мұндай түрде жазылған теңдеу шешімінде физикалық шамалар айқындалады. Осылайша бағалау критерийлері айқындалады. Бағалау негізінен осы бағалау критерийлеріне сүйене отырып, әр қадамның дұрыс орындалғанына негізделі отырып жүргізіледі. Бағалау критерийлері нақты оқу мақсаты бойынша анықталатындықтан, гармоникалық тербеліс теңдеуін шешу алгоритміне тығыз байланысты болғандықтан жоспарланған бағалау оқу мақсатына жетелейді. Нақты күтілетін нәтиже – оқушылардың толықтай оқу мақсатына жетуі.

Жоспарлаудың тиімді тұстары берілген оқу мақсаты 9 сыныптағы тригонометриялық формулалар, 10 сыныптағы тригонометриялық функцияларды түрлендіру, 11 сыныптағы дифференциалдау, туындының физикалық мағынасы, интеграл және 12 сыныптағы комплекс сандар тақырыптарының түйінді нәтижесі және аталған тақырыптарды кешенді қарастыруға мүмкіндік береді. Жоспарлау барысында оқушылардың физикалық шамалардың математикалық тәсілмен тапқан қатынастардағы элементтерді байланыстыру

әрекеті жүзеге асырылмай қалуы мүмкін деген болжам жасалды. Сондықтан алдын ала үй тапсырмасы ретінде осы ұғымдарды қайталау қажеттілігі айқындалды. Әріптестермен бірлесіп жоспарлау өз тиімділігін көрсетеді. Себебі сабақты өткізуде жоспарланған іс әрекеттердің орындаудың нәтижесінде, оқушылар пәнаралық есепті шешуде нақты математикалық операторлар мен әдістерді қолдануды үйренеді. Болашақта мұндай есептерді шешудегі қиыншылықтарды жеңеді. Табиғи құбылыстарды математикалық тұрғыда, физикалық шамалар мен математикалық ұғымдарды байланыстыра отырып, есепті шығарудың оңтайлы алгоритмін құра алады деген болжам жасалды.

Физикалық құбылысты зерттеу барысында, ғалымдар дифференциалдық теңдеуді ойлап тапқан, сондықтан алдымен сабақ барысында оқушылардың видеоны қарастыруы барысында оқушыларға физикалық сұрақтар қойылды. Жалпы дифференциалдық теңдеудің қайдан келіп шығатынын оқушылардың жете түсінуі мақсатында сабақ барысында видеода серіппелі маятник қарастырылды, яғни жоспарланғандай, проблеманы қою кезеңі. Серіппелі маятник жүгі тыныштықта тұрғанда жүкке қандай күштер әсер етеді? Неліктен жүк тыныштықта тұр? Осы құбылысты математикалық тұрғыда қалай түсіндірер едіңдер? Дифференциал теңдеуді қорытып шығару мақсатында, оқушылар осы орайда физикалық құбылыстардағы күштердің векторлық шамалар екендігін атап өтіп тыныштық күйдегі денеге әсер ететін векторлар – күштер екендігін байланыстыра отырып сараптады. Осы тұста айтылып кеткен макроконцепттер арқылы оқыту орын алады: күштің формуласында үдеу бар. Үдеу орын ауыстырудың екінші ретті уақыт бойынша туындысы. Ал екінші жағынан күш Гук заңы бойынша орын ауыстыруға тура пропорционал. Осыдан келіп дифференциал теңдеу қорытылып шығарылады. Жалпы гармоникалық тербелістің дифференциалдық теңдеуін қорытып шығару толығымен видеода көрсетілген. Алайда оқушылардың осы тұста тақырыпты өз бетімен түсінуіне, олардың талдау дағдыларын дамытуы мақсатында видеоның соңғы бөлігі көрсетілмегені дұрыс деген шешім қабылданған болатын. Бұл оқушылардың әр қадамды сипаттап, дифференциалдық теңдеуді өз бетінше қорытып шығаруынан байқалды.

Оқушылар ендігі кезекте білімдерді жүйелеу және талдау барысында оқушылар қорытып шығарылған дифференциалды теңдеуді шешу қажет. Оқушылар екі рет туынды алғанда бастапқы функциядан тек коэффициентімен ғана ерекшеленетін қандай функцияның бар екендігін талдай отырып табады деген мақсатпен келесі сұрақ қойылды: Қандай математикалық шаманың екінші ретті туындысы қарама қарсы таңбамен алынған бастапқы шамасына тура пропорционал болады? Оқушылар өз жауаптарында екі тарапқа бөлінді: біріншісі – экспоненциалды функция десе, екіншісі синус немесе косинус функциясы деп жауап берді. Негізінде екі тараптың да жауабы дұрыс. Жоспарлау барысында оқушылардың екінші ретті туындысы өзіне пропорционал болатын функцияларды атағанда экспонентаны атайтыны ескерілмеген болатын. Яғни оқушылар осы екі функцияның байланысы болатындығына көз жеткізе алды. Оқушылардың осы тұста жоғары ойлау дағдысы дамығандығын көрсетеді. Ендігі кезекте оқушылар есепті шешудің жолын табуы қажет. Сондықтан бірнеше сабақтар топтамасының алдыңғы тақырыптағы білімдерге сүйену қажеттілігін ескере отырып, оқушыларға гармоникалық тербелістің дифференциал теңдеуінің характеристикалық теңдеу түбірлерін табу ұсынылады. Бұрынғы білімдерін жаңғырта отырып, оқушылар өткен сабақпен байланыстыра отырып жаңа ой тұжырым қорытып шығара алды. Талдау, аналитикалық ойлау жүйесінің оқушыларда реттелгендігінің көрінісі: дәрежесі комплекс сан болатын экспонентаны тапты.

Тұрақты коэффициентті екінші ретті дифференциалдық теңдеулердің үш жағдайының бірі ретінде осы гармоникалық теңдеу болады деген қорытынды жасауы мақсатында оқушыларға осы туралы сұрақ қойылды. Нәтижесінде үш жағдай талданып,

характеристикалық түбірі таза жорамал сан болады деген қорытынды жасады. Себебі бұл тақырыпқа дейін екінші ретті дифференциал теңдеулер тақырыбы қарастырылған болатын. Алдыңғы тақырыптағы білімдеріне сүйену арқылы оқушылар мұны жүзеге асыра алды.

Ендігі кезекте дифференциал теңдеудің шешіміндегі алынған коэффициенттер, қосымша бұрыштың математикалық мағынасынан физикалық мағынасына қайта көшу қажет болады. Бұл макроконцепт арқылы оқытудың екінші кезеңі. Бұл оқушылардың зерттеу үдерісіндегі жинақтау және бағалау кезеңі. Оқушылар синус пен косинустың сызықтық комбинациясын тек синусқа жинақтау барысында алынған функцияның коэффициенті, аргумент коэффициенті және қосымша аргументтің физикалық мағынасы бірден анықталды. Себебі оқушылар гармоникалық тербелістің функциясында амплитуда, жиілік, тербеліс фазасы ұғымдарымен физика курсынан таныс және бұл туралы үй тапсырмасын алдында қарастыру тиімді шешім екендігіне көз жеткізілді. Бұдан әрі кезкелген физикалық мағыналы есепті оқушылардың математикалық тұрғыда теңдеуін құрып, оны шеше алуын дамыту мақсатында қозғалыс амплитудасы, фаза және жиілік берілген физикалық есеп қарастырылды. Ерекшелігі сол, бұл есепте тербеліс фазасы, бастапқы уақыт моментіндегі функция аргументі ретінде айқындалмай берілген болатын. Есептің берілгені бойынша синус функциясын жазу керек болатын. Оқушылар бастапқы уақыт моменті болғанда аргументте тек тербеліс фазасының мәні қалатындығын оңай анықтады. Бұл кезеңде оқушылардың жұптасып жұмыс жасауы нәтижесін берді. Себебі, оқушылар өзара ақпарат алмаса алды, бірінің білімін екіншісі толықтырып отырды. Және де жұптық жұмыста профильдік пән ретінде физиканы таңдаған оқушы физикалық білімдерімен бөлісіп, алмаса алды.

Қандай уақыт моментінде тербеліс қайталанады деген сұраққа кейбір оқушылар синус функциясының бір периоды орындалғанда деп жауап берді. Сабақтың ең ұтымды сәтінің орын алуы: оқушылар 10-шы сыныпта көпшілігі мән бермеген периодты функцияның ең үлкен оң периодын анықтайтын формуланы еске түсірді және оны физикада өткен период пен жиіліктің байланысын көрсететін формуламен бірдей екендігіне өз беттерімен көз жеткізді. Жоспарлау барысында оқушылар тек математикалық жолмен периодты табады деп болжанған болатын, тіпті физикалық мағынасы ескерілмеген болатын. Оқушылардың өз бетімен математикалық заңдылықтың физикалық формуламен интерпретациялауы сабақтың тиімділігінің қосымша көрінісі болды. Осылайша интеграциялық тапсырманы қолдануда оқушылар білімдерін жинақтап, нәтижені бағалап зерттеу дағдыларының жоғары дамығандығын көрсетті. Оқушылардың өзін-өзі бағалауы мен бірін-бір бағалауы нәтижесінде бұрынғы қателіктеріне баға бере алды.

Оқыту тиімділігі оқушылардың физикалық есепті математикалық тұрғыда жете түсініп, математикалық аппаратты қолдануы барысында көрінді. Себебі, оқушылар дифференциалдық теңдеуді құрды, одан соң оны шешті. Сонымен бірге кейбір физикалық формулаларды математикалық тұрғыда түсіне білді. Екінші ретті тұрақты коэффициентті теңдеуді математикалық тұрғыда шығарып қана қоймай оны гармоникалық тербеліс теңдеуі ретінде тани білді. Физикалық мағынасын математикалық тұрғыда сипаттай отырып оқушылардың зерттеушілік дағдыларын дамыту – талдау, сараптау дағдыларын қолдану жүзеге асырылды.

Оқушылардың жетістік деңгейлері туралы ақпарат жинақтауы үшін бақылау жүргізілді. Зерттеу дағдыларының дамығандығын қалай бағалаймын? Қалыптастырушы сұрақтар «неге? қалай? Неліктен?» деген сұрақтарды қою арқылы жүзеге асырылады. Зерттеудің әр кезеңінде бағалаудың әр түрі қолданылуы тиіс деп болжанды. Проблеманы қою кезінде жетелеуші сұрақтар қойылады, оның ішінде ең бастысы: құбылысты дифференциалдық теңдеумен қалай сипаттаймыз? Себебі оқушылар проблеманы түсінбей, оны шеше алмайды. Мәселені анықтамай зерттеуді жүргізу мүмкін емес. Физикалық мағыналы есепті шешу үшін оның математикалық түрде жазылуы, одан кейін оны

математикалық жолмен шешуі қажеттігінен, осындай әрекеттер орындау ұсынылды. Зерттеудің бұл кезеңі білімдерді жүйелеу талдау, ал бағалаудың бақылау түрі қолданылды. Себебі бұл оқушылардың талдауды жүргізу барысында дұрыс немесе бұрыс қортындыға келуіндегі қадамдарды орындағандығын бағалауына мүмкіндік береді. Осы орайда оқушылардың физикалық шамаларды ажыратуы үдеудің орын ауыстырудың екінші ретті туындысы болатындығын ажыратуы, күштердің қарама-қарсы таңбада векторлардың бағытының қарама-қарсы болатындығын болжауы, содан келіп дифференциал теңдеуді тұжырымдауы, осының барлығы талдау, жинақтау дағдыларының көрінісі екендігін анықтайды.

Оқушылардың зерттеу дағдысының бағалау кезеңін жүзеге асыруы мақсатында оқушыларға құрылымды физикалық есеп берілді. Оқушылар есепті шешу жолын құра отырып, әр бөлігінде өздерінің орындаған қадамдарына баға беру ұсынылды. Мұны оқушылар сыртқы жиынтық бағалау кезіндегі бағалау марксхемасын қолдану арқылы орындаймыз деп шешкен. Оқушылардың мұндай қадамды таңдауы жоспарлауда болжанбаған болатын. Оқушылардың мұндай қадамға баруы тиімді, себебі құрылымды физикалық есепті шешу жолдарының дұрыстығын бағалауға, есепті шешу жолын жүйелеуге, қате жіберудің алдын алуына, тіпті есептің жауабын дұрыс дөңгелектеуге назар аударуына көмектесті.

Оқушылардың ой қорытындыларын бақылай отырып, бағалау жүргізу барлық кезеңдерде орын алды. Осылайша интеграциялық есептің тиімділігі неде болды деген сұраққа жауап берейік. Математикада синус функциясын қарастырған кезде негізгі функцияның периоды ұғымы қарастырылады. Оның формуласы:  $T=2\pi/k$ . Мұндағы  $k$ - тригонометриялық функцияның аргумент коэффициенті. Ал физикада осы формуланың дәл көрінісі келесіде:  $T=2\pi/\omega$ , мұндағы  $\omega$ - тербелістің жиілігі, дәл сол тригонометриялық функция аргументінің коэффициенті. Оныншы сыныпта осы оқушылардың көпшілігі математикадан тоқсандық ішкі жиынтық бағалауында  $T=2\pi/k$  формуласын ұмытқаны, период ұғымын физикамен байланысты қарастырылса орын алмас еді. Себебі үй тапсырмасында физикада өткен гармоникалық тербеліс тақырыбын қайталауы арқылы оқушылар  $T=2\pi/\omega$  формуласын бірден атай алды. Сөйтіп, оқушылар осы қателікті еске түсіре отырып, өздерінің бұрынғы және қазіргі әрекеттерін бағалай алды. Яғни, олар гармоникалық тербелістің  $x = x_m \cos(\omega t + \varphi_0)$  теңдеуінде  $\omega$  не екендігін түсіндіре отырып, ал математикада ұмытылған функцияның негізгі тербеліс периоды формуласын жаңа физикалық тұрғыда сипаттап бере алды. Бақылау техникасын қолдана отырып оқушының осы ой қорытуын жасауы интеграциялық тапсырманың оқушының талдау дағдысын дамытқандығының тағы бір көрінісі.

Қалыптастырушы бағалау оқушының өзінің қай деңгейде екенін, оқуды қалай, қай бағытта жүзеге асыратындығын білуіне жетелеу керек. Бағалау арқылы оқушылар оқу мақсатына жетті деген қорытынды жасалды. Өйткені, оқушылар гармоникалық тербелістің дифференциал теңдеуін шешу үшін оның құрылу этиологиясын білді, одан әрі физикалық шамаларды математикалық тұрғыда сипаттай білді, математикалық теңдеуді құрып оны шеше білді, қайтадан физикалық тілде жауабын берді. Яғни бағалау критерийлері орындалып отыр. Кез келген математика сабағында тиімді бағалау стратегияларына мұғалім тарапынан бақылау, «жуан» сұрақ қою стратегиялары мен оқушылардың өзара бағалауы орын табады. Қарастырылған сабақта осы бағалау стратегиялары жоспарланып, жүзеге асырылды. Бақылау жуан сұрақ қою арқылы оқушылар бұрын жіберген қателіктерін еске түсіре отырып, дұрыс тұжырымдар жасай алды. Өзара бағалау арқылы жоспарланбаған бағалау марксхемаларын қолданып, есептің шығару жолдарын талдай алды. Осының барлығы жоспарланған және жүзеге асырылған бағалау әдіс-тәсілдерінің тиімділігін көрсетеді.

«Гармоникалық тербелістің дифференциалдық теңдеулерін шығарады» оқу мақсатын қарастыратын сабақты жоспарлауда ең бастысы оқушылардың зерттеу дағдылары, ең бастысы, талдау дағдысын дамытуға бағытталды. Сабақты жоспарлаудың алдында анықталған мәселе – оқушылардың физикалық және басқа да пәндермен байланысты есептерде, қолданбалы есептерде математикалық білімдерді қолдана алмауы болатын. Сондықтан, жоспарлау барысында математикалық білім мен физикадан алған білімдерін кіріктіре оқыту үшін интеграциялық тапсырмалар таңдалды. Жоспарланған кезде орын алатын қолайсыздықтардың болуы болжанып, олардан шығу жолдарын алдын алу жүзеге асырылды. Жоспарлаудың тиімділігі горизонтальды және вертикалды жоспарлауды ұштастыра отырып, негізгі ұғымдарды анықтап алуда байқалды. Оқыту барысында оқушылардың назарын негізгі ұғымдардың байланысына аударып, сабақ үстінде талдау жасауға бағыттайтын оқытудың әдіс-тәсілдері арқасында оқушылар интеграциялық тапсырманы толықтай орындады. Оқушылардың оқу жетістіктерін бағалауда, оқушылардың сабақ барысындағы әрекеттері зерттеу кезеңдерімен сәйкестендіріле отырып бағалау стратегиялары таңдалды. Сабақты жоспарлау, оқыту, оқыту жетістіктерін бағалауды жүзеге асыру үдерісінде осы мәселені шешуге бағытталған әрекеттер дұрыс таңдалды. Гармоникалық тербелістің дифференциал теңдеуі екінші ретті дифференциал теңдеудің бір түрі болатындығын оқушылардың сабақ барысында өз бетінше зерттеуі нәтижесінде көз жеткізуі, сабақтың жүзеге асырылуының барлық кезеңдері тиімді болғандығының көрінісі. Үшінші тоқсанда қарастырылатын «Интегралдау мен дифференциалдау арқылы қолданбалы есептерді шешу» тарауы бойынша қарастырылған әдіс-тәсілдер өз жалғасын табады. Қайсыбір зерттеу дағдыларын дамыту үшін сабақта интеграциялық тапсырмалар қолдана отырып, зерттеудің барлық кезеңдерін сабақ барысында жүзеге асыруды енгізу арқылы оқыту үдерісіне өзгеріс енгізілді. Осы арқылы концептуалды оқыту жүзеге асты деген қорытынды жасалады. Себебі, тербеліс – теңдеуі – синус косинус заңы - периодтылық, күш(вектор) – жылдамдық өзгерісі – үдеу – екінші ретті туынды – орын ауыстыруға пропорционал- дифференциал теңдеу сияқты біртұтас ұғымдар макроконцепттер ретінде қарастырылды. Концепт бойынша оқытудағы категорияға жіктеу арқылы физикалық ұғымнан математикалыққа, математикалық тұжырымнан қайтадан физикаға көшу орын алады. Бұл орайда оқушылардың физика мен математикалық білімдерін кіріктіруі орын алды. Концептуалды оқытуда оқушылар екі немесе одан да көп тұжырымдарды байланыстыруы – аналитикалық дағдылары мен жоғары ойлау дағдысының дамығандығының көрінісі. Нәтижесінде оқушылардың функционалды сауаттылықтары жақсарады. Бірнеше тұжырымдарды байланыстыра оқыту ең алдымен пәнаралық байланысты тереңінен түсінуге, бірнеше пәндерді біртұтас ғылым ретінде түсіне отырып оқуға бағыттайды. Осы сабақ барысында макро концепттер бойынша оқытуға алғышарттар жасалды, алайда бұл бағытта зерттеулер әлі де жүргізілуі қажет. Пәнаралық байланысты түсіну барысында зерттеушілік дағдысы дами отырып, оқушыларды ғылыми жобаларға қатысуға бағыттауға болады. Ғылыми жобаларға қатысу оқушылардың зерттеушілік дағдыларының дамығандығының, практикалық әрекетке дайындығының жоғары көрсеткіші.

Әріптестермен біріге отырып жүргізілген әрекеттегі зерттеудің нәтижесінде бірқатар өзгерістер ұсынылды:

- Пәнаралық байланысты жүзеге асыру үшін жоспарлаудың вертикалды, әрі горизонталды бағытта жүргізілуі маңызды. Сабақта қарастырылатын оқу мақсатының алдыңғы білім мен қатар басқа пәндердегі алатын орны, ондағы оқу мақсаттарымен байланысы алдын ала қарастырылуы қажет. Осы байланысты сабақты жоспарлауда, оқытудың әдіс-тәсілдері мен бағалау стратегияларын таңдауда ескеріп отыру қажет.

- Оқыту барысында кіріктірілген үй тапсырмаларын беру арқылы мұғалім сабақ барысында уақытты үнемдей алады. Кіріктірілген үй тапсырмасын беру осы әрекеттегі

зерттеудің нәтижесінде ұсынылатын екінші өзгеріс. Жоғарыда айтылғандардан, алдын ала берілген интеграциялық үй тапсырмасы нәтижесінде, мағынаны ашу кезеңінде уақыт үнемделіп, оқушылардың жаңа сабақты игеруге оңай көшуіне жетеледі.

- Оқушылардың практикалық қызметке даярлауын, олардың зерттеушілік дағдыларын дамыту үшін қолданбалы есептерді шығаруының маңызы зор. Сондықтан сабақтың тақырыбы мен оқу мақсатына сәйкес қолдабалы есептерді таңдап, сабақ жоспарына енгізу осы зерттеудің нәтижесінде қорытылған келесі ұсыныс болып табылады.

- Пәнаралық байланысты нығайтудың мынадай жолдары ұсынылады: оқытуда STEM – білім беру идеяларын жүзеге асыра отырып оқыту. Бірнеше тұжырымдарды біріктіру мақсатында макро-концепттер негізінде оқыту.

# GAME-BASED LEARNING FOR CYBERSECURITY EDUCATION- LITERATURE REVIEW

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*This work analyzed 4 articles on cybersecurity education using serious game concepts. After analyzing the methods used and the results of each article, it was concluded that these works will help professors improve the effectiveness of the course.*

*Keywords: cybersecurity, serious games, evaluation, user experience, education.*

## *Introduction*

Cybersecurity education is becoming gradually important for the world. The large number of network attacks that have taken place over the past few years only appeases the growing need. Some of these events contain the following: massive consumer information leaks at Sony and Sony PSN [1]; A covert attack by the Stuxnet worm on the Iranian nuclear program and the Chinese electronic infiltration of Google [2].

The idea of using games to support healthcare, education, management, and other sectors has already produced positive results. Moreover, research is advancing in the field of modeling and simulation, which seems to be potentially applicable to games in the field of cybersecurity and defense (cyberwar) [3].

## *Methodology*

The following papers write how can use the serious game in cybersecurity.

“Evaluation of HackLearn COFELET Game User Experience for Cybersecurity Education” [4] – the authors made a hacking simulation game for teaching cybersecurity concepts. “Evaluation of Game-Based Learning in Cybersecurity Education for High School Students” [5] - the authors organized a cybersecurity camp for high school students. “SecurityEmpire: Development and Evaluation of a Digital Game to Promote Cybersecurity Education” [6] – the authors made multiplayer challenge game for teaching cybersecurity concepts in high school. “A video game for cyber security training and awareness” [7] – the authors made an interactive game for training cybersecurity.

To find out the advantages and disadvantages of each methods, firstly, I decided to evaluate each article.

The evaluation of the work was carried out according to these parameters:

1.The convenience of use – this parameter is evaluated comfortably using, optimization of these works, etc.

2.Assimilation time – this parameter is evaluated for how long it takes to understand what was happening, understanding the functions.

3.Reality – this parameter is evaluated using the information in the real world, the novelty of acquired knowledge, and the relevance of work.

*Results and discussion*

The works evaluated were carried out on a 5-point scale in each parameter. And we got such results (shown in Figure 1).

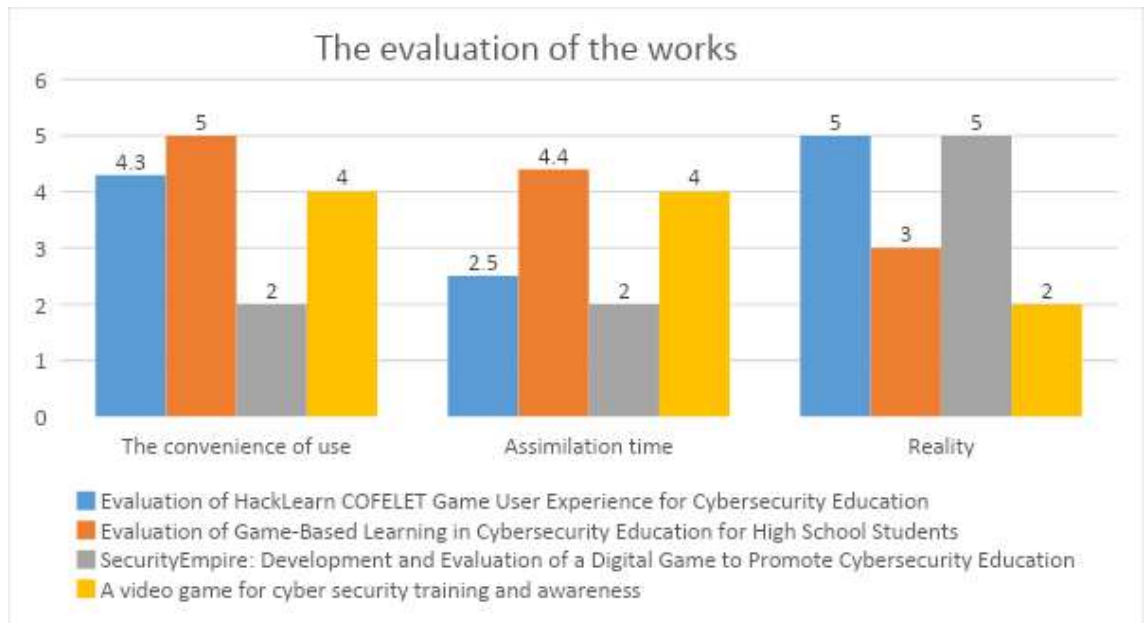


Figure 1. The evaluation of the works

After analyzing the methods and results, also after the evaluation of the works. I was able to analyze the advantages and disadvantages (shown in Table 1).

Table 1. Advantages, disadvantages, and analyze the results.

Name of works	Authors	Advantages	Disadvantages	Analyze the results
Evaluation of HackLearn COFELET Game User Experience for Cybersecurity Education	Menelaos N. Katsantonis, Ioannis Mavridis	Comfortably user interface; Players can use experience in the real world; Interesting scenario;	Long assimilation time	According to the results of the survey, many participants noted that this game is effective, interesting, and has a user-friendly interface. But it takes a long time to understand some of the concepts. I analyzed these results and identified the advantages and disadvantages.
Evaluation of Game-Based Learning in Cybersecurity Education for High School Students	Ge Jin*, Manghui Tu, Tae-Hoon Kim, Justin Heffron, Jonathan White[7]	The more friendly interface; Understanding information; Scalable and flexible;	only the basics are shown there	The authors in this paper analyzed gender and racial difference in learning potential, and the result Caucasian students were more effective for learning. But I analyzed questions, which are connected with learning. And identified the advantages and disadvantages.
SecurityEmpire: Development and Evaluation of a Digital Game to Promote Cybersecurity Education	Marc Olano, Alan Sherman, Linda Oliva, Ryan Cox, Deborah Firestone, Oliver Kubik, Milind Patil, John Seymour, Isaac Sohn, Donna Thomas[8]	Players can use all information in the reality; Many game mechanics for cyber security; Multiplayer game;	Longer assimilation time; Don't understand the interface;	In the results of this game, many participants noted that this game doesn't have a comfortable interface and is not very clear. But playing it is very interesting because it has multiplayer.
A video game for cyber security training and awareness	Benjamin D. Cone, Cynthia E. Irvine*, Michael F. Thompson, Thuy D. Nguyen[9]	Comfortable interface; Flexible, scalable, and interactive; Don't have long assimilation time;	Don't use more information in reality;	Knowledge in this game can use for only to self - safe. This game can use only for the introduction. But it has a comfortable and understanding user interface

### *Conclusion*

Cybersecurity plays an important role in society today. It has been proven that incorporating games into learning improves learning outcomes over time.

In this review, 4 papers used different ways for educating cybersecurity with used serious games. And so, teachers and professors can use these games for their programs, the same way students can use these games for increasing their skills

### **References**

- L. B. Baker and J. Finkle "Sony PlayStation suffers massive data breach" // *Reuters* - April, 2011 - vol. 26 - p. 43
- J. Markoff "A Robot Network Seeks to Enlist Your Computer" // *New York Times*. Retrieved - Oct, 2008 - vol. 21
- A. Nagarajan, J. M. Allbeck, A. Sood, and T. L. Janssen "Exploring game design for cybersecurity training" - 2012 - pp. 256–262
- M. Katsantonis and I. Mavridis, "Evaluation of HackLearn COFELET Game User Experience for Cybersecurity Education" // *International Journal of Serious Games* - 2021 - vol. 8, no. 3 - pp. 3–24
- G. Jin, M. Tu, T.-H. Kim, J. Heffron, and J. White, "Evaluation of game-based learning in cybersecurity education for high school students" // *Journal of Education and Learning (EduLearn)* - 2018 - vol. 12, no. 1 - pp. 150–158
- M. Olano, *et al.* "SecurityEmpire: Development and evaluation of a digital game to promote cybersecurity education" - 2014
- B. D. Cone, C. E. Irvine, M. F. Thompson, and T. D. Nguyen "A video game for cyber security training and awareness" // *computers & security* - 2007 - vol. 26, no. 1 - pp. 63–72

# Биология сабақтарында проблемалық технологияны қолданудың маңызы

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XXI ғасырдың жан-жақты зерделі, дарынды, талантты адамын қалыптастыру бағытындағы білім беру мәселесі мемлекетіміздің басты назарында. Білім мен ғылымның Қазақстан дамуына оңтайлы әсер етуі үшін дүниежүзілік кеңістігіне ену, білім беруді одан әрі демократияландыру, оқыту жүйесін заман талабына сай үйлестіре алу міндеті туындап, білімге, бүкіл оқу-әдістемелік жүйеге жаңа талаптар қойылуда.

Заманауи мектепте оқытуды жаңа әдістемелік тұрғыдан ұйымдастыруда оқушылардың қажетті құзырлылықтарын қамтамасыз ететін педагогикалық технологияларды қолданған орынды. Педагогикалық технологиялар оқыту мақсатына жетудің тиімді, нақты жолдарын көрсетеді. Жаңа оқыту технологиясы жеке тұлғаның жетілеуіне көмектесіп, оларды білімді азамат етіп қалыптастыру – заман талабы. Педагогикалық технологиялардың арасында қазірде тиімділігі - проблемалық оқыту технологиясы.

Проблемалық оқыту технологиясын пайдалану оқушының танымдық, ізденушілік іс-әрекеттерін жандандырып, оның шығармашылық ойлауын дамытады. Мұндай технологияны пайдаланудың мақсаты – оқушы мен мұғалімнің проблемалық ойлау қабілетінің дамуына ықпал ету болып табылады.

Проблемалық оқыту теориясын В.Т. Кудрявцев, И.Я.Лернер, М.И.Махмутов, А.М.Матюшкин, М.Н.Скаткин, Л.А.Волович, Г.И.Ибрагимов, Г.В.Мухаметзянова, Қ. Бітібаева, Нағымжанова Қ.М. өз еңбектерінде жан-жақты зерттеген.

Қазірде оқушылардың білім мен тәрбиелік қабілеттерін арттыру үшін оқу процестеріне жаңа технологиялы әдістемелерді енгізу өмір талабы.

Сондықтан бүгінгі заманның талабына сай оқытудағы басты талап – дүние жүзілік дамудағы адамзаттың орны, ол жасаған әлемдік құндылықтардан хабардар, жан – жақты жетілген, өз тарихының өткеніне көз жүгіртетін, ұлтжанды, патриот азаматты қалыптастыру болып отыр. Оған ықпал ету үшін оқытушының шығармашылық ізденісі қажет. Жаңа заман талаптарына сай сабақ түрі өзгеріп, жаңарып отырса, болашақ ұрпаққа әсері мен ықпалы ерекше болады. Қазіргі заман ағымына байланысты оқушылардың білімге қызығуын арттыру үшін оқытушыларға жаңа талаптар қойылуда.

Бүгінгі мақсат — әрбір оқушыларға түбегейлі білім мен мәдениеттің негіздерін беру және олардың жан-жақты дамуына қолайлы жағдай жасау. Сондықтан да сабақтарда проблемалық оқыту технологиясын пайдалану арқылы оқушының дүниетанымын кеңейтуге жан-жақты жол ашуға тырысу керек. Проблемалық оқыту технологиясында дұрыс іздене білгенде ғана ол тіл дамытуда өнімді, нәтижелі қорытынды береді. Проблемалық оқытудың тиімділігі де сол – ол оқушының өз дербес іс-әрекеті арқылы проблеманы шешуі, сол жолдағы ізденісі, шығармашылық өнімге қол жеткізуі.

Проблемалық оқыту технологиясын пайдалану оқушының танымдық, ізденушілік іс-әрекеттерін жандандырып, оның шығармашылық ойлауын дамытады. Мұндай технологияны пайдаланудың мақсаты – оқушы мен мұғалімнің проблемалық ойлау қабілетінің дамуына ықпал ету болып табылады.

Проблемалық оқыту – оқушының жүйелі түрде мұғаліммен бірге өзіне таныс емес, жаңа проблемаларды шешуге ізденіс жасайтын педагогикалық процестің ерекше ұйымдастырылуы.

Проблемалық оқыту технологиясы режимінде сабақтарды моделдеу принциптеріне проблемалық жағдаяттарды жасау, проблемаларды шешу процесінде оқушыларды оқыту, іздену іс-әрекетін жасата отырып, дайын білімді меңгеру.

Проблемалық оқыту технологиясымен жұмыс жасай отырып, мұғалім сапалық түрде жаңа нәтиже алады: оқушы ақпараттарды іздеудің жаңа тәсілдерін меңгереді, ойлаудың проблемалық деңгейі жұмыс жасайды. Мұндай технология бойынша сыныппен жұмыс жасаудың басында проблеманы мұғалім қояды, ал балалар оның шешімін табуға тырысады. Технологияның әдістерімен таныс болған сайын, оқушылар мұғалім көмегімен өздері проблеманы қоя бастайды. Проблема сабақтың тақырыбына жалпы қойылуы мүмкін, сонымен қатар, сабақтың құрамды бөліктеріне де қойылады.

Атамыш оқыту жаңадан ғана пайда болған жоқ. Кезінде бұған өз үлес қосқан педагог-ғалымдар: Сократ, Руссо, Дистерверг, Ушинский. Мысалы, Дистервергтің дәлелдеуінше, «жаман ұстаз ақиқатты айта салады, жақсы ұстаз оны іздеп табуды үйретеді».

Проблемалық оқыту элементтерін Сократ еңбектерінен, Ж.Ж.Руссоның сабақ жоспарларынан (Эмеяға арналған) кездестіруге болады. Әсіресе К.Д.Ушинский бұл мәселені көп қарастырған. Ол «Сократ әдісі» деп аталып кеткен Сократ әдісінің тиімділігі бұл әдісті барлық жастағы балаларға, яғни кез келген сыныпта қолдануға болатындығында деп есептейді. Сократ өзінің шәкірттерін логикалық ойлауға, зерттеулердің нәтижелерін табуға бағыттап отырған. Руссо білімді игеруде ситуациялар қоюға мән берген. Проблемалық оқытудың ең керекті әрекеті ізденіс болса, оны өз тәжірибесінде қолданған ғалымдар қатарында Песталоцци мен Дистервергтің еңбегі зор. Оқытудың осы әдісінің негізін қалап, оны жоспарлы түрде іске асырған Д.Дью болды. Кейіннен оқытудың осы түріне Д.Бруннер, И.Лернер, Т.В.Кудрявцев, А.М.Матюшкин, М.И.Махмутов зор үлес қосты.

Проблемалық оқыту технологиясын зерттеу жұмыстары 60-шы жылдардың соңында 70-ші жылдардың басында пайда болды. Проблемалық оқытудың негізін салушылар мен зерттеушілер: американдық: Джон Дьюи мен оның шәкірті В.Клипатрик, орыс ғалымы М.И. Махмутов.

Олардың негізгі идеясы: Проблема қойып, оны шешу арқылы оқып үйрену. Проблемалық оқыту технологиясы оқытушы басшылығымен проблемалық ситуацияны шешуде өздік зерттеу іс-әрекетімен айналысуы, соның нәтижесінде оқушылардың білім дағдыларының қалыптасуымен, танымдық белсенділігінің, шығармашылық ойлау және т.б. маңызды қасиеттерінің дамуымен сипатталады.

Проблемалық оқыту идеясы мен принциптері психолог ғалымдар С.Л.Рубинштейн, Д.Н.Богоявленский, Н.А.Менчинская, А.М.Матюшкин еңбектерінде көрініс тапса, мектеп оқу үрдісінде қолдану мәселесі М.А.Данилов, М.Н.Скаткин сияқты әдіскерлердің еңбектерінде қарастырылды. Проблемалық оқыту мәселесімен Т.В.Кудрявцев, Д.В.Вилькеев, Ю.К.Бабанский, И.Я.Лернер сияқты ғалымдар да айналысты. Қазіргі кезеңде де бұл мәселемен басқа да педагогика ғылымы өкілдері қарастыруда.

Проблемалық оқыту оқушылардың танымдық белсенділігін қалыптастыруға бағытталған және ол оқыту арқылы іске асырылады. Бұдан проблемалық оқыту оқушылардың ой-санасының белсенді жұмыс атқаруы нәтижесінде және оладың ой-өрісін өз бетінше шығармашылық жолмен дамыту нәтижесінде жүзеге асады деген қорытынды жасауға болады.

Проблемалық оқытудағы негізгі ұғымдар: «проблема», «проблемалық сұрақ», «проблемалық тапсырма», «проблемалық жағдай (ситуация) ».

Биология пәнінде проблемалық оқыту мәселесін, алдымен «проблема» ұғымына анықтама беретін болсақ, қазақ тілінің түсіндірме сөздігінде былай деп көрсеткен: «Проблема – зерттеуді, шешуді керек ететін күрделі мәселе». Олай болса, биология сабағын проблемалық оқытудағы басты міндет – оқушылардың ойлау жүйесін өздерінің шығармашылық қабілеттері арқылы игерген білім қорын одан әрі тереңдету және түрлі проблемаларды шеше білетін білімді оқушы тұлғасын қалыптастыру болып табылады.

Проблема дегеніміз – субъектінің өзінде бар іздену құралдарымен (білім, икемділік, іздену тәжірибесі және т.б.) шешуге болатын жағдай. Кез келген сұрақ, тапсырма проблемалық бола бермейді. Олардың проблемалық болуының негізгі шарты – оларға жауап іздеуде оқушыға даяр жауап не үлгі болмайды және ол өзінің білетіні мен білмейтінінің арасындағы қайшылықты басқаша айтқанда, берілген проблеманы шешуге керекті білімнің немесе тәсілдің онда жетіспей тұрғанын сезінеді.

Проблемалық оқытудың негізі – проблемалық ситуацияны туғызу.

Проблемалық ситуация дегеніміз - шешуді талап ететін, іздендіретін, ойландыратын күрделі жағдайдың тууы. Биология пәнінің әрбір тақырыбын өту барысында ғылыми болжам жасауға жетелейтін проблемалық жағдаяттар тудыру ерекше орын алады.

Проблемалық жағдаятты қабылдап, талдап шешудің жолдарына болжам жасауда оқушылар бұған дейінгі алған білімдеріне сүйенеді, сөйтіп қарастырылып отырған құбылыстың, үдерістің өздеріне әлі таныс емес қасиеттері, белгілері, ерекшеліктері, заңдылықтары жөнінде пікірлерін ортаға салады, әркім өзі ұсынған пікірлерін негіздейді, қорғайды, ғылыми принциптерге сүйене отырып тұжырымдайды. Оқушы ойын қозғап, түртіп, қозғалысқа келтіріп отыру оқытушының басты міндеті болып табылады.

Проблемалық оқытуды ұйымдастырудағы шешуші тәсіл проблемалық жағдаяттар тудыру. Бұл тапсырмалар оқушылардың ой-өрісін кеңейтеді, ойлана білу қабілетін дамытады, ғылымға, пәнге деген қызығушылығын арттырады, төзімділікке, шыдамдылыққа, аңғарымпаздыққа баулиды.

Проблемалық жағдай дегеніміз - өзіне күрделі әрі қиын қандай да бір тапсырмаларды шешуге қажетті мәліметтерді оқушының өзінің іздеп табуы. Осы айтылғандарға орай, қандай жағдайда проблемалық жағдай туындайды және оны шешудің жолдары қандай? деген сұрақ туындайды.

Проблемалық жағдай туғызуда мынадай ережеге сүйену керек:

1. Проблемалық сұрақтарды оқушылардың білмеуі;
2. Проблемалық сұрақтарды шешуде студенттердің бұрынғы қалыптасқан білімін пайдалану, ол жетіспеген жағдайда жаңа ұғымдарды іздестіру.

П.И.Пидкасистый проблемалық жағдай туғызу мен оны шешудің 5 кезеңін былай деп көрсетеді:

1. Проблемалық жағдай туғызу.
2. Проблеманы шешу жолдарын іздестірі және оған өз ой тұжырымын беру.
3. Қиындық тудырған мәселеге талдау жасау, себебін іздестіру және оны шешудің ғылыми болжамын беру.
4. Білімін жетілдіру арқылы берген ғылыми болжамын дәлелдеу.
5. Проблемалық жағдайды толық шешу, оған көз жеткізу.

Зерттеу нәтижесі проблемалық жағдай мынандай жағдайларда туындауы мүмкін екендігін көрсетті (барлық пәндер бойынша).

1. Оқушы қойылған мәселенің шешімін табу әдісін білмеген жағдайда, проблемалық сұраққа жауап бере алмағанда және жаңа фактіге түсініктеме бере алмаған жағдайда, яғни жаңа ұғымды түсіндіру үшін бұрынғы алған білімнің жетіспеуі кезінде проблемалық жағдай туындайды.

2. оқушының бұрынғы меңгерген білімін тәжірибеде қолдану қажеттігі туындаған кезде және оны тәжірибеде қолдану үшін білімнің жетіспеушілігі анықталған жағдайда проблемалық жағдай туындайды. Білімнің жетіспеушілігін түсінген жағдайда оқушыда танымдық қызығушылық пайда болып, ізденімпаздылыққа ынталандырады.

3. Мәселені теориялық тұрғыда шешу мүмкіндігі бар, бірақ оны тәжірибеде жүзеге асыру тәсілі арасында қарама-қайшылық болған жағдайда проблемалық жағдай оп-оңай туындайды.

4. Керісінше, мәселені тәжірибелік тұрғыда шешу мүмкіндігі бар, бірақ оны теориялық тұрғыда негіздеуге мүмкіндік болмаған жағдайда проблемалық жағдай туындайды[4].

Ал оқу үрдісінде проблемалық жағдай тудырудың дидактикалық негіздері төмендегі 4 түрлі мақсатты іске асыруды көздейді:

1. Қойылған проблемалық сұраққа, мәселеге т.б. оқушының назарын аударту, оның танымдық қызығушылығын ояту;

2. Оқушының ойлау қабілетін белсендіруге ықпал ететін күрделі танымдық тапсырмалар беру;

3. Оқушыға берілген танымдық тапсырманың, мәселенің негізгі түйінін шешуге, қиындықтардан шығу жолдарын іздестіруге көмектесу;

4. Тығырықтан шығудың ең тиімді жолдарын іздестіруге бағыттау.

Проблемалық жағдайлар тудырып, оны шешу дұрыс жолға қойылған жағдайда оқушылардың ой-өрісін жан-жақты дамытуға, интеллектісі мен зейінін арттыруға мүмкіндік туады.

Проблемалық жағдаяттар тудыру тәсілдерін келтірейік.

I. Алдын-ала проблемалық жағдаяттар тудыратын сұрақтар дайындау.

II. Оқушылардың өздеріне биологиялық есептер құрастыртып оны шығарту, шыққан нәтижелерге тоқталып ой жүгірту.

III. Демонстрациялық тәжірибелер мен зертханалық жұмыстар орындалу.

IV. Биологиялық құбылыстарды негізге ала отырып жұмбақ жазу.

V. Биологияны көркем әдебиетпен байланыстыру.

Проблемалық жағдай деп пайда болған құбылыстар, фактілерді адамның түсіндіре алмай қиыншылық жағдайға ұшырауын айтады. Сондықтан сол қиыншылықтан шығудың жолын қарас-тырып, іздену іс-әрекетіне көшеді. Проблемалық жауап кезеңінде оқушының іс-әрекеті ойлаумен, пайымдаумен өз бетінше ізденумен сипатталады.

Проблемалық оқыту тек проблемалы жағдай тудырып қана қоюды емес, сонымен қатар оны дұрыс шеше білу тәсілдерін меңгертуді де қажет етеді. Ол үшін оқытушы оқушының тақырыпта кездесетін ой, пікір қайшылықтарын дұрыс аңғаруына жағдай жасап, оны шешудің жолдары мен тәсілдерін меңгертуге өздігінен ізденудің, зерттеудің амалдарын үйретуге тиіс.

Мұның басты жолы - дұрыс ойлай білуге баулу. Әрбір мұғалім дидактикалық ережелерді типтік, стандарттық жағдайларда тиімді пайдаланса, күрделі педагогтық жағдайларда дидактикалық принцип-терге сүйеніп шығармашылық танытса қойылған мақсатына жетері сөзсіз.

Оқушылардың таным белсенділігін, ойлау қызметін дамытуда, жетілдіруде, оларға өз бетінше қорытынды, тұжырым жасата білуде проблемалық проблемалық оқытудың маңызы ерекше. Оқытудың бұл түрі арқылы мұғалім оқушы алдында проблемалық жағдаят тудыратын танымдық-іздендіруші, шығармашылық сипаттағы зерттеу әдісіне бағытталған тапсырмалар береді және оны орындата алады.

Қорыта келе, өзгелермен ақыл, білімімізді тинақтап ортақтастыра отырып көшбасшылық таныта білсек, іс-тәжірибеміздің жоғары нәтиже бергенін байқаймыз. Кәсіби шебер, құзіретті, көшбасшы бола білген мұғалім шығармашылық жетістіктің шыңына

жетеді. «Шеберліктің белгісі – түрлі әдісті болу» -деп А.Байтұрсынов айтқандай, түрлі әдіс-тәсілдер арқылы сабақты түрлендіріп, оқушының ынтасын арттырып, білім беруде оң нәтиже көрсету- әрбір мұғалімнің міндеті. Ертеңінен үміт күткен Мәңгілік еліміздің ұрпағы білімді, білікті болу үшін нақты жоспар, нақты қадам керек. Әр мұғалім әзірленіп жатқан жаңа мазмұнды бағдарламаны игеруі маңызды.

# Биология сабақтарында проблемалық технологияны қолданудың негізгі ерекшеліктері

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Қазіргі заманғы білім берудің басты мақсаты - мамандарды әлемді шығармашылық тұрғыдан өзгертудің әдістемесімен қаруландыру. Осы тұрғыдан алғанда ғылыми міндеттерді дәстүрлі емес әдістермен шешудің жолы ретінде проблемалық оқыту жүйесі ұсынылуы заңды құбылыс.

Проблемалық оқытудың жаңа әдістері мен түрлері: іскерлік ойындар, баяндамалар мен ақпараттық хабарлар, кері байланысты дәрістер, дәріс –диалог, тренинг, дөңгелек үстелдер, пікірталас, ұжымдық –танымдық оқу және тағы басқалар.

Сонымен проблемалық оқыту оқушыны танымдық көкжиегін кеңейтеді, шығармашылық белсенділігін арттырады, білім игеру қарқынын тездетеді, тапсырмаларды орындау кезінде өз бетінше жұмыс істеуге үйретеді, оқуға деген ынта-ықыласын оятады. Ерекшелігі мұғалім білімді дайын түрде баяндап бермейді, оқушылардың алдына проблемалық міндет қояды. Шешімді және шешу құралдарын оқушы өзі іздестіруі тиіс.

Бұл технологиялық әдістегі ең маңызы мәселе – жаңа білім жаттау немесе есте сақтау үшін емес, проблеманы немесе бірнеше проблемаларды шешу үшін беріледі.

Проблемалық оқытудың ең басты ерекшеліктерінің бірі – теориялық мәселелерден туындайтын жаңа ұғымдар мен пікірлерді оқушылардың өз беттерімен іздестіруі, ол өз кезегінде оқушылардың білімді берік сапалы меңгерулеріне, ойлау қабілеттерін, білік, дағдыларын шыңдауға мүмкіндік береді.

Проблемалық оқытудың екінші ерекшелігі - оқушылардың өз бетімен жұмыс жасау қабілетін қалыптастыра отырып, өзіндік көзқарастарын қалыптастыру болса, үшінші ерекшелігі - теориялық және тәжірибелік мәселелер арасындағы байланыс заңдылықтарынан келіп шығады да, дидактиканың оқыту мен өмір тәжірибесі арасындағы байланыс ұстанымымен анықталады. Яғни оқушылар теориялық білімдерін тәжірибеде қолдана алу мүмкіндігіне ие болады.

Проблемалық оқытудың төртінші ерекшелігі - оқушылардың әр түрлі үлгідегі өздік жұмыстарын тиімді орындауы болып табылады.

Оқушылар өздік жұмыстарын орындай отырып, бұрыннан қалыптасқан білім қорларын пайдаланады жаңа білім, білік, дағды меңгереді.

Бесінші ерекшелігі - дидактиканың жеке бағдарлы оқыту ұстанымымен анықталады. Әр түрлі қиындық деңгейіндегі оқу проблемаларын әр оқушы әрқалай қабылдайды және оның шешімін әркім әрқалай шешеді. Осыған сай бірнеше ғылыми болжам, дәлел, түсінік беріледі де, оқушылар оны салыстыра отырып, өз ой-пікірлерін, болжамдарын дәлелдейді.

Проблемалық оқытудың алтыншы ерекшелігі - “ойлауды белсендіру”. Проблемалық оқыту технологиясының міндеттерін іске асыруда, яғни, оқу мазмұнын толық ұғынып, одан белгілі бір нәтиже шығаруда ой негізгі рөл атқарады. Ойлау – адамның таным әрекетінің ең

жоғарғы формасы. Ол – күрделі психикалық үрдіс. Көрнекті кеңес психологі Л.С. Выготский оқыту баланың дамуын ілгері қарай жетектеуге, әсіресе, оның өздігінен ойлау әрекетінің жоғары сатыда болуын қамтамасыз етуі тиіс дегенді айтады. Бұл жерде оқушылардың ойлау әрекетін үнемі белсендіріп отыру көзделеді.

Проблемалық оқытудың жетінші ерекшелігі бойынша, оқушылардың “шығармашылық ойлауын” жетілдіру арқылы олардың шығармашылық қабілетін шыңдау, өзіндік ойлауы мен көзқарасын қалыптастыру көзделеді.

Проблемалық оқыту технологиясы ерекшеліктерінің ішіндегі алғашқы үшеуі ең маңызды болып есептеледі, өйткені біріншісі – білімнің беріктігін, екіншісі - өз көзқарасын қалыптастыру мен қорғауды, үшіншісі – меңгерген теориялық білімді өмірде қолдана білуді қамтамасыз етеді. Ал қалған ерекшеліктер осы үш ерекшеліктің тиімділігін арттырып, жетілдіре, толықтыра түседі.

Дәстүрлі оқыту әдісі бойынша мұғалім сабақ тақырыбын хабарлайды, мазмұнын түсіндіреді, есептер шығартады, талдау жүргізеді, қорытынды жасайды. Ал, оқушылар мұғалімнің әңгімесін тыңдайды, тапсырмаларды орындайды, керекті әдебиеттермен танысады. Мұнда игеруге тиісті оқу мазмұны күні бұрын дайындалған күнінде оқушылардың қабылдауын талап етеді. Мұндай оқыту жүйесі репродуктивтік немесе дайын білім беру әдісі деп аталады.

Проблемалық оқыту әдісінің екі түрлі айырмашылығы бар. Біріншісі, оқыту мақсатына байланысты, мұнда оқу материалының мазмұны зерттеледі, ол белгілі бір дәрежеде қорытылады. Нәтижесі практикада сыналып, оқу программаларына, оқулықтарға және қосымша оқу құралдарына жазылады. Екіншісі, педагогикалық процесті ұйымдастыру принципі тұрғысынан қарастырылады. Бұл кезде әдебиеттерде дайындалып көрсетілген білім мазмұнының көшірмесін қайталап өз қалпында түсіну талап етілмейді.

Проблемалық ахуал - оқушылардың игерген білімі мен іскерлікті қалыптастырудағы қажетті ұғымдар мен фактілердің арасындағы сәйкессіздік. Информатика пәнінде оның негізгі көзі берілген есептің математикалық моделін жасау, алгоритмін құру болып табылады. Бұл кезде оқушылардың өзіндік шығармашылық әрекеті орындалады.

Проблемалап оқыту теориясының аумағында әлі де зерттеулерді қажет ететін көптеген мәселелер бар. Бұл маңызды мәселелердің бірі - оқыту процесінде оқушының шығармашылық қабілетін дамыту мәселесі. Оқу-тәрбиесінде мынандай өзекті проблемалар бар: оқушылардың өз бетінше ойланып, әрекет етулері жеткіліксіз. Бұл проблемаларды шешу үшін, білім үрдісінде инновациялық технологияларды оқып үйреніп, өз іс-әрекетінде енгізу қажет деп ойлаймын. Негізгі дәстүрлі оқыту мен проблемалық оқыту айырмашылығы 1-шы кестеде көрсетілген.

Кесте 1

Дәстүрлі оқыту мен проблемалық оқыту айырмашылығы

Дәстүрлі оқыту	Проблемалық оқыту
1. Проблема қойылмайды.	1. Алдағы проблема қойылады.
2. Мұғалім тарапынан тапсырмалар – берілетін жауабы дайын, қарапайым тапсырмалар. Нақты жауап оқулықта, қосымша материалдарда да бар.	2. Дайын жауабы жоқ, проблема шешуді талап ететін, зерттеушілікті, шығармашылықты қажеттетін тапсырмалар.
3. Оқушы – нысан. Ол- орындаушы. Мұғалім жетекшілігі, басшылығы үстем болады.	3. Оқушы – субъект. Ол дербес ізденуші. Еш нәрсені қайталамайды, дайын дүниені көшірмейді, өзінің ізденісі, зерттеуі арқылы проблеманы шешуге талаптанады. Мұғалім – ақылшы, кеңесші, ұйымдастырушы, бағыт беруші.
4. Сыныптағы барлық оқушыларға арналған тапсырмалар.	4. Оқушыларды жан-жақты дамытуға, жеке тұлғаға, оның қабілетін арттыруға бағытталған шығармашылық сипаттағы тапсырмалар.

Проблемалық оқыту технологиясының көрсетілген ерекшеліктеріне қарай, проблемалық оқытудың түрлері анықталады. Проблемалық оқытудың түрлері:

1. Теориялық ізденіс немесе ғылыми-шығармашылық (ғылыми-зерттеу). Оқушының жаңа теорема, заң, ереже т.б. ойлап шығарудағы ізденісі және өз болжамын жасау. Оқу проблемаларының теориялық шешімін табу қарастырылады.

2. Тәжірибелік ізденіс немесе тәжірибелік-шығармашылық. Оқушы меңгерген теориялық білімін жаңа жағдайда, өмірде қолдан білуі қажет. Проблемалық оқытудың бұл түрінде оқушы оқу проблемаларының тәжірибелік шешімін іздестіреді.

3. Шығармашылық ізденіс. Оқушы үйреніп білген білім қорын одан әрі дамытып, шығармашылықпен жұмыс істеу дағдыларын жетілдіру қажет. Шығармашылық жұмыстарға көркем шығарма жазу, сурет салу, ән шығару, жоба құрастыру, слайд жасау, т.б.

Проблемалық оқыту түрлері оқушылардың шығармашылық белсенділіктерін жетілдіреді, пәнге деген қызығушылықтарын арттырады, пәннен терең білімділіктерін дамытады. Оқушының ғылыми тұрғыдан ойлау дағдылары қалыптасады. Көтерілген мәселе бойынша көпшілік ақпарат құралдары мәліметтерімен, кітапханада, қосымша әдебиеттермен, энциклопедиялық сөздіктермен, т.б. жұмыс істей отырып білім қорларын молайтады. Қозғалған мәселе бойынша бір-бірімен ой бөлісуге, сол арқылы белсенді тілдік қатынасқа түсуге мүмкіндік туындайды. Өйткені ол белгілі бір мәселені шешу бойынша ой бөліседі, өз көзқарастарын білдіреді, оны дәлелдейді. Бұның бәрі тілдік қатынасқа түсудің бірден-бір жолы және оқушының өзіндік жұмыс істеуіне мүмкіндік туады. Яғни, проблемалық оқыту дегеніміз – оқытушы мен оқушының бірлескен оқу және іздену, зерттеу әрекеті. Проблемалық жағдайларды шеше отырып, оқушылардың өз беттерінше саралау, түсіну, игеру, талдау, баға беруі болып табылады.

*Проблемалық оқытудың күшті жақтары:*

- оқушылардың логикалық ойлау қабілетін арттырады;
- оқу еңбегіне қызығушылығын арттырады;
- берік білімге оқытудың жоғары нәтижесіне жеткізеді;
- оларды өздігінен санал жұмыс істеуге үйретеді.

*Проблемалық оқытудың артықшылығы:*

- зейіннің дамуына мүмкіншілік жасайды,
- байқампаздықты танытады, оқушының танымдық іскерлігін белсенді дамытады, жауаптылық, сыншылдық, өзін сынау, бастамашылдық және өзіне баға беру әрекетін дамытады. Бұдан басқа проблемалық оқыту білімнің тұрақтылығын қамтамасыз етеді.

Екіншіден, мұнда Б. Зейгарник ашқан, психологияда белгілі аяқталмаған әрекет эффектісі жұмыс істейді. Оның мәні мынада, басталған әрекеттер, бірақ аяқталмағаны есте жақсы қалады: «әрекеттердің басы мен күтілетін нәтиже арасында өзекті байланыс сақталады, сондықтан бізді аяқталмағаны ойландырады, аяғына дейін істелмегені есімізде сақталады» .

Проблемалық оқытуға негізделген зерттеу- іздендіру бағытындағы тапсырмалардың ерекшелігін төмендегі салыстырмалы кесте арқылы дәлелдеуге болады .

*Проблемалық оқыту әдістерінің ерекшелігі:*

- алдын ала белгіленбеген, кенеттен;
- проблемалық мазмұндау;
- зерттеушілік-лабораториялық жұмыс;
- мәселені проблемалық тапсырма және шешу;
- проблемалық жағдай (ойын түрінде).

Проблемалық оқытудың негізгі ерекшелігі – оқушының білетіні мен білмейтінінің арасында қайшылықтар пайда болады және проблемалы міндетті шешуге дайын тәсіл

болмағандықтан, проблемалы жағдаят пайда болады, осыған орай, оқушының ізденушілік әрекеті мен ынтасы күшейе түседі. Сонымен, ойлауға үйрету дегеніміз диалектикалық қарама-қайшылықты көре білуге, сол арқылы нақты шындықты тануға үйрету деген сөз. Қарама – қайшылық ой – дамуының қозғаушы күші.

Проблемалық оқыту оқытушы үшін әр түрлі деңгейдегі қиындықтар тудыруы мүмкін, қандай және қанша іс –әрекеттерді қою және проблеманы шешуді ол өзі жүзеге асыруына тәуелді .

Негізгі проблемалық оқыту технологиясының басты элементтері 1- суретте көрсетілген :



Сурет 1. Проблемалық оқыту құрылымы

Проблемалық оқыту технологиясы мұғалім басшылығында өтетін оқушылардың оқу міндеттерін шешуге орайластырылған өзіндік ізденіс іс-әрекеттерін ұйымдастыруға негізделеді. Оқу ізденістері барысында оқушыларда жаңа білім, ептілік және дағдылар қалыптасып, қабілеттері, танымдық белсенділігі, қызығуы, ой-өрісі, шығармашыл ойы және басқа да тұлғалықмаңызды сапалары дамиды (Т.В.Кудрявцев, А.М. Матюшкин, М.И. Махмудов және т.б.).

Жалпы түрінде проблемалық оқыту технологиясы сипаты келесідей: оқытушы білімді дайын қызықтырады және оның шешу әдіс-тәсілдерін табуға ынталандырады. Ал оқушылар мұғалімнің тікелей басшылығында не өз бетінше олардың шешімін табудың жолдары мен әдістерін зерттейді, яғни болжам жасайды, оның шынайылығын тексеру тәсілдерін белгілейді әрі талқылайды, дәйектейді, нәтижелерін талдайды, пікір жүргізеді, дәлелдейді.

Проблемалық оқыту-оқытушы білімді дайын күйінде ұсынбай, оқушылар алдына проблема қою арқылы баланы оқыта отырып жалпы амыту: сезімін, түйсігін, қабылдауын; ынтасын, зейінін, еске сақтауын, ұғынуын; ойлау, қиялдау, болжау қабілетін ерік қайратын, оқу, іс-әрекетін; дағды, машықтарын; жауапкершілігін, дербестігін, өздігінен ізденісін дамытады.

Проблемалық оқыту - мәні проблемалық жағдаят (ситуация) туғызу мен оқушылардың оқу проблемасын дербес шешулері бойынша іс-әрекеттерін басқару болып табылатын оқыту түрі. Проблема деп шешілуі оқушылардан білім алу үшін белгілі әрекеттерді талап ететін есептердің, тапсырмаларың, теориялық немесе тәжірибелік мәселелердің әртүрлілігін түсінуге болады.

Проблемалық оқытудың ерекшелігі - мұнда мұғалім білімді дайын түрде баяндап бермейді, оқушылардың алдына проблемалық міндет қояды. Шешімді және шешу құралдарын оқушы өзі іздестіруі тиіс.

Проблемалық оқыту бірнеше сатыдан тұрады: проблемалық жағдайды аңғару, жағдайды талдау негізінде проблеманы тұжырымдау, болжаулар ұсынуды, оларды алмастыру және тексеруді қамтып проблеманы шешу, шешімді тексеру. Бұл процесс ойлау актісінің үш фазасымен ұқсастық бойынша өрістейді (С.Л. Рубинштейн бойынша), ол проблемалық жағдайда пайда болып, проблеманы аңғаруды, оны шешуді және соңғы ой тұжырымын қамтиды.

Проблемалық оқыту оқушылар үшін қиыншылық деңгейі бойынша әртүрлі болуы мүмкін, ол оның проблеманы шешу үшін қандай және қанша іс-әрекеттер жүзеге асырылатынына байланысты. В.А. Крутецкий оқушы мен мұғалімнің іс-әрекеттерін бөлу негізінде дәстүрлі оқытумен салыстыра отырып, оқытудың проблемалығы деңгейінің сызбасын ұсынды.

Проблемалық оқытудың ең негізгі мақсаты - қазіргі заманғы ғылым жетістіктеріне сүйене отырып, продуктивтік және творчестволық оқу процесінің логикалық жолдарын баяндау. Міндеттер: мұғалімнің проблемалық оқыту процесінің ұйымдастыруының негізгі тәсілдері мен формаларын көрсету, оқытудың ғылымилық дәрежесін жоғарылатып, оқушылардың неғұрлым тиімді жалпы дамуына жағдай тудыру.

Проблемалық оқытудың мақсаты-ғылыми таным нәтижелерін, білімдер жүйесін ғана меңгеріп қоймай, сонымен бірге бұл нәтижелерге жету жолының өзі де, процесінде меңгеру, оқушының танымдық дербестігін қалыптастырып, оның творчестволық қабілеттерін дамыту.

Проблемалық оқытуда мұғалімнің түсіндіруі мен оқушылардың репродуктивтік қызметті талап ететін міндеттер мен тапсырмаларды орындауы жоққа шығарылмайды.

Проблемалап оқыту әдісін жүргізу дидактиканың заңдылықтарына байланысты мынадай кезеңдерге бөлінеді:

1.Проблемалық ахуалдар туғызу жолын алдын - ала дайындау.

2.Проблемалық сұрақтарды грамматикалық және стилистикалық жағынан дұрыс құру.

3.Проблемалық мәселелерді шешу амалдарын күні бұрын дәл белгілеу.

4.Проблемалық сұрақтардың теориялық анықтамасын заңды түрде дәлелдеу.

Проблемалап оқыту әдісінің екі түрлі айырмашылығы бар. Біріншісі, оқыту мақсатына байланысты, мұнда оқу материалының мазмұны зерттеледі, ол белгілі бір дәрежеде қорытылады. Нәтижесі практикада сыналып, оқу программаларына, оқулықтарға және қосымша оқу құралдарына жазылады. Екіншісі, педагогикалық процесті ұйымдастыру принципі тұрғысынан қарастырылады. Бұл кезде әдебиеттерде дайындалып көрсетілген білім мазмұнының көшірмесін қайталап өз қалпында түсіну талап етілмейді.

Проблемалап оқыту теориясының аумағында әлі де зерттеулерді қажет ететін көптеген мәселелер бар. Бұл маңызды мәселелердің бірі - оқыту процесінде оқушының шығармашылық қабілетін дамыту мәселесі. Оқу-тәрбиесінде мынадай өзекті проблемалар бар: оқушылардың өз бетінше ойланып, әрекет етулері жеткіліксіз. Бұл проблемаларды шешу үшін, білім үрдісінде инновациялық технологияларды оқып үйреніп, өз іс-әрекетімде енгізу қажет деп ойлаймын.

Проблемалық оқыту-ойлау операциялары логикасы (талдау, қорытындылау және тағы басқа) мен оқушылардың ізденіс әрекетінің заңдылықтарын (проблемалық ситуация, танымдық қызығушылығының, қажетсінуінің және тағы басқа) ескере отырып жасалған оқу мен оқытудың бұрыннан мәлім тілдерін қолдану ережелерінің жаңа жүйесі. Сондықтан да көбінесе мектеп оқушыларының ойлау қабілеттерін дамытады және сенімдерін қалыптастыруды қамтамасыз етеді.

Проблемалық оқыту әдісі негізінен екі функциясымен анықталады:

1. Ақыл-ой ізденісінің бағытын анықтау, яғни оқушылардың проблемаларды шешудің амалдарын іздестіруі.

2. Оқушының жаңа білімді меңгерудегі танымдық қабілетін дамыту, оқу әрекеті белсенділігін қалыптастыру.

Заманауи білімдендірудің мақсаты мамандарды шығармашылыққа дайындау екені даусыз. Шығармашылық дегеніміз жаңалықты (жаңа нысана, жаңа білім, жаңа проблема, жаңа әдіс ) ашу. Осыған орай, проблемалық оқытудың өзі де шығармашыл процесс: бейқалыпты ғылыми-оқу мәселені бейқалыпты әдістермен шешу. Соңғы кезде кең тараған оқу түрінің мәні: мұғалім жаңа білімді дайын түрде баяндамай, оқушылардың алдына проблемалық сұрақтарды қойып, оларды шешудің жолдары мен тәсілдерін іздеуге бейімдейді.

# METHODOLOGY OF FORMING "21ST CENTURY SKILLS" IN STUDENTS OF PEDAGOGICAL SPECIALTIES

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## Abstract

The methodology of forming "21st century skills" in students of pedagogical specialties is a key direction in modern pedagogical science and practice. Its relevance is determined by the contemporary demands on education and the labor market, as well as the need to prepare highly qualified professionals capable of successfully functioning in the information society and addressing future challenges. The aim of this research is to analyze effective methodologies for forming "21st century skills" in students of pedagogical specialties and their impact on future professional competencies as educators. The literature review includes an examination of key competencies and skills of the 21st century, as well as methods and approaches to their formation. The research results emphasize the importance of adapting pedagogical education to the contemporary demands of society and focus on the role of teachers in this process. The practical significance of the results lies in the possibility of implementing the developed methodologies in the educational process of pedagogical institutions. The research methods are based on a review of scientific literature, including peer-reviewed publications. The results are synthesized and analyzed in a descriptive form using meta-analysis methods and systematic literature reviews. The synthesized conclusions underscore the importance of further research in the field of forming 21st century skills and the necessity of improving pedagogical practice in light of the new challenges of the modern world.

**Keywords:** 21st century skills, pedagogical education, competence development, teaching methodologies, contemporary approaches, educational innovations.

## Introduction

In our time, students, especially those studying pedagogical specialties, face new challenges and demands posed by contemporary society. Rapid technological advancements, globalization, changes in the economic sphere, and socio-cultural context create a new dynamic that influences the preparation of professionals in the field of education. Therefore, the relevance of the methodology for forming "21st century skills" in students of pedagogical specialties is undeniable. The concept of "21st century skills" encompasses a wide range of abilities and competencies necessary for successful adaptation and effective functioning in the modern world. Among them, critical thinking, creativity, communication skills, digital literacy, collaboration ability, as well as problem-solving and decision-making skills in changing conditions can be highlighted. These skills are not only important for students' academic success but also hold immense significance for their future careers and professional development (Pesha, 2020).

It is important to note that traditional teaching methodologies, although still important, often prove insufficient in adequately preparing students for modern challenges. Therefore, the

development and implementation of specialized methodologies for forming "21st century skills" become an extremely important task for educational institutions and the scientific community. Scientific research shows that students possessing "21st century skills" demonstrate higher motivation for learning, cope more effectively with educational tasks, and better adapt to changing conditions. Additionally, acquiring such skills contributes to the personal development of students, enhancing their self-awareness and self-confidence, which is also crucial for their professional and personal growth.

The methodology for forming "21st century skills" in students of pedagogical specialties should be comprehensive and adapted to the specifics of their future professional activities. It may include the use of modern educational technologies, project work, methods of active and collaborative learning, as well as practical activities aimed at developing specific skills. For example, within such a methodology, students may participate in interactive projects where they have to work in teams, explore problems, develop solutions, and present their results in the form of presentations or other creative formats. Such an approach not only contributes to the formation of specific skills but also cultivates students' independence, responsibility, and ability to adapt to new situations (Nikitina, 2019).

The methodology for forming "21st century skills" in students of pedagogical specialties is a key direction in modern pedagogical science and practice. Its relevance is determined not only by the contemporary demands on education and the labor market but also by the need to prepare highly qualified professionals capable of effectively functioning in the modern information society and successfully addressing the challenges of the future.

**The aim of this study** is to analyze effective methodologies for developing "21st century skills" in students majoring in pedagogical specialties.

**Research Question:** How does the development of "21st century skills" in students of pedagogical specialties affect their future professional competencies as educators?

**The object of the research** is students majoring in pedagogical specialties.

**The subject of the research** is the methodology for forming "21st century skills".

**The research problem** lies in the necessity of adapting pedagogical education to the modern societal demands. In the context of rapid technological advancement and changes in the job market structure, students majoring in pedagogical specialties need to be equipped with skills that enable them to adapt and function effectively in the contemporary information society.

**The practical significance** of the study lies in the potential impact of its results on educational practice. The developed methodology for forming "21st century skills" can be implemented in the educational process of pedagogical institutions, thereby preparing future professionals with relevant competencies necessary for successful professional activities in the modern world. Additionally, the research results may be useful for educational practitioners, methodologists, and administrators involved in developing educational programs and methodological support for teaching.

### **Research Methods**

The research methodology is based on a review of scientific literature, including only peer-reviewed publications. Systematic searches were conducted in databases such as Google Scholar, Elsevier, Citeseer, Web of Science, and Scopus to identify relevant sources. The research period covers the last decades. After applying selection criteria, only publications meeting the specified criteria were included in the analysis. Keywords for the search included "21st century skills," "pedagogical education," "skills development," "modern teaching methods," and "educational innovations." The extracted data were carefully synthesized and analyzed in descriptive form, illuminating the significance and effectiveness of methods used for developing 21st century skills in students majoring in pedagogical specialties. To enhance the reliability of the results, meta-analysis methods were used, combining the results of various studies to identify common trends

and patterns. Additionally, systematic literature reviews were utilized to provide a comprehensive overview of research results in this area. By employing a rigorous and systematic approach to literature review and analysis, this research article aims to contribute to understanding effective methodologies for developing 21st century skills in students majoring in pedagogical specialties.

### **Results and Discussion**

The literature review of scientific articles presented in the context of developing 21st century skills in students majoring in pedagogical specialties reflects a deep understanding of the relevance of this issue in modern education.

Pesha A.V. and Evplova E.V. conduct an extensive analysis of Russian and foreign research, using content analysis to identify key aspects of 21st century skills. The authors also conduct an online survey involving 150 students from three pedagogical universities to gather practical data on students' perception of the significance of these skills. Their theoretical analysis of the problem field of "soft skills" based on domestic and foreign experience is complemented by a study of global approaches to classifying skills and competencies of the 21st century to develop a model of competencies for future educators. Such a holistic approach allows the authors to comprehensively study and assess the significance of 21st century skills and competencies for future educators (Pesha, 2020).

Shramko K.I.'s article delves into practical methods for developing 21st century skills, focusing on the use of innovative teaching methods. The authors emphasize the importance of active learning methods that stimulate effective material assimilation, develop creative abilities, and transition to independent information search. Interactive learning, including simulation games and discussions, as well as cooperative learning, contribute to the development of communication and problem-solving skills among students. Special attention is given to the use of moral values in education, contributing to the formation of ethical principles and critical thinking (Shramko, 2019).

Panfilova V.M. and Panfilov A.N.'s article highlights the need for developing global competence among students majoring in pedagogical specialties. The authors emphasize the importance of decision-making skills, teamwork, adaptation to various cultural contexts, and career orientation in modern society. They propose using various methods, such as content analysis, literature review, structural-functional method, and observation, to effectively develop these competencies among students (Panfilova, 2021).

Tkacheva S.A. identifies key competencies such as design skills, communication skills, research skills, and diagnostic skills. The authors emphasize the importance of these skills in developing educational concepts, effective pedagogical communication, and adapting the learning process to individual student needs. Their work provides a detailed description of methods for developing each of these competencies and underscores their role in modern education (Tkacheva, 2018).

Nikitina G.V.'s article discusses the idea of using social practice to develop professional and social skills of the 21st century among pedagogy students. The authors analyze foreign and Russian research on the content and process of developing 21st century skills, arguing for the possibility of using social practice resources as one of the solutions to this problem. They propose incorporating social practice as an independent and specific type of practice into the system of preparing future educators. The importance of students' social activity in the expanded socio-educational space is also emphasized as an element of informal education. This approach allows students to develop interaction skills, solve social problems, and form the competence of social interaction, which is crucial for successful pedagogical activities in the modern world. Thus, combining formal and informal education through social practice contributes to the effective development of 21st century skills among future educators (Nikitina, 2019).

Fatmawati A. examines the method of developing 21st century skills through project-based learning (PBL). The study shows that implementing PBL contributes to the development of 21st

century skills such as critical thinking, problem-solving, collaboration, and creativity among students. The authors note that it is important for teachers to organize the learning process using PBL effectively, set clear skill goals, and realize their role as facilitators rather than traditional instructors. It is also emphasized that successful implementation of PBL requires careful selection of project topics, planning tasks and activities, assessing results, and ensuring collaboration among students to enhance their problem-solving, motivation, and creativity skills (Fatmawati, 2018).

González-Salamanca J.C., Agudelo O.L., and Salinas J. discuss the importance of integrating skills into the curriculum, teaching them, and assessing them. The authors note that it is essential to include communication, collaboration, critical thinking, and problem-solving skills in the curriculum, and to teach and assess them. They also emphasize that the successful integration of 21st-century skills into the curriculum depends on teacher preparation, as teachers need to incorporate these skills into their teaching programs. Furthermore, the use of technology as a resource and tool plays a crucial role in developing higher-order skills, such as 21st-century skills, especially when used at levels of modification and redefinition. Thus, the article underscores the need for a comprehensive approach to developing 21st-century skills, including their integration into the educational process, teacher training, and the use of technology to support this process (González-Salamanca, 2020).

According to research, Kim S., Raza M., and Seidman E., one of the key methods is the use of the Teacher Induction Practices and Processes System (TIPPS), which helps measure the social quality of teaching processes in various learning contexts. The authors emphasize the importance of feedback for teachers on their own teaching activities, contributing to continuous professional development. It is also noted that to improve teachers' 21st-century skills, attention should be paid to teaching methods, curricula, school climate, assessments, and monitoring of skill acquisition. An important aspect is also the modeling of skills by teachers for students, highlighting the significance of preparing and training educators not only in acquiring 21st-century skills but also in transmitting them to others. Thus, the article offers a comprehensive approach to developing 21st-century skills among future educators, including the use of assessment tools, feedback, and continuous professional development (Kim, 2019).

Van Gompel, K. highlights the constructivist approach as one of the key methods, which involves active interaction of students with material and context for individual organization and construction of knowledge. This approach is supported by research by German theorists presented in the work. Constructivism fosters critical thinking, collaboration, communication, and other skills necessary for successful adaptation to the modern educational environment. Additionally, the authors draw attention to the use of technologies such as Web 2.0 for developing 21st-century skills. The connection between technology and constructivism enables students not only to actively interact with information but also to develop digital literacy, creativity, and problem-solving skills. The article suggests that education students should not only understand the theoretical foundations of 21st-century skill formation but also actively apply the constructivist approach and modern technologies in their teaching practice for effective student learning and development (Van, 2019).

González-Pérez L.I. discusses methods for developing 21st-century skills, which include collaboration, problem-solving, creative and innovative thinking, as well as the use of information and communication technologies (ICT). They emphasize that modern students must possess skills for successful teamwork, the ability to effectively solve various problems, developed creative and innovative thinking, as well as the ability to use ICT in their academic and professional activities. The authors also note that educators should be aware of various pedagogical approaches and be able to integrate ICT into the teaching process to support the development of 21st-century skills among their students. These methods not only contribute to active learning and the development

of key competencies among students but also help them successfully adapt to the rapidly changing society and the requirements of the modern job market. Ultimately, the use of these methods in the educational process contributes to the development of skills among students necessary for success in the modern world (González-Pérez, 2020).

Paskha Marini Thana examines the method of developing 21st-century skills through a multispecialty approach for pedagogy students. They emphasize the importance of using a multispecialty approach in education to develop critical thinking, creative thinking, communication skills, and collaboration among students. This approach allows students to study a single topic or problem through various disciplines, leading to a deeper understanding and increased knowledge. The authors point out that the multispecialty approach involves privileging each discipline while creating connections between them. At the middle school level, students study the same topic in different classes according to the subject. This means that learning activities are carried out through discussions of topics or issues in various disciplinary contexts. The multispecialty approach is part of an integrated curriculum aimed at integrating learning across all disciplines to ensure connections between different subjects and to help students increase their knowledge and understanding (Paskha, 2022).

Alismail H.A., and McGuire P. discuss problem-based learning, integrating cognitive and social skills with course material, and using innovative teaching strategies and modern learning technologies. Problem-based learning involves discussing and analyzing real-world problems and topics, allowing students to explore issues, provide explanations, generate ideas, analyze data, and draw conclusions to find appropriate solutions. This approach contributes to the development of critical thinking, teamwork skills, and the application of knowledge in practice. The use of innovative teaching strategies and modern learning technologies helps students integrate cognitive and social skills with course material. This promotes active student participation in the learning environment, enhances their problem-solving skills, and fosters collaboration. The article emphasizes the importance of using diverse teaching methods to develop 21st-century skills among pedagogy students, helping them successfully meet the challenges of modern society and future careers (Alismail, 2015).

Vladimirovna S.Y., and Kumisbekovna K.G. highlight the importance of integrating these skills into the educational process to prepare students for successful careers in modern society. Some of the methods the authors discuss include:

1. Problem-based learning: Students learn to solve real-world problems, promoting critical thinking and solution-finding skills.
2. Collaborative learning: Group work and teamwork help students develop collaboration, communication, and leadership skills.
3. Use of information technology: Learning with modern technology helps develop digital literacy and the ability to work with large amounts of information.
4. Active learning methods: Methods such as group discussions, project work, role-playing, etc., foster creative thinking and imagination.
5. Development of self-reflection and personal growth: Encouraging students to self-analyze and set goals promotes their personal development and leadership.
6. Assessment through projects and portfolios: Using project tasks and portfolios allows for a more comprehensive assessment of students' development in key 21st-century skills such as creativity, communication, and problem-solving.
7. Teaching self-learning skills: Encouraging students to self-educate and search for information helps them develop lifelong learning skills.
8. Practical experiences and real-life scenarios: Providing students with opportunities to apply their knowledge in practice and solve real-life scenarios helps them develop adaptability, the ability to work in changing conditions, and cope with failures.

These methods not only contribute to the development of 21st-century skills among pedagogy students but also help them become prepared for the challenges and opportunities of modern society. Developing these key skills enables students not only to successfully complete their education but also to function effectively in a dynamic and rapidly changing world (Vladimirovna, 2023).

Vuojärvi H., Eriksson M., and Vartiainen H. explore various methods of developing 21st-century skills through the application of design-based research (DBR). They describe a pedagogical course design based on the 21st-century skills framework proposed by Binkley et al. (2012). This course design aims to develop critical thinking, problem-solving, communication, collaboration, information literacy, digital technology use, citizenship, time and career management, as well as personal and social responsibility skills among students. The authors emphasize that students should apply these skills in practice through collaborative problem-solving in a team format during the course, which promotes the development of their epistemic flexibility and professional competence. Deductive content analysis using NVivo software was employed to analyze the manifestation of 21st-century skills in students' experiences. The framework of 21st-century skills and their definitions served as an analytical basis for interpreting data and coding students' descriptions for each of the ten skills. The article offers an innovative approach to developing 21st-century skills among pedagogy students through the practical application of these skills in the context of collaborative learning and problem-solving, facilitating the development of a set of key skills necessary for successful engagement in the modern world (Vuojärvi, 2019).

According to research by Djudin T., the following methods for developing 21st-century skills among pedagogy students can be highlighted:

1. Making course material relevant to the "big picture": This method involves linking course material to real-life situations and problems, helping students better understand the importance of their academic knowledge and its applicability in the real world.

2. Teaching across disciplines to develop low-level and high-level thinking skills: Aimed at developing students' ability to think critically, analyze information, solve problems, and apply knowledge in various contexts.

3. Facilitating knowledge transfer: Helping students transfer acquired knowledge and skills from one area to another, promoting deeper and more sustainable learning.

4. Teaching learning skills or metacognitive skills: Providing students with the ability to be aware of their learning process, manage their learning strategies, and develop skills in planning, monitoring, and evaluating their learning.

5. Addressing Misunderstandings Directly: This method involves promptly and purposefully correcting misunderstandings among students, which contributes to more effective learning and prevents misconceptions.

6. Facilitating Teamwork: Promotes the development of students' collaboration, communication, and teamwork skills, which are crucial for successful adaptation to the modern work environment.

7. Using Technology to Support Learning: This method entails the use of modern technologies in the educational process to improve access to information, diversify teaching methods, and enhance student motivation.

8. Stimulating Student Creativity: This method aims to develop students' creative thinking, innovation skills, and ability to find unconventional solutions, which are important aspects of successful adaptation to a rapidly changing world.

These methods help pedagogy students develop not only technical skills but also soft skills necessary for a successful career in education and other fields in the 21st century. The results of the literature analysis are also presented in Table 1, systematically listing methods for developing 21st-century skills in pedagogical education.

**Table 1 - Methods for Developing 21st-Century Skills in Pedagogical Education**

<b>Authors</b>	<b>Methods for Developing 21st-Century Skills</b>
Pesha A.V., Evplova E.V.	Content analysis, online surveys, holistic approach
Shramko K.I.	Interactive learning, simulation games, discussions, cooperative learning, use of moral values
Panfilova V.M., Panfilov A.N.	Content analysis, literature review, structural-functional method, observation
Tkacheva S.A.	Design skills, communication skills, research skills, diagnostic skills
Nikitina G.V.	Social practice, integrating social practice into teacher training, combining formal and informal education
Fatmawati A.	Project-based learning (PBL), organizing the learning process, defining skill goals, role of the teacher as a facilitator, careful selection of project topic, planning tasks and activities, assessing results, student collaboration
González-Salamanca J.C., Agudelo O.L., Salinas J.	Integration of skills into curriculum, teacher training, technology use, comprehensive approach
Kim S., Raza M., Seidman E.	Teacher practices and processes assessment system (TIPPS), modeling skills by teachers, training in pedagogical methods, curriculum, school climate, assessment and monitoring of skill acquisition
Van Gompel, K.	Constructivist approach, use of technology (web 2.0)
González-Pérez L.I.	Collaboration, problem-solving, creative and innovative thinking, use of information and communication technologies (ICT), ICT integration into the educational process
Paskha Marini Thana	Multispecialty approach
Alismail H.A., McGuire P.	Problem-based learning, integration of cognitive and social skills, use of innovative teaching strategies and modern learning technologies
Vladimirovna S.Y., Kumisbekovna K. G.	Problem-based learning, collaborative learning, use of information technologies, active learning methods, self-reflection and personal growth, assessment through projects and portfolios, teaching self-learning skills, practical experiences and real scenarios
Vuojärvi H., Eriksson M., Vartiainen H.	Design-based research, pedagogical course design, use of 21st-century skills frameworks, collaborative problem-solving, deductive content analysis
Djudin T.	Making course material relevant to the "big picture," teaching through disciplines, facilitating knowledge transfer, teaching learning skills or metacognitive skills, directly addressing misunderstandings, promoting teamwork, using technology to support learning, stimulating student creativity

Researchers and practitioners actively develop and apply various strategies, including problem-based learning, collaborative learning, the use of modern technologies, active learning methods, and others, with the aim of preparing future educators for effective work in contemporary educational and professional environments. Each of the methods presented has its own advantages and specifics, but they all share the goal of developing both technical and soft skills in students. The combination of these methods allows for the creation of a learning environment that promotes not only the mastery of academic material but also the development

of critical thinking, communication skills, problem-solving ability, and teamwork—all of which are essential for a successful career in the modern world. Research in this area continues, and it is important to further investigate and develop effective methods for developing 21st-century skills in pedagogical education to ensure that future educators have the necessary competencies to work in modern society.

### Conclusion

The research presented in this literature review vividly demonstrates the high relevance and significance of the problem of developing 21st-century skills in students majoring in education in modern education. The variety of methods and approaches discussed by the authors of the articles reveals the richness and complexity of this issue and offers valuable practical recommendations for its solution. Articles by Pesha A.V., Evplova E.V., Shramko K.I., Panfilova V.M., Panfilov A.N., Tkacheva S.A., and Nikitina G.V. highlight key competencies and skills of the 21st century, such as critical thinking, communication, collaboration, and digital literacy. They emphasize the importance of these skills for students' successful adaptation to the modern requirements of education and the job market. Moreover, they propose various methods and approaches, such as content analysis, interactive learning, social practice, and project-based learning, for effectively developing these competencies. Other articles, such as those presented by Van Gompel, K., González-Pérez L.I., Paskha Marini Thana, Alismail H.A., and McGuire P., complement previous research by highlighting the constructivist approach, multispecialty approach, problem-based learning, and integration of information and communication technologies. These approaches not only contribute to the development of specific skills but also support the overall educational development of students, enhancing their ability for independent thinking, analysis, problem-solving, and creativity.

Special attention in the articles is paid to the role of teachers and their ability to effectively integrate various methods and approaches into the teaching process. Teachers play a key role in stimulating active learning, creating a supportive learning environment, and providing diverse opportunities for developing 21st-century skills in their students. Furthermore, the examination of research allows us to conclude that effective development of 21st-century skills requires not only the integration of various teaching methods but also consideration of students' individual characteristics and the socio-cultural context in which learning takes place. Thus, the conclusion of the literature review underscores the importance of further research in the field of developing 21st-century skills, as well as the need for continuous improvement of pedagogical practice in light of new challenges and demands of the modern world. The interaction of different methods and approaches, supported by conscious teaching and active student participation, will contribute to more effective learning and the development of future educators, providing them not only with a successful career but also the ability to adapt to the rapidly changing educational and socio-cultural environment.

### Reference

1. Pesha, A. V., & Evplova, E. V. (2020). Nadprofessionalnye kompetentsii pedagoga XXI veka [Supra-professional competencies of the 21st-century educator]. *Pedagogika i prosveshchenie*, (3), 29-46.
2. Shramko, K. I. (2019). Ispol'zovanie informatsionno-kommunikatsionnykh tekhnologiy pri obuchenii studentov pedagogicheskikh spetsial'nostey [The use of information and communication technologies in teaching students of pedagogical specialties]. *Filologicheskie aspekty nachal'nogo obrazovaniya: istoriya, sovremennost' i perspektivy razvitiya: materialy Vserossiyskoy nauchno-prakticheskoy konferentsii molodykh uchennykh*.

3. Panfilova, V. M., & Panfilov, A. N. (2021). Formirovanie global'noy kompetentnosti kak uslovie effektivnogo professional'nogo obrazovaniya budushchikh pedagogov [Formation of global competence as a condition for effective professional education of future educators]. *Pedagogicheskiy zhurnal*, 11(2A), 239-247.
4. Tkacheva, S. A. (2018). O problemakh professional'noy gotovnosti budushchikh pedagogov k vospitatel'noy rabote v novykh sotsiokul'turnykh usloviyakh [On the problems of professional readiness of future educators for educational work in new sociocultural conditions]. *Nauchnyy rezul'tat. Pedagogika i psikhologiya obrazovaniya*, 4(1), 30-40.
5. Nikitina, G. V. (2019). Formirovanie professional'nykh i sotsial'nykh navykov XXI veka v transformiruyushchemsya obrazovanii: potentsial sotsial'noy praktiki [Formation of professional and social skills of the 21st century in transforming education: the potential of social practice]. *Sovremennaya vysshaia shkola: innovatsionnyy aspekt*, 11(2 (44)), 87-92.
6. Fatmawati A. (2018). Students' perception of 21st century skills development through the implementation of project-based learning. *Pedagogy: Journal of English Language Teaching*, 6(1), 37-46.
7. González-Salamanca, J. C., Agudelo, O. L., & Salinas, J. (2020). Key competences, education for sustainable development and strategies for the development of 21st century skills. A systematic literature review. *Sustainability*, 12(24), 10366.
8. Kim, S., Raza, M., & Seidman, E. (2019). Improving 21st-century teaching skills: The key to effective 21st-century learners. *Research in Comparative and International Education*, 14(1), 99-117.
9. Van Gompel, K. (2019). *Cultivating 21st century skills: An exploratory case study of design thinking as a pedagogical strategy for elementary classrooms* (Doctoral dissertation, Pepperdine University).
10. González-Pérez, L. I., & Ramírez-Montoya, M. S. (2022). Components of Education 4.0 in 21st century skills frameworks: systematic review. *Sustainability*, 14(3), 1493.
11. Paskha Marini Thana. (2022). Developing Students' 21st -Century Skills Through A Multidisciplinary Approach. *Journal of Digital Learning and Distance Education*, 1(7), 277-283. <http://doi.org/10.56778/jdlde.v1i7.64>
12. Alismail, H. A., & McGuire, P. (2015). 21st century standards and curriculum: Current research and practice. *Journal of Education and Practice*, 6(6), 150-154.
13. Vladimirovna, S. Y., & Kumisbekovna, K. G. (2023). Skills of the 21st century in modern pedagogy: preparing students for success. *European research*, (1 (40)), 12-17.
14. Vuojärvi, H., Eriksson, M., & Vartiainen, H. (2019). Cross-boundary collaboration and problem-solving to promote 21st century skills—students' experiences. *International Journal of Learning, Teaching and Educational Research*, 18(13), 30-60.
15. Djudin, T. (2020). Exploring the 21st century skills and science teaching pedagogy: Profiles, readiness, and barriers. *Journal of Education, Teaching and Learning*, 5(2), 346-355.

# THE ROLE OF MOTIVATION IN LEARNING ENGLISH

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The tasks of the work are:

- determination of types of motivation;
- identification of the most effective factors in the formation of motivation to learn foreign languages.

Research methods. To achieve the goal that was set in this study, modern methods of cognition of phenomena and processes were used. These methods are general scientific methods such as: dialectical and systematic method, as well as private methods such as: descriptive-analytical, system-structural, and statistical method. The scientific novelty of this article is based on the range of analyzed issues related to the formation of motivation to learn foreign languages.

The main part. Motivation is often divided into internal and external motivation. Motivation is closely related to the theory of self-determination of Deci and Rhine. The theory of self-determination draws attention to the significant difference from a motivational point of view between situations when we ourselves can set a goal or task, and situations when someone else determines the goal or task for us. There is a distinction between action, self-defining behavior and controlling action. Independent action is when a person acts on the basis of his own decision, spontaneously, without coercion and experiences pleasure, freedom. With controlled, controlled behavior, a person has no choice, he is forced to perform a given activity, and this causes such negative emotions as tension and nervousness. It is important that with self-determined behavior, the internal motivation of the individual is higher than with controlled behavior.

When the behavior comes from the person himself, naturally and spontaneously, it is internally motivated. The task itself is a reward for a person. In particular, with regard to internal motivation for learning. A student can be considered internally motivated when he studies, because learning is a source of knowledge for him, and thus the educational activity itself satisfies his need for knowledge. In this concept, intrinsic motivation to learn is understood as motivation arising mainly from cognitive needs.

Needs are one of the sources of motivation for human behavior. The internal motivation of students has a positive effect on their success and the quality of their education. Students who are interested in what they are learning can, for example, concentrate better, they enjoy learning itself.

There are five types of motivation:

1. Target motivation - what is needed for this activity is well assimilated, what it is aimed at and with what it is carried out.

2. Motivation for success - if the subject succeeds, then it is studied with double interest. Motivation in learning foreign languages increases significantly if the prospects for using knowledge are realized not only in the classroom, but also in extracurricular activities.

3. Regional motivation - language reacts quickly to all social changes in the life of a country. It reflects the customs and customs of the country. All this is of great value for understanding the social nature of language.

4. Aesthetic motivation helps to make learning a language a pleasure.

5. Instrumental motivation takes into account the temperament of students and gives each student the opportunity to express themselves in their favorite type of work.

The initial stage in secondary school refers to the period of learning a foreign language, which allows you to lay the foundations of communicative competence, necessary and sufficient for their further development and improvement in the course of studying that subject. It takes quite a long time to lay the foundations of communicative competence, because students need to familiarize themselves with the language they are learning as a means of communication from the very first steps. This means that they must learn to understand foreign language speech by ear (listening), express their thoughts by means of the language being studied (speaking), read, that is, understand a foreign language text read to themselves, and write, that is, learn to use graphics and spelling of a foreign language when performing written tasks aimed at mastering reading and oral speech, or be able to express your thoughts in writing. Indeed, in order to lay the foundations for each of these types of speech activity, it is necessary to accumulate linguistic means that ensure the functioning of each of them at an elementary communicative level, allowing them to move to a qualitatively new stage of their development in the future.

The initial stage is also important because success in mastering the subject at subsequent stages depends on how the training goes at this stage. One cannot disagree with the English methodologist G. Palmer, who attached great importance to the beginning of learning a foreign language. So, he wrote: "Take care of the first two stages and the rest will take care of itself." Although in this statement, in addition to the elementary stage, an intermediate one is mentioned, this does not remove the importance of the first, that is, the initial stage.

In addition, it is at the initial stage that the methodological system is implemented, which is the basis for teaching a foreign language, which from the first steps allows the teacher to enter this system and carry out the educational process in accordance with its basic provisions. As is known, the construction of the initial stage can be different in terms of language material, its volume, organization; consistency in the formation and development of oral and written speech; consideration of the conditions in which the educational process is carried out; disclosure of the potential of the subject itself in solving the educational, educational and developmental tasks facing the school. That is why the initial stage in learning a foreign language allows you to lay the foundations of communicative competence, necessary and sufficient for their further development and improvement in the course of studying the subject.

The effectiveness of mastering a foreign language depends not only on the learner's strategy, but also on the learning strategy. The maximum effect can be achieved in harmony of these strategies. An important factor helping to achieve this goal is to increase the effectiveness of the teacher's pedagogical influence on students, their communication in the classroom in conditions of full socio-psychological compatibility. Every teacher wants to make their lesson interesting and exciting, to ensure that the cognitive interest of schoolchildren, their creative mental activity develops.

How can I make my lesson interesting, exciting and ensure that children learn language material well and firmly? Having analyzed a wide variety of methods of organizing educational activities, you can use role-playing, the game in general, especially at the initial stage of learning.

To achieve this goal, namely the development and improvement of the communication skills of younger students, a game technique should be used in the lessons. As you know, the game is a specially organized activity that requires the exertion of emotional and mental strength. The game always involves making a decision - what to do, what to say, how to win. The desire to solve

these issues sharpens mental activity. And if the child speaks a foreign language at the same time, this opens up rich learning opportunities. Children don't think about it. For them, the game is, first of all, an exciting activity. Everyone is equal in the game. It is possible even for weak students. Moreover, a student who is weak in language training can become the first in the game: resourcefulness and ingenuity are sometimes more important here than knowledge of the subject. A sense of equality, an atmosphere of enthusiasm and joy, a sense of the feasibility of tasks - all this makes it possible for children to overcome shyness, which prevents them from freely using words of a foreign language in speech, and has a beneficial effect on learning outcomes. The language material is imperceptibly assimilated, and with this comes a feeling of satisfaction - it turns out that I can already speak on an equal footing with everyone. Thus, games in the educational process have great opportunities for further formation and activation of students' creative thinking and cognitive skills.

Along with the game technique in the classroom, most teachers use the Imagery technique, which contributes to the development of students' speaking skills, creative initiative, and imaginative language skills, which are given special attention here - the ability to convey images by means of the English language, using forms of verbal and non-verbal communication. The vocabulary of students is activated, an emotional and intellectual attitude to the use of knowledge in an unconventional communicative situation is formed.

The Describe and Depict technique is one of the ways to involve students in the communication process using their own vocabulary in a foreign language. This technique is universal, it can be used to consolidate vocabulary and grammar.

Songs are used to develop communication skills. The songs are interesting to students by what they talk about and in what musical form they are presented. Songs motivate the activity of students to report something, to ask, that is, the communication factor should take the first place. When learning a song, students receive new information, which stimulates cognitive activity. For example, by learning a song, students will learn the names of body parts and organs of smell in English.

It is impossible not to mention the aesthetic motivation. It is she who influences the formation of positive feelings, emotions, and develops imagination. All this is possible when students are happy to intone their favorite song in a foreign language.

The use of songs contributes to:

- improving pronunciation skills;
- allows you to achieve precision in articulation, rhythm and intonation;
- deepens knowledge of the English language;
- enriches the vocabulary;
- develops reading and listening skills and abilities;
- stimulates monologue and dialogical utterance;
- develops both prepared and spontaneous speech.

Moreover, the song introduces an element of conviviality, not tradition, into the process of learning the language, which has a significant impact on the emotional sphere of students. It is noted that foreign language activity against the background of music contributes not only to memorizing the material, but also relieves fatigue in the learning process.

If the behavior is motivated by external rewards and incentives, we are talking about external motivation. External motivation for learning is spoken of if other needs, initially independent of it, are satisfied through educational activity. Students with external motivation study, for example, for the praise of a teacher, good grades, the joy of parents from their success in school, the admiration of classmates, or to increase the chances of admission to school, university, etc. Learning by itself, i.e. learning new things, is no longer as interesting for students as it is for internal motivation. The disadvantage of external motivation for learning is that it only

works when learning is a tool for the student to receive this external reward. For example, students who study a foreign language or any other subject at school only because of good grades and successful graduation will not continue to focus on that foreign language or other subject after graduation.

In the case of motivation to learn a foreign language, the difference between integrative and instrumental motivation is also known from Canadian psychologists Robert Gardner and Wallace Lambert. We are talking about integrative motivation when a person wants to learn a foreign language because he is interested in the culture of the country of the given language, representatives of this culture and the language itself. On the other hand, a person wants to become a member of this culture himself, perhaps he wants to live in this country. We are talking about instrumental motivation when a person learns a foreign language because of its usefulness. Integrative motivation has a greater impact on the successful acquisition of a foreign language, but this hypothesis has not been confirmed in any way. Instrumental motivation is also very useful in the learning process. One example indicating the usefulness of instrumental motivation is a study demonstrating the positive impact of instrumental motivation even in connection with the anti-integrative motivation of Mexican immigrants to the United States in the field of language learning. Newer theories do not consider the difference between integrative and instrumental motivation to be significant, since both types of motivation can positively influence the learning process, and neither of these types of motivation, as a rule, is superior to the other. In addition, a personality can be motivated both instrumentally and integratively.

There is a natural question of how to stimulate or increase the motivation of students to learn, what role, for example, the teacher plays in this. There are several factors that can increase or decrease a student's motivation to study.

Such factors should include: the role of the teacher; the teacher's feedback on student performance; awards and grades; Success that increases student self-confidence; attribution of reasons; student's interest in language, setting goals, prospective orientation of students; pleasant, relaxed and motivating atmosphere during classes; learning should be stimulating and fun.

In conclusion, it can be noted that the role of motivation in the process of learning foreign languages is very important. It is crucial for the teacher to remember this, it is necessary to individually select factors that increase the motivation of students in order to optimize the educational process.

# EFFECTIVE METHODS FOR DEVELOPING LANGUAGE SKILLS

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## Abstract

The article elaborates the most effective language learning strategies and methods including CLT, GTM, the Direct method, CLIL, TBLT, TPR, etc. While analyzing the most effective methods for language learners, it was revealed that individual needs should be taken into consideration. Besides, the language learners should have the qualities of persistence or endurance, the ability to use the cutting-edge technology. The language learners should have motivation in order to grasp the language more effectively. Language skills such as reading, writing, listening and speaking were scrutinized based on the language strategies and methods. Cultural immersion or cultural understanding is also very vital in the most effective language acquisition process. Since it accelerates the language learning process.

**Key words:** CLT, CLIL, TPR, GTM, the Direct method, cultural immersion

In the vast tapestry of human existence, few threads are as intricate, dynamic, and essential as language. It's the cornerstone of our civilizations, the medium through which we convey thoughts, emotions, and ideas. Language, in its myriad forms, shapes the very fabric of our societies, defining cultures, bridging divides, and enabling progress [1].

From the ancient tongues spoken by our ancestors to the modern-day languages that span the globe, the evolution of language is a captivating saga of innovation, adaptation, and interconnectedness. As we embark on a journey into the depths of linguistic exploration, we unravel the mysteries that surround this fundamental aspect of human existence.

At its core, language is far more than a mere tool for communication; it's a window into the human mind and soul. Through language, we express our deepest desires, share our most profound insights, and connect with others on a profound level. It's a testament to the boundless creativity and complexity of the human intellect, manifesting in the rich tapestry of words, grammar, and syntax that define our linguistic landscapes.

But what exactly is language, and how did it come to shape the world as we know it? This question has intrigued scholars, philosophers, and linguists for centuries, leading to a myriad of theories and hypotheses. Some view language as a purely functional system of symbols and sounds, while others see it as a reflection of cultural identity and societal norms.

Yet, regardless of the perspective, one thing remains abundantly clear: language is a dynamic and ever-evolving phenomenon, shaped by the ebb and flow of human interaction and experience. From the subtle nuances of regional dialects to the global reach of lingua francas, language adapts and transforms in response to the shifting tides of history and culture.

Throughout this series, we set sail on a journey to explore the cultivation of language proficiency, investigating various methodologies and their practical applications. Language materials also play an important role in effective acquisition of foreign languages [4].

### **Motivations for Language Learning:**

The motivations for embarking on language-learning endeavors are as expansive and enduring as the languages themselves. From professional ambitions to personal enrichment, individuals embark on journeys to master new languages for a plethora of reasons:

- Career Advancement: In our ever-expanding globalized landscape, fluency in multiple languages becomes increasingly indispensable, unlocking a myriad of career avenues and facilitating seamless communication and collaboration across diverse cultural and geographical boundaries.
- Academic Pursuits: The pursuit of higher education or specialized fields often necessitates proficiency in specific languages relevant to one's area of study, driving individuals to embark on language-learning quests to fulfill their academic ambitions.
- Cultural Curiosity: Language acquisition serves as a gateway to cultural exploration, allowing learners to delve into the intricate tapestry of global cultures, traditions, and histories, fostering cross-cultural understanding and appreciation.
- Personal Growth: Beyond the tangible benefits, language learning is a transformative journey of personal development and self-discovery. It expands one's horizons, cultivates empathy, and nurtures a profound understanding of the complexities of human communication and expression, enriching lives in profound and meaningful ways.

### **Core Language Skills:**

Language proficiency encompasses a diverse array of competencies, each serving as a cornerstone for effective communication and comprehensive understanding [13]:

1. Listening Skills: The capacity to accurately interpret and comprehend spoken language, encompassing nuances in tone, pronunciation, and context.
2. Speaking Proficiency: The ability to articulate ideas, opinions, and emotions fluently and coherently, engaging in meaningful verbal exchanges with others.
3. Reading Comprehension: The aptitude to comprehend written texts across various genres and formats, extracting key information and discerning underlying meanings.
4. Writing Competence: The skill to express thoughts, concepts, and information clearly and eloquently through written communication, employing appropriate grammar, vocabulary, and structure.

### **Exploring Effective Language Learning Strategies:**

Embarking on the journey of language acquisition is akin to navigating a vast ocean of methodologies and approaches, each presenting its own set of benefits and challenges [11]. To traverse this linguistic landscape successfully and attain proficiency across all language skills, learners can leverage a diverse array of strategies tailored to their individual learning styles, preferences, and goals.

#### **1. Communicative Language Teaching (CLT):**

At the heart of CLT lies the emphasis on real-life communication and interaction [7]. Rather than focusing solely on grammatical accuracy, this approach prioritizes fluency, encouraging learners to engage in authentic conversations and activities that mirror everyday language use [12]. Through

role-plays, discussions, and collaborative tasks, learners not only develop their speaking and listening skills but also gain confidence in using the language in various contexts [14].

#### 2. Task-based Language Teaching (TBLT):

TBLT adopts a task-oriented approach to language learning, where learners are presented with meaningful tasks that require the application of language skills in practical situations. By engaging in tasks such as problem-solving activities, information gap exercises, or project-based assignments, learners acquire language skills while simultaneously developing critical thinking, problem-solving, and communication skills.

#### 3. Content and Language Integrated Learning (CLIL):

CLIL integrates language learning with subject-specific content, providing learners with opportunities to acquire language skills while exploring various academic topics. Whether studying science, history, or literature, learners engage with authentic materials and language-rich contexts, deepening their understanding of both the subject matter and the language itself.

#### 4. The Direct Method:

Advocating for language instruction conducted entirely in the target language, the Direct Method promotes immersion and communicative competence [9]. Through exposure to authentic language input, learners develop their listening and speaking skills naturally, without relying on translation or explicit grammar instruction. Visual aids, gestures, and contextual clues are used to facilitate comprehension and communication, creating an immersive learning environment.

#### 5. Total Physical Response (TPR):

TPR utilizes physical movement and commands to reinforce language learning, particularly effective for kinesthetic learners and beginners. Learners respond to verbal commands by performing corresponding actions, linking language with physical gestures and experiences. This multisensory approach enhances comprehension and retention, making language learning both engaging and memorable [8].

#### 6. The Silent Way:

In the Silent Way approach, learners take an active role in their learning process, with minimal teacher intervention. Visual aids such as colored rods and charts are used to represent language structures, allowing learners to explore and manipulate language patterns independently. By encouraging self-discovery and experimentation, this method fosters a deeper understanding of language principles and encourages learners to take ownership of their learning journey.

#### 7. Grammar-Translation Method:

While less favored in communicative language teaching approaches, the Grammar-Translation Method focuses on explicit grammar instruction and translation exercises. Learners analyze grammatical structures and translate texts between languages, developing a systematic understanding of language rules and conventions. While this method may lack the communicative focus of other approaches, it can be beneficial for learners who prefer a more structured and analytical approach to language learning [5].

#### **Tailoring Methods to Individual Needs:**

Incorporating a blend of these methodologies ensures a dynamic and personalized learning experience that caters to the diverse needs and preferences of learners [15]. By understanding their own learning style and adapting strategies accordingly, learners can optimize their language

learning journey for maximum effectiveness and enjoyment. Whether through communicative activities, task-based assignments, or content-integrated learning experiences, each approach offers valuable opportunities for learners to develop their language skills in meaningful and engaging ways. Ultimately, by embracing a learner-centric approach and embracing the richness of linguistic diversity, learners can unlock the doors to new cultures, perspectives, and opportunities through the power of language.

Additional Considerations:

In addition to exploring various methodologies, several additional factors play pivotal roles in the successful acquisition of a new language [10]. These factors contribute to a well-rounded language learning experience, enhancing proficiency and facilitating a deeper understanding of both the language and the associated culture:

#### 1. Cultural Immersion:

Immersing oneself in the culture linked to the target language is a powerful catalyst for language acquisition. Exposure to authentic cultural experiences, such as interacting with native speakers, consuming media in the target language, and participating in cultural events, provides invaluable context and insight into the nuances of the language. Cultural immersion not only enriches the learning process but also fosters empathy, cross-cultural understanding, and appreciation for diverse perspectives.

#### 2. Technology Integration:

Incorporating technology into language learning can amplify the effectiveness of traditional methods and provide additional opportunities for practice and engagement [2]. Language learning apps, online resources, virtual immersion experiences, and multimedia materials offer interactive and dynamic learning environments that cater to diverse learning styles. These technological tools supplement classroom instruction, allowing learners to access resources anytime, anywhere, and tailor their learning experiences to suit their individual preferences and goals.

#### 3. Motivation and Persistence:

Sustained motivation and persistence are fundamental to language learning success. Setting clear and achievable goals, whether they be related to proficiency levels, cultural experiences, or personal milestones, provides a sense of direction and purpose [16]. Tracking progress, celebrating achievements, and embracing setbacks as opportunities for growth foster a positive learning mindset and maintain momentum throughout the language learning journey. Cultivating a passion for the language, nurturing curiosity, and embracing challenges with resilience and determination are key ingredients for long-term success [17].

In conclusion, mastering a new language is a multifaceted journey that requires dedication, perseverance, and an adaptable approach to learning [3]. By recognizing the intrinsic value of language, tapping into personal motivations, honing core language skills, and embracing effective learning methodologies, learners can embark on a transformative language learning experience that transcends linguistic barriers and fosters meaningful connections across cultures and communities. Whether pursued for professional advancement, academic enrichment, or personal growth, language learning offers endless opportunities for exploration, discovery, and connection in our increasingly interconnected world. As learners embark on this enriching journey, they not only expand their linguistic repertoire but also broaden their horizons, deepen their cultural understanding, and cultivate lifelong skills that extend far beyond language proficiency alone.

### References

1. Bax, Stephen (2003-07-01). "The end of CLT: a context approach to language teaching". *ELT Journal*. 57 (3): 278–287
2. Brandl, Klaus (2007). *Communicative Language Teaching in Action: Putting Principles to Work*. Upper Saddle River, NJ: Phil Miller. pp. 284–297
3. Canale, M.; Swain, M. (1980-03-01). "Theoretical Bases of Communicative Approaches to Second Language Teaching and Testing". *Applied Linguistics*. 1 (1): 1–47.
4. Babayev, J. (2021). The role of instructional materials in language learning. *ELMİ XƏBƏRLƏR, Humanitar elmlər seriyası*, 2, 29-35.
5. Babayev Javid. Characteristics of Grammar-Translation method. V International Scientific and Practical Conference «Modern science: theoretical and practical view», May 09-10, 2023, Madrid. Spain.60 p
6. Babayev Javid. General overview to student-centered approach. Publisher.agency: Proceedings of the 5th International Scientific Conference «Modern Scientific Method» (January 4-5, 2024). Vienna,Austria, 2024. 163p
7. Babayev Javid. Major techniques of CLT in language learning. Publisher.agency: Proceedings of the 4th International Scientific Conference «Foundations and Trends in Modern Learning» (November 23-24, 2023). Berlin, Germany, 2023. 201p
8. Babayev J. The methods ignoring the usage of mother tongue. I international scientific conference. "World Science: achievements and innovations". Lviv. Ukraine. 27-28.10.2022. 92 p.
9. Babayev J. Traditional methods versus Communicative language teaching method. *The Scientific Heritage*, № 123, Budapest, Hungary, 2023.
10. Brown, D.H. (2000). *Principles of language learning and teaching*. (4th ed.) New York: Longman
11. Javid , B. (2024). The Process of Developing Instructional Materials. *Web of Semantics : Journal of Interdisciplinary Science*, 2(2), 13–17. Retrieved from <https://web.semanticjournals.org/index.php/wos/article/view/26>
12. Javid Babayev. Analysis of the CLT in terms of coverage of language skills. Publisher.agency: Proceedings of the 2nd International Scientific Conference «Academics and Science Reviews Materials» (March 9-10,2023). Helsinki, Finland, 2023. 258p
13. Javid Babayev. About the correlation of language skills on the basis of traditional methods. *Xarici dillərin tədrisi və tədqiqində ənənəviliyin və müasirliyin vəhdəti mövzusunda Respublika Elmi konfransı*, Naxçıvan, 2022.
14. Javid Babayev. Characteristics of the CLT. Publisher. agency: Proceedings of the 4th International Scientific Conference «European Research Materials» (November2-3, 2023). Amsterdam, Netherlands, 2023. 241p
15. Javid Babayev. How to teach a foreign language through CLT. Publisher.agency: Proceedings of the 4th International Scientific Conference «Interdisciplinary Science Studies» (December 1, 2023). Dublin, Ireland, 2023. 212
16. Jones, L. (2007). *The Student-Centered Classroom*. Cambridge: Cambridge University Press.
17. Schiller, S. Z. (2009). Practicing Learner-Centered Teaching: Pedagogical Design and Assessment of a Second Life Project. *Journal of Information Systems Education*, 20, 369-381.

# Physical and Mathematical Sciences

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## ОБ ИННОВАЦИИ В ПРЕПОДАВАНИИ МАТЕМАТИКИ

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**Аннотация:** В статье рассмотрен и произведен анализ инновационных технологий преподавания математики в образовательных учреждениях. Показаны содержание, цели и задачи инновационных технологий преподавания математики, в частности, в современной программе по математике, включающей три уровня сложности заданий. Показаны пути достижения обязательного дифференцированного и личноно - ориентированного подхода, в соответствии с которым каждый ученик выбирает свою траекторию обучения.

**Ключевые слова:** инновационная технология, ориентация, личность, программа, траектория, дифференцирование, интерактивный, мультимедийный, видеоуроки, онлайн-ресурс.

Инновация заключается в том, что постепенно происходит переоценка значимых целей обучения и приоритет отдается целям развития. В связи с этим в современной программе по математике, как известно, выделено 3 уровня сложности заданий:

1. соответствует обязательным программным требованиям. Этим требованиям должны соответствовать знания каждого ученика и обязательный уровень знаний, умений и навыков должен быть достигнут каждым учеником в отведенное время.
2. есть задания среднего уровня сложности.
3. задания, которые предназначены для учеников, проявляющих повышенный интерес к математике, а также для использования в классах, школах, с углубленным изучением математики. Если раньше учитель был ориентирован в основном на среднего ученика, то современные инновационные подходы к обучению математике требуют обязательного дифференцированного и личноно ориентированного подхода, в соответствии с которым каждый ученик выбирает свою траекторию обучения. Требования к каждому ученику и конкретная работа с ним определяются уровнем способностей, возможностей и интересов каждого ученика [1].

Программой по математике средних образовательных школ предусмотрено развитие в первую очередь интеллектуальной сферы учащихся, развитие мышления школьников, основой которого являются мыслительные операции анализа, синтеза, сравнения, обобщения, классификации умением проводить умозаключения. Дифференцированное обучение математике тесно связана с совершенствованием постановки целей обучения математике. Система целей учебной деятельности в математике может быть представлена в виде некоторой системы действий ученика, где он должен научиться выполнять в результате обучения и это будет означать перенос акцента с математического образования на образование с помощью математики.

Все инновационные технологии и методы, которые вводятся в системе обучения в средней школе, основаны на положительных результатах, дающих высокие показатели. У учителей математики появляется возможность применять современные средства и методы обучения. На уроках математики часто применяются интерактивные доски, мультимедийные проекторы, персональные компьютеры. Преподавание математики – один

из важнейших компонентов образовательного процесса. Но как сделать это увлекательным и интересным для учеников? Один из способов – использовать инновационные методики обучения [2].

Инновационный метод преподавания математики в школе – это подход, который активно привлекает учеников к изучению этого предмета. Он основывается на использовании современных технологий, интерактивных уроков, игровых элементов и других инструментов, которые делают учебный процесс более увлекательным и понятным. Одним из популярных инновационных методов преподавания математики является использование различных онлайн-ресурсов и приложений. На сегодняшний день существует множество интерактивных задач, игр и уроков, которые помогают ученикам лучше понять математические концепции и закрепить полученные знания.

Кроме того, можно использовать такие методы, как flipped classroom, когда учитель предоставляет ученикам видеоуроки и материалы для самостоятельного изучения дома, а затем на уроке проводит интерактивные занятия и дискуссии по этим темам. Такой подход позволяет более эффективно использовать время урока и обеспечить индивидуальный подход к каждому ученику. Еще одним эффективным методом является использование игровых элементов в учебном процессе. Математические игры и задачи не только увлекают учеников, но и помогают им развивать логическое мышление, умение работать в команде и решать задачи. Инновационный метод преподавания математики в школе – это отличный способ сделать учебный процесс более интересным и продуктивным. Он позволяет ученикам лучше усваивать материал, развивать свои навыки и подготовиться к успешной сдаче экзаменов. Таким образом, использование инновационных методов в преподавании математики в школе – это важный шаг к повышению качества образования и развитию учебного процесса. Важно помнить, что каждый ученик уникален и требует индивидуального подхода, и инновационные методы позволяют обеспечить это.

В современном мире существует множество онлайн-ресурсов и приложений, которые можно использовать в преподавании математики в школе. Некоторые из них включают в себя:

1. Конструкторы уроков, такие как Classkick или Nearpod, которые позволяют создавать интерактивные уроки с заданиями, викторинами и другими учебными материалами.
2. Платформы для онлайн-тестирования, например Kahoot или Quizlet, позволяющие проводить викторины и проверять знания учащихся.
3. Математические приложения, такие как Desmos или GeoGebra, которые помогают визуализировать математические концепции и решать задачи.
4. Онлайн-тетради и учебники, такие как Khan Academy или OpenStax, предоставляющие качественные материалы для самостоятельного обучения.
5. Видеоуроки, доступные на платформах YouTube или Coursera, которые объясняют сложные математические темы более понятным образом.

Использование таких онлайн-ресурсов и приложений поможет сделать обучение математике более интересным и доступным для учащихся, а также сэкономит время преподавателя на подготовку уроков и проверку заданий. Современные технологии преподавания математики школьникам включают в себя использование интерактивных онлайн-уроков, компьютерных программ и приложений, обучающих игр, виртуальных лабораторий, мультимедийных презентаций и других современных средств обучения [3].

Эти технологии помогают сделать обучение математике более интересным, доступным и эффективным. Они позволяют учащимся изучать материал в интерактивном режиме, применять полученные знания на практике, решать задачи и игры, а также получать обратную связь и поддержку от учителей и других учащихся. С использованием современных технологий преподавания математики можно стимулировать интерес учащихся к изучению

предмета, развивать их логическое мышление, креативность, навыки решения проблем, а также улучшать их успеваемость и результаты на уроках и экзаменах. Существует несколько способов стимулировать интерес учащихся к изучению математики:

1. Использование игр и задач на логику. Математика может быть увлекательной, если преподаватель использует игры, головоломки и задачи на логику для развития математического мышления у учеников.
2. Применение математики на практике. Показывайте учащимся, как математика применима в реальной жизни, например, при решении финансовых задач, проектировании зданий или создании компьютерных программ.
3. Использование интерактивных методов обучения. Используйте интерактивные доски, онлайн курсы и другие современные технологии для обучения математике. Это поможет сделать учебный процесс более интересным и увлекательным для учащихся.
4. Поощрение и похвала. Поощряйте учащихся за успешные решения математических задач, хвалите за усердие и старание. Позитивный подход способствует формированию интереса к изучению математики.
5. Организация конкурсов и соревнований по математике. Участие в соревнованиях и конкурсах по математике может стать дополнительным мотивом для учащихся и помочь им ощутить радость от победы и достижения целей. Организация конкурсов и соревнований по математике - это отличный способ поощрить учеников к изучению математики, развить их навыки и интерес к этой науке, а также выявить талантливых математиков. Конкурсы и соревнования могут проводиться как на уровне школы или учебного заведения, так и на региональном, национальном или даже международном уровне. В качестве примеров таких конкурсов можно привести олимпиады по математике, математические турниры, математические игры и головоломки, конкурсы решения математических задач. Участие в таких мероприятиях поможет ученикам проверить и улучшить свои знания и навыки, а также познакомиться с единомышленниками из разных школ и стран[4].

Организация конкурсов и соревнований по математике требует хорошей организации и планирования. Необходимо определить цели и задачи мероприятия, разработать правила и критерии оценки, подготовить материалы и задания, а также обеспечить честное и объективное проведение соревнований. Важно также обеспечить мотивацию участников и создать атмосферу соревнования, способствующую активному участию и развитию математических способностей. Организация конкурсов и соревнований по математике поможет не только развить математические навыки учеников, но и создать позитивное отношение к изучению математики, что в дальнейшем может подтолкнуть их к выбору математических специальностей и профессий.

#### Литература

- 1.Саранцев, Геннадий Иванович. Методика обучения математике в средней школе : учеб. пособие для студентов математ. специальностей пед. вузов и ун-тов . М.: Просвещение, 2002, 223 с.
2. Стефанова, Н.С. Подходова, В.В. Орлов и др. Методика и технология обучения математике: курс лекций: учеб. пособие для студентов мат. фак. вузов. М.: Дрофа, 2005. – 416 с.
- 3.Епишева, Ольга Борисовна. Технология обучения математике на основе деятельностного подхода : кн. для учителя . М.: Просвещение, 2003. – 223 с.
- 4.Денищева, Лариса Олеговна. Избранные вопросы методики преподавания математики : учебно-метод. пособие [Электронный ресурс] / Департамент образования г.Москвы, Гос. автоном. образоват. учреждение высш.образования г. Москвы "Моск. гор. пед. ун-т" (ГОУ ВО МГПУ), Ин-т математики, информатики и естеств. Наук. М.: МГПУ, 2016. – 155 с.

# INNOVATIVE APPROACH TO THE DEVELOPMENT OF A COURSE ON INFORMATION PROCESS RE-ENGINEERING AND THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN INFORMATION PROCESSING

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## **Annotation**

This paper presents an innovative approach to developing a course that covers the application of artificial intelligence (AI) in processing a variety of information, including video, audio, text, and other data formats. Existing AI courses often do not adequately address the specifics of processing different types of information, which limits their effectiveness in real-world tasks. This course aims to fill this gap by offering a comprehensive approach to teaching students modern AI data processing techniques.

The article describes the core modules of the course, including video, audio and textual information processing using advanced AI techniques. Data integration and multimodal analyses are also covered, allowing students to work effectively with heterogeneous sources of information. Each module of the course includes both theoretical foundations and practical examples, allowing students to consolidate what they have learnt in practice.

The presented approach to course development ensures the relevance and effectiveness of training specialists in the field of information processing with the use of AI, preparing them to solve real problems in the modern information society.

**Keywords:** artificial intelligence, education, technology, automation, adaptation.

## **Introduction**

In today's information society, data is presented in various formats such as video, audio, text and others. The application of artificial intelligence (AI) to process such multi-dimensional information is becoming a necessity in many fields, from medicine to business. Developing a course that trains professionals to apply AI to process diverse types of information is an urgent task.

*Relevance of the Problem* Existing AI courses often focus on general algorithms and methods without paying sufficient attention to the specifics of processing different types of data. This creates a need to develop an innovative course that covers how to process information in different formats using AI.

*Purpose of the Study* The purpose of this paper is to present an innovative approach to develop a course on the application of artificial intelligence to process information in various formats such as video, audio, text and others.

*Research Methods* To achieve the objective, existing methods of data processing using artificial intelligence were analysed, and best practices in the field of video, audio and textual information analysis were studied. Based on the findings, a conceptual framework for an innovative course was developed.

## 1. an overview of basic AI concepts and techniques

Artificial intelligence (AI) is a branch of computer science that specialises in building systems that can perform tasks that normally require human intelligence. This section introduces the basic concepts and techniques underlying AI.

Artificial intelligence technologies are widely used in industry, government and science. Examples include advanced Internet search engines (e.g., Google Search), recommendation engines (used by YouTube, Amazon, and Netflix), voice interaction with humans (e.g., Google Assistant, Siri, and Alexa), driverless cars (Waymo), generative and creative tools (e.g., ChatGPT and AI Art), and superhuman play and analysis in strategic games (e.g., chess and Go) [1].

Basic concepts and methods of artificial intelligence:

- Machine learning : Machine learning is a branch of artificial intelligence that teaches computer systems to "learn" from experience. It includes supervised learning, unsupervised learning and reinforcement learning.

- Neural networks model the structure of the human brain and are used for tasks such as perception, classification and pattern recognition. Deep neural networks are at the heart of many modern machine learning techniques.

- NLP is a field of research that studies the interaction between computers and natural language; the main tasks of NLP include text recognition and generation, machine translation, and sentiment analysis.

- Computer vision deals with the development of algorithms and techniques that allow computers to analyse and understand images and videos. This includes tasks such as object recognition, image segmentation, and tracking moving objects.

- Optimisation methods are used to tune the parameters of machine learning models for efficient performance. These include gradient descent and loss function optimisation methods.

- Heuristic methods are based on the experience and knowledge of experts in a particular field. Expert systems use these methods to make decisions and solve problems in real time.

Artificial Intelligence is a broad and rapidly growing field that combines different methods and concepts to create intelligent systems capable of self-learning, adaptation and decision making.

## 2.The current state of the problem of course design

The reform of the education system has led to the creation of information and educational systems based on e-learning platforms.

The following groups of e-learning can be distinguished:

- Content Management System (CMC);

- Learning Management System (LMS);
- Learning Content Management System (LCMS).

In Russian, the abbreviation LMS-"distance learning system" is often used instead of LMS. These systems are divided into commercial and open source systems.[1]

The commercial system presented on Russian Sunday is based on the CMS platform.

Table 1. Commercial SDO systems

Name	Opportunities
"Bitrix: Site Management" - CMS	Allows you to solve virtually any task, the system has different versions in terms of power, differing in the set of modules, requiring the involvement of expensive specialists for initial configuration and making any changes in the future.
Amiro.CMS	Multifunctional system, balanced and has the advantage of a high level of responsiveness and control over the site, focused on search engine optimisation, easy to use and configure.

The main disadvantages of these systems are expensive maintenance, copyright depending on the number of users, and lack of available code that does not allow users to modify their own transactions.

An open source system allows users to quickly adapt their chosen system to their needs and changes in the training programme. Based on the review of existing training systems on the LMS / LCMS platform, we can highlight the following:

Table 2. Open source CDS systems

Name	Opportunities
ATutor (www.atutor.ca)	Learning content management system, designed with the ideas of accessibility and adaptability for administration, teachers and learners in mind. The system allows quick updating of the content and structure of the training material for online classes.
Claroline (Klass room online)(www.claroline.net)	Provides the construction of a teacher-friendly distance learning site for audiences of up to 20,000 students. Created at the Institute of Pedagogy and Multimedia of the Catholic University of Louvain. The system allows you to create, edit and manage lessons. It includes a quiz generator, formulas, a calendar, a function for differentiating access to documents, a catalogue of links, a knowledge control system, and an authorisation module.
Dokeos (www.dokeos.com)	A platform for building distance learning sites based on the Claroline fork (version 1.4.2), designed to change the original application in one direction or another. Dokeos <sup>1</sup> , is more oriented towards a personal clientele - staff of an organisation or enterprise where the number of courses and learners is smaller than in universities.
LAMS(www.lamscommunity.org)	"Learning Activity Management System (LAMS) Learning Activity Sequence Management System is based on the LMS Learning Design specification prepared in 2003 by the Open University of the Netherlands. The system provides the teacher with visual tools for sequencing the learning process, as well as an intuitive interface for creating educational content that includes a variety of individual assignments, group work assignments, and frontal work with a group of students.

OLAT( <a href="http://www.olat.org">www.olat.org</a> )	It is the main educational e-learning platform in Switzerland, development started back in 1999 at the University of Zurich.
OpenACS( <a href="http://www.openacs.org">www.openacs.org</a> )	Open Architecture Community System is a system for developing scalable, portable educational resources <sup>1</sup> , used in e-learning technologies of universities and companies.
Sakai( <a href="http://www.sakaiproject.org">www.sakaiproject.org</a> )	It is an online system for organising educational space, supports IMS Common Cartridge, SCORM standards and specifications.
Moodle( <a href="http://www.moodle.org">www.moodle.org</a> )	Modular Object-Oriented Dynamic Learning Environment is a distance learning system designed to create quality distance courses. The socio-constructivist approach to learning embedded in the project offers individualised contact with each student, taking into account their personal experience and learning needs, the teacher and student can swap places, with the teacher having the responsibility to guide the discussion and ensure that the collective learning goals are met.

Moodle is used by universities, schools, businesses and independent teachers in over 100 countries.

Benefits of the system:

Bun allows you to quickly adapt to the specific objectives of a particular educational institution with little cost to develop educational content;

Ability to integrate with other SDOs;

Joint solution of educational tasks, the possibility of using active forms of learning in the process of mutual exchange of knowledge;

Wide possibilities for communication: file sharing, mailing list, forum, chat, mailing list, etc;

Opportunity to review student work;

Ability to use any knowledge assessment system (bitter, verbal);

Ability to work with people of different fitness levels, with different physical abilities;

Full details of the student's work (activities, duration, academic content, portfolio).

The benefits of a Moodle distance learning system should also include ease of installation and upgrading to a new version. Moodle runs on Unix, Linux, Windows, Mac OSX and other operating systems that support PHP. By default, Moodle uses a MySQL database. But if you want, you can use another supported database, such as PostgreSQL. In this case PostgreSQL is not installed by default, so you will need to install it from the installation disc. You will need to create the database required to run Moodle. Currently Moodle uses MySQL, MSSQL, Oracle, PostgreSQL, Interbase, Foxpro and Access[3] databases to support its operation.

Based on the analysis of forum reviews on the topic of SDS, research of Internet resources, we came to the conclusion that moodle is the most popular system. demand. It is supported by an active international online community of developers and users.

There is no doubt that it is necessary to train specialists in computer science and computer technology, using knowledge gained in various fields of social and business development. We decided to emphasise the need for IT specialists to study new subject areas - the integrated course "Knowledge Reengineering".

The task we set for ourselves in scientific research is to investigate the extent of the respondent's knowledge of the subject area at the level of jargon, origin story, amount and source of information.

The survey used as the basis for this survey is based on Google Forms cloud-based technology. The technology allows you to design online surveys and online polls and collect the resulting data. You can create a form in the Google Drive menu or in an existing spreadsheet.

The study used purposive probability sampling. Participants were selected by sending out social media invitations to participate in online surveys. The survey, conducted over a 3-4 month period in 2022, resulted in a total of N = 73 participants.

The question asked can be divided into 2 parts. The first chapter presents the structure of the socio-demographic characteristics of the participants. In terms of occupation, 40% of the total number of participants study in non-technical schools, laboratories and universities, while 52% have or are studying technical specialities.

The second component of questions is directly related to the study of knowledge about the terms "reengineering" and "computer engineering", their relationship and place in society. Let us consider the results obtained.

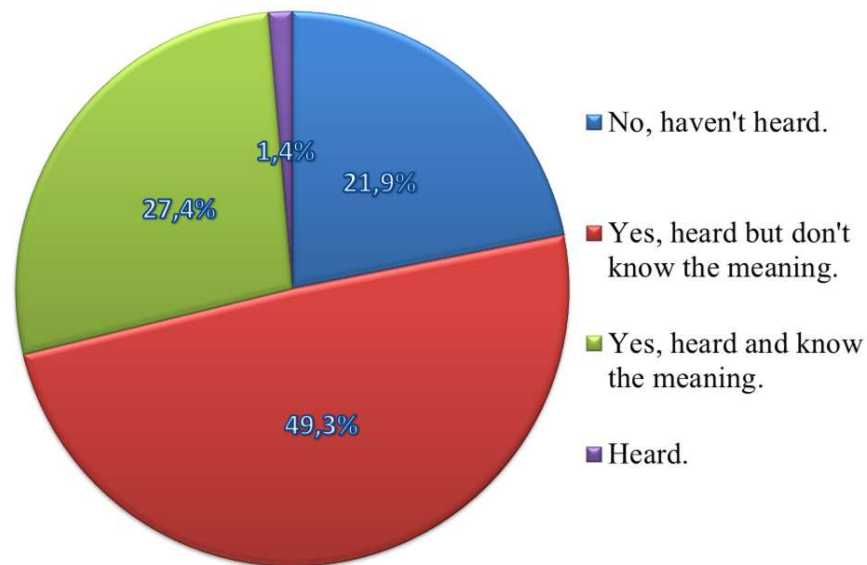


Figure 1: Distribution of respondents' opinions when answering the question "Do you know the concept of "engineering"?"

The given data show that 76.7% of respondents are familiar with the term "Engineering", and 27.4% know the meaning of this concept (Fig. 1).

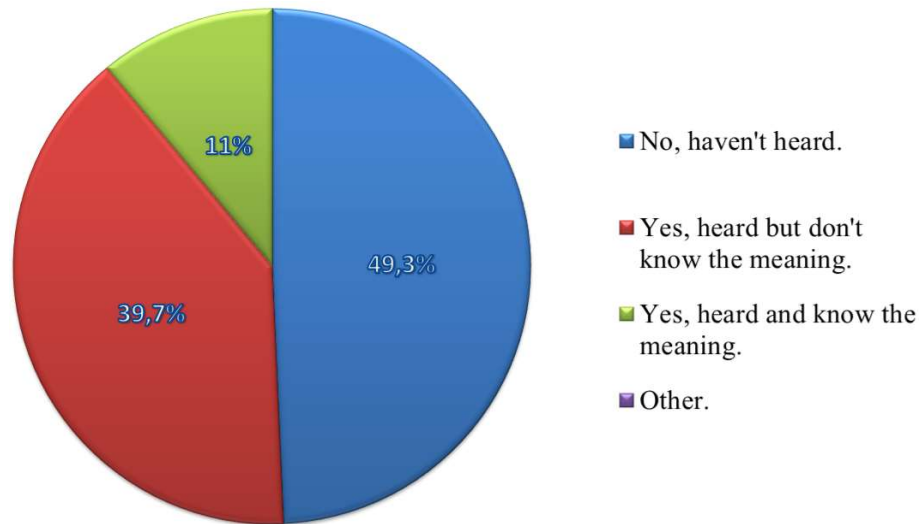


Figure 2. Distribution of respondents' opinions when answering the question "Are you familiar with the concept of computer re-engineering?"

According to the results of the questionnaire, we can conclude that 50.7% of respondents are familiar with this concept, while only 11% know the meaning of the term "computer re-engineering" (Fig. 2). The results are noticeably lower than the previous ones.

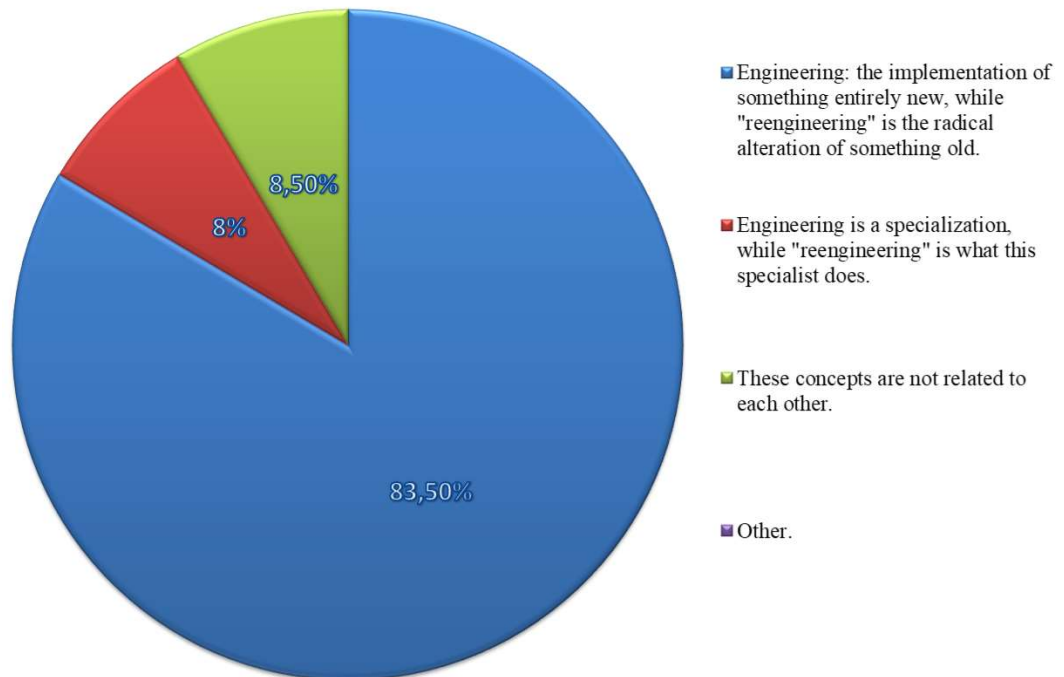


Figure 3: Distribution of respondents' opinions when answering the question "What is the difference between engineering and reengineering?"

Figure 3 shows that 59(83%) of respondents chose the following answer to the question: "engineering" - implementation of the initially new, and "re-engineering" radical changes of the old. The high result of the correct answer is most likely an intuitive choice rather than the level of erudition of the respondents.

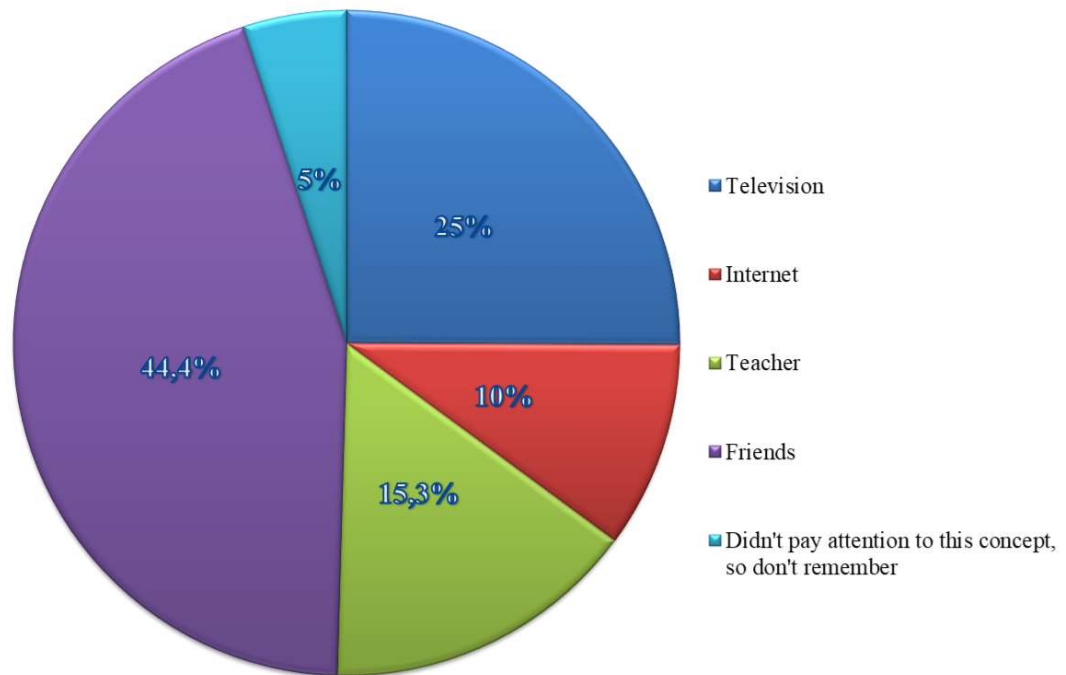


Figure 4. Distribution of respondents' opinions when answering the question "Where did you first hear the concept of "computer re-engineering"?"

The results shown in Figure 4 indicate a lack of interest in the new field of knowledge, as 44.4% of respondents "did not pay attention to this concept", a quarter of respondents learnt about this term on the Internet, 15.3% heard this concept from friends, and 83% - from the teacher. It can be concluded that the majority of the survey participants heard this concept accidentally.

Hence, the answer to the question about the time of the emergence of the concept of "computer reengineering" is naturally incorrect (Fig. 5).

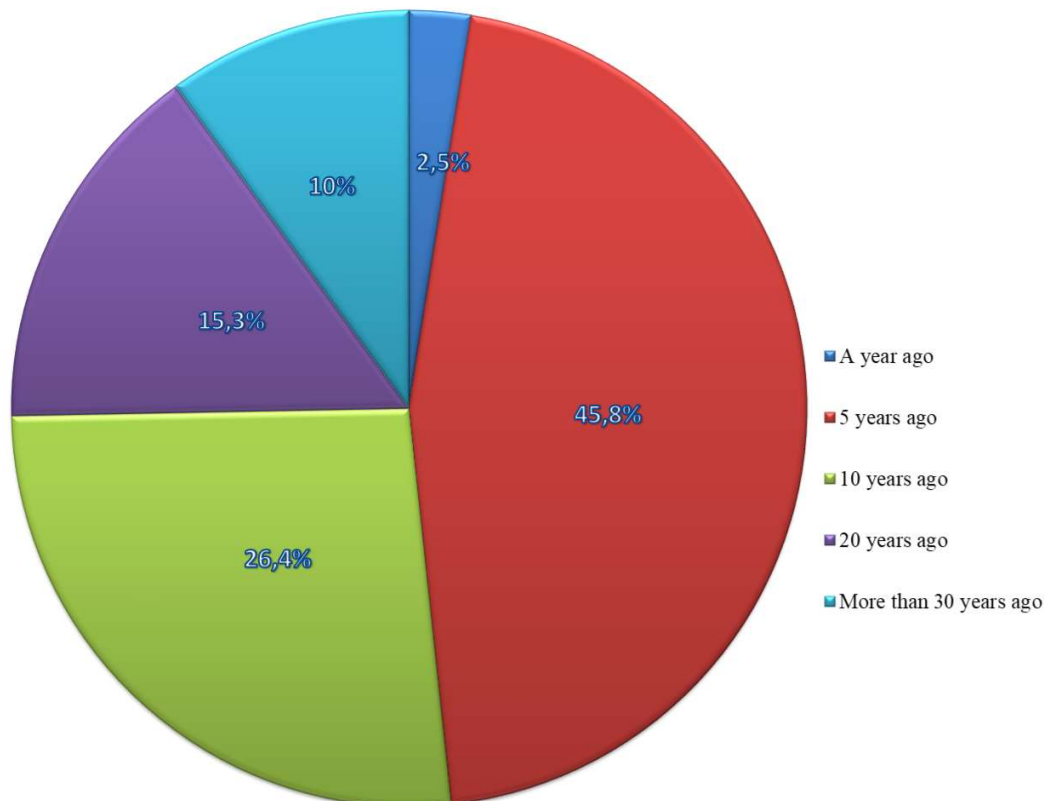


Figure 5: Respondents' answers to the question "When did computer-aided reengineering emerge?"

emerge"

According to the majority of respondents, which is 45.8%, the term originated "5 years ago", 26.4% of participants answered "10 years ago", and 15.3% answered "20 years ago". These data confirm the poor knowledge of circumstances about the time of emergence of this field of activity.

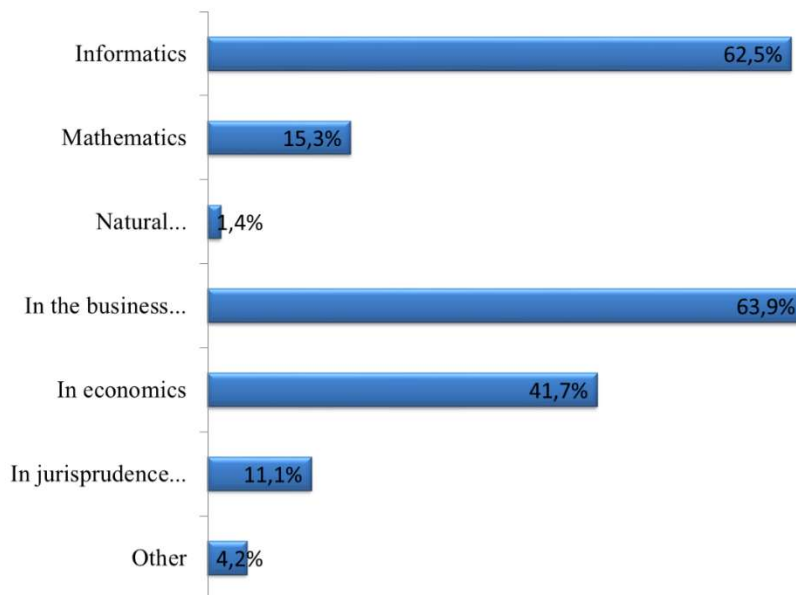


Figure 6. Distribution of respondents' opinions when answering the question "In what spheres do you think the concept of "reengineering" is applied?"? (% of respondents)

The most popular answers to the question posed (Fig.6) were: "informatics" (62.5%), "in business" (63.9%), "in economics" (41.7%). These answers were chosen by almost every second respondent.

Thus, the conducted research allows us to draw the following conclusions:

1) the majority of respondents have gaps in their knowledge, received it accidentally and do not understand the essence of terms, the reason for the emergence of a new field of knowledge, the scope of its application.

2) when training IT specialists, economists and engineering technicians, more attention should be paid to this training area.

After all, "reengineering" is a rethinking and complete transformation of business processes to achieve specific improvements in the main performance indicators of the enterprise or organisation, and "information reengineering" provides transformation of the entire information system, increasing the effectiveness of business analysis and the possibility of prompt elimination of shortcomings in the work of personnel, in the organisation of production and the organisation as a whole.

To reinforce the conclusions drawn from the conducted research study, let us analyse the placement of the course "Information Reengineering" on the most popular distance learning sites:

- Universarium; [2].
- Technology Entertainment Design; [3].
- Open Education; [4].
- edX is a free online learning system; [5].
- Coursera; [6].
- Udacity; [7].
- National Open University "INTUIT"; [8].

- MIT OpenCourseWare; [8].
- Russian education. [10].

Table 3: Modern distance education resources

Resource link	Brief description	Pros	Minuses	Course availability
<a href="http://universarium.org">universarium.org</a>	An inter-university e-Learning platform. Its programmes are provided by MIPT, Lomonosov Moscow State University, MEPhI, Bauman Moscow State Technical University, Plekhanov Russian Economic University.	Training is based on a modular plan: video lecture, independent work, homework and testing	Training courses are not launched on specific dates, but based on occupancy - once the number of trainees reaches 5,000	Absent
<a href="http://ted.com">ted.com</a>	A collection of over 1,000 short (up to 20 minute) talks from TED conferences that anyone can watch.	<ul style="list-style-type: none"> <li>- There are new shows every week</li> <li>- The videos are subtitled in English, and many have been translated into more than 20 languages worldwide</li> <li>- Your own Youtube channel</li> <li>- Ability to listen to audio podcasts via iTunes</li> </ul>	<ul style="list-style-type: none"> <li>- The rolls are not grouped into courses</li> <li>- Lack of interaction with the trainees</li> </ul>	Absent
<a href="http://openedu.ru">openedu.ru</a>	National online education platform. To date, 63 courses from eight leading Russian universities, such as MIPT, MSU, SPbSU, ITMO, SPbPU, NIU HSE, UrFU and NITU MISIS, are available.	- The course may be counted towards a diploma from any university in Russia with the consent of the university administration	- Paid certificates to prove completion of training.	Absent
<a href="http://edx.org">edx.org</a>	A free educational platform created jointly by Harvard University and MIT.	<ul style="list-style-type: none"> <li>- Opportunity to get a new profession by mastering a certain set of 3-9 courses</li> <li>- Possibility to choose the amount of donation for receiving a course certificate</li> </ul>	<ul style="list-style-type: none"> <li>- Lack of mobile applications</li> <li>- Almost complete absence of courses with Russian subtitles</li> </ul>	The Engineering course in English has been posted
<a href="http://coursera.org">coursera.org</a>	A world leader in online learning, cooperating with universities all over the world. Not so long ago, fully Russian-language courses appeared here, some of them taught by MIPT scientists. Each course lasts from 4 to 12 weeks on average. At the end of most courses, you can receive an official certificate.	<ul style="list-style-type: none"> <li>- Class interactivity: many lectures are divided into several parts, after each of which students are asked to answer a question about the material they have listened to.</li> <li>- Availability of mobile applications for iOS and Android</li> <li>- Opportunity to get a new profession by mastering a certain set of 3-9 courses</li> <li>- Opportunity to obtain an official certificate</li> <li>- There are about 700 different courses available</li> </ul>	<ul style="list-style-type: none"> <li>- Paid certificates to prove completion of training.</li> <li>- The main language of instruction is English</li> <li>- Lack of live interaction with teachers</li> </ul>	<u>Absent</u>
<a href="http://udacity.com">udacity.com</a>	An educational platform specialising in Computer Science. The main areas of study are web-design, data analysis and mobile applications. The emphasis is not on theory, but on practice. Among the teachers are employees of leading IT-companies: Google, AT&T, Facebook, Salesforce, Cloudera. Each course is divided into several sessions consisting of 10-15 thematic videos.	<ul style="list-style-type: none"> <li>- Practice-oriented</li> <li>- Availability of mobile applications</li> <li>- Ability to work offline by downloading a few lessons in advance</li> <li>- Availability of Russian subtitles in some courses</li> <li>- <u>Your own Youtube channel</u></li> </ul>	<ul style="list-style-type: none"> <li>- Not a very diverse range of courses</li> <li>- Receive certification only after passing a paid final exam</li> </ul>	<u>Absent</u>
<a href="http://intuit.ru">intuit.ru</a>	The largest Russian Internet university with the opportunity to receive higher and second higher education, as well as professional retraining and advanced training, existing since 2003.	<ul style="list-style-type: none"> <li>- Teaching language - Russian</li> <li>- No fee of any kind</li> <li>- No time limits - all materials are freely available all year round</li> <li>- Opportunity to obtain an official certificate</li> </ul>	<ul style="list-style-type: none"> <li>- Unfriendly interface</li> <li>- Lack of interactivity</li> </ul>	The course "Optimisation of Business Processes! The course discusses in detail the approaches to reengineering an <u>organisation</u> and explains the terminology of reengineering.
<a href="http://ocw.mit.edu">ocw.mit.edu</a>	The Institute posts publicly available recordings of all its lectures on the website. This resource is not an MOOC in the traditional sense, as there is no feedback from students.	Availability of a wide variety of lectures and self-study materials	<u>Lack of interactive interaction</u>	Posted the course "Distributed Computing. <u>Engineering</u> ."
<a href="http://www.edu.ru">www.edu.ru</a>	Distance learning: section of the Russian Education portal	A wide variety of open educational courses for self-study courses.	Lack of live interaction with teachers	Posted a Business Planning course that covers the basic concepts of engineering, marketing analysis, management, financial analysis and planning.

The analysis of modern distance learning resources shows that they do not contain courses on information Engineering, one of which is the reengineering approach, published on 3 websites,

1 of which is devoted to the engineering subject in English. At the same time, the course contains only basic concepts.

Textbook Blinova A.O., 2016, Rudakova O.S., 2013. It should also be noted the work "Faster, Better, Cheaper: Ten Methods of Business Process Reengineering / M. Hammer.-M.: Alpina Pable, 2012. There are separate manuals with a narrow focus in the banking sector, on training students in economics and management, finance and statistics, etc. There are also some manuals with a narrow focus in the banking sector, on training students in economics and management, finance and statistics, etc.

This is clearly not enough. Therefore, it arises:

- The need to collectively discuss the future prospects of this educational resource;;
- The need to develop programmes to improve the pedagogical and methodological base, academic courses on knowledge restructuring with application on distance learning platforms, educational programmes for specialists of different profiles.

### Course Concept

The innovative course on Information Process Reengineering with Artificial Intelligence involves the following key modules.

Introduction to multimedia data and artificial intelligence is an important step in understanding modern information processing technologies. Understanding of the basic concepts and methods of working with multimedia data, as well as knowledge of the basics of artificial intelligence opens wide opportunities for the development and implementation of innovative solutions in the field of information process management.

Video data processing is an important component of modern information technology that allows extracting valuable knowledge and information from video files. Video processing techniques include object and action recognition, content analysis, and more to automate analysis processes and improve video quality. Segmentation: dividing video into smaller segments for analysis and processing. Motion detection: identify objects moving in the frame to analyse their behaviour. Object Tracking: Track moving objects across multiple frames. Keyframe extraction: identify the most informative moments in the video for further analysis.

Audio data processing and analysis is an important area of research in modern computer science, finding applications in areas such as speech interfaces, music services, audio analytics and more. The application of advanced methods and technologies enables efficient analysis and classification of audio signals, which contributes to the development of innovative solutions in various fields of human activity.

Text data is one of the main sources of information in today's information society. Text processing and analysis play a key role in areas such as natural language processing, information retrieval, social media analysis, and more. Below are the main methods and technologies used to process and analyse text data.

Text processing

Tokenisation: breaking text into individual tokens such as words, characters or sentences.

Lemmatisation and Stemming: reducing words to their base form (lemma) or truncating words to their root form (stemma).

Removing stop words: excluding from the text the most frequently occurring words that do not carry a semantic load (prepositions, conjunctions, etc.).

Keyword and phrase extraction: highlighting the most informative words and phrases in a text. Process integration and optimisation using artificial intelligence: applying information process re-engineering techniques to optimise multimedia data processing.

Processing and analysing textual data represent an important area of research in the field of information technology. The application of advanced methods and technologies allows to effectively analyse and interpret textual information, which finds wide application in various spheres of human activity, including scientific research, business analytics, medicine, education and many others.

### Conclusion

The development of an innovative course on information process re-engineering is essential for training personnel capable of effectively managing change and optimising information processes in modern organisations. The approach presented in this article can become the basis for creating such a course and ensure its relevance and effectiveness in the dynamic information technology environment.

### REFERENCE LIST

1. Butorin V.M., Anikina E.I., Bochanova N.N., Pavlova E.V. Analytical review of information and educational systems / V.M. Butorin // Izvestia South-West State University. - 2012. - № 2.- C. 24-27
2. Universarium [Electronic resource] / Access mode: universarium.org.
3. Technology Entertainment Design [Electronic resource] / Mode of access: ted.com.
4. Open Education [Electronic resource] / Mode of access: openedu.ru.
5. edX - free online learning system [Electronic resource] / Mode of access: edx.org.
6. Coursera [Electronic resource] / Access mode: coursera.org.
7. Udacity [Electronic resource] / Mode of access: udacity.com.
8. National Open University "INTUIT" [Electronic resource] / Access mode: intuit.ru.
9. MIT OpenCourseWare [Electronic resource] / Mode of access: ocw.mit.edu
10. Russian Education [Electronic resource] / Mode of access: www.edu.ru.

## Technical Sciences

# Principles of modeling the technological process of manufacturing small editions based on fuzzy logic

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The investigated technological process of manufacturing small editions on digital printing presses involves a series of specialized equipment implementing previously described procedures step by step. The quality of machine operations during edition production at each stage depends on various factors, the integral impact of which determines the final quality of the printed product [1, 2, 3, 4]. These factors are determined by material properties, equipment operating modes, peculiarities of post-operation machine designs, and their sections, and so forth. The investigated technological process does not always yield adequate quality indicators due to the presence of a large number of influencing factors and insufficient consideration of relationships between equipment technical characteristics and operating modes.

Therefore, the task of predictive quality assessment of manufacturing small editions becomes relevant based on establishing relationships between influencing factors on post-printing processes, studying quantitative and qualitative variables identifying parameters of technological procedures. To solve this task, it is advisable to use methods and tools of fuzzy logic and fuzzy logical programming [5, 6, 7, 8] with the application of a fuzzy knowledge base and weights of membership functions of linguistic variables, representing a set of distinguished technological parameters and influencing factors on the technological process.

For a better understanding of the research essence, let's consider the stages and general principles of the research [5, 6] used in building a model of the technological process of manufacturing small editions.

Stage 1: Building a logical deduction model and phasing factors influencing the quality of the investigated process.

A logical deduction model is a graph, the structure of which reflects the ordering of factors influencing the predicted indicator, namely, the numerical quality indicator of manufacturing small editions on digital printing presses. The nodes of the tree are interpreted as follows: the root of the tree - the initial indicator, terminal nodes - influencing factors, non-terminal nodes - classes of influencing factors.

The phasing stage, or introduction of fuzziness, involves forming membership functions for terms of all input and output variables, compiling a system of fuzzy inference rules, and justifying the weight of each rule [6].

Stage 2: Construction of fuzzy knowledge matrices.

A fuzzy knowledge matrix contains knowledge about the results of a so-called virtual experiment. During such an experiment, an expert responds to combinations of linguistic assessments of factors. The hierarchy of the inference tree requires building fuzzy knowledge matrices for all non-terminal nodes and the root of this tree. In other words, the fuzzy knowledge base contains logical statements about relationships between input and output variables.

Stage 3. Fuzzy logical inference and defuzzification of the output quality indicator.

The technique of fuzzy logical inference applied to the information collected in the previous stages allows computing the indicator predicted as a fuzzy set. This fuzzy set determines the level of quality of manufacturing small editions for a fixed vector of influencing factors. To convert from the obtained fuzzy set to a quantitative assessment, it is necessary to perform the defuzzification procedure, i.e., transforming fuzzy information into a crisp form. Among the variety of defuzzification methods, the most common is the "center of gravity" method of a figure bounded by the membership function of the fuzzy set and the horizontal coordinate [6, 9].

Developing mathematical models for assessing the quality level of manufacturing small editions on digital printing presses from identified factors, it is proposed to use expert assessments of fuzzy logical expressions like "IF-THEN" type. Modeling is carried out on hierarchies such as assembly quality, cover folding quality, wire stitching quality, and block trimming quality on three sides.

The result is obtained by forming an influence factor as linguistic variables with a given universal set and corresponding linguistic terms, designing a fuzzy knowledge base, constructing fuzzy logical equations, and obtaining values of membership functions of the quality indicator of the investigated processes. Ultimately, the defuzzification of the fuzzy set, characterizing the linguistic variable, enables predicting the level of output quality of manufacturing small editions on digital printing presses based on quantitative and qualitative influencing factors. This minimizes the possibility of producing defective products and maximizes the productivity of the process of manufacturing small editions [10, 11].

#### References

1. Senkivskiy V. M. Formalization of Linguistic Factors in Modeling Post-Printing Processes / V. M. Senkivskiy, Yu. I. Petriv // Proceedings of the Scientific and Technical Conference of the Teaching Staff, Researchers, and Post-graduates. - Lviv: Ukrainian Academy of Printing, 2012. - P. 133.
2. Petriv Yu. I. Modeling the Forecast of Quality in the Technological Process of Manufacturing Small Editions as the Basis for Expert Systems Construction / Yu. I. Petriv // Proceedings of the 13th International Scientific and Technical Conference of Students and Postgraduates "Young Printing" - Kyiv: NTUU "KPI", 2013. - P. 8.
3. Petriv Yu. I. Technological Process of Manufacturing Small Editions as an Object of Modeling / Yu. I. Petriv // Proceedings of the VI Scientific and Technical Seminar "Printing Technology and Equipment: Latest Technologies and Equipment". - Kyiv: VPI NTUU "KPI", 2014. - P. 5-6.
4. Petriv Yu. I. Expert System for Forecasting the Quality of Small Editions Based on Fuzzy Logic / Yu. I. Petriv // Proceedings of the XIX International Scientific and Practical Conference on Issues of the Publishing and Printing Industry. - Kyiv: UkrNDISVD, 2014. - P. 72-74.
5. Siavavko M. S. Information System "Fuzzy Expert" / M. S. Siavavko. - Lviv: Publishing Center of Ivan Franko National University of Lviv, 2007. - 320 p.
6. Certificate of Copyright Registration for Work No. 41832. Ukraine. Imitative Modeling in System Analysis by Binary Comparisons Method (Computer Program) / Intellectual Property Rights belong to I. V. Hileti, V. M. Senkivskiy, O. V. Melnykov. Registered on 17.01.2012.
7. Zadeh L. The Role of Soft Computing and Fuzzy Logic in Understanding, Constructing, and Developing Information Intelligent Systems / L. Zadeh // Artificial Intelligence News. - Moscow, 2001. - No. 2-3. - P. 7-11.
8. Petriv Yu. I. The Use of Fuzzy Logic in Modeling the Technological Process of Manufacturing Small Editions / Yu. I. Petriv // Proceedings of the X International Scientific and Practical Conference "Development of Scientific Research 2014". - Poltava: 2014. - P. 85-87.

9. Petriv Yu. I. Concept of Expert System for Quality Forecasting Based on Fuzzy Logic / Yu. I. Petriv // Proceedings of the Scientific and Technical Conference of the Teaching Staff, Researchers, and Postgraduates. - Lviv: Ukrainian Academy of Printing, 2015. - P. 131.
10. Shtovba S. D. Designing Fuzzy Systems Using MATLAB Tools / S. D. Shtovba. - Moscow: Hotline - Tele-com, 2007. - 288 p.
11. Petriv Yu. I. Expert System for Forecasting the Quality of Small Editions Based on Fuzzy Logic / Yu. I. Petriv // Proceedings of the XIX International Scientific and Practical Conference on Issues of the Publishing and Printing Industry. - Kyiv: UkrNDISVD, 2014. - P. 72-74.

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# СПОСОБ ОПРЕДЕЛЕНИЯ ИЗНОСОСТОЙКОСТНЫХ ХАРАКТЕРИСТИК СОЕДИНИТЕЛЬНЫХ ШВОВ В ПАКЕТАХ ОДЕЖДЫ

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В настоящее время особое внимание обращено на разработку и изготовление высококачественной одежды, качество которых во многом зависит от прочности ниточных соединений в одежде. Прочность ниточных соединений зависит от длительности эксплуатации швейного изделия, условий эксплуатации, характера действия нагрузок. В процессе эксплуатации швы, как элемент одежды, подвергаются различного рода механическим воздействиям: сжатию, растяжению, кручению, изгибу, т.е. многократным деформациям. Поэтому уже в процессе проектирования модели необходимо выбрать такой вид соединения деталей одежды, который обеспечивал бы прочность, надежность, долговечность швов и красивый внешний вид изделия.

Среди работ [1,2,3], посвященных вопросам оценки качества ниточных соединений, имеется пробел в области исследования эксплуатационных свойств швов одежды. Недостаточно изучена способность швов противостоять разрушающим нагрузкам, обусловленным естественными движениями человека, возникающими в ходе его трудовой деятельности. Отсутствие достаточно полных исследований, связанных с поведением швов в процессе эксплуатации одежды в различных условиях, не позволяет устанавливать рациональные методы соединения тканей, обеспечивающие безотказную работу изделия в течение нормативного срока носки, а также прогнозировать возможные сроки эксплуатации одежды для горных видов спорта. Проектирование данных видов одежды с заданными эксплуатационными показателями швов возможно только на основе глубокого и всестороннего анализа процессов, которым подвергаются ткани и скрепляющие материалы при функционировании одежды. В этой связи, исследование эксплуатационных показателей ниточных соединений, выполненное в условиях, имитирующих реальный износ одежды, является актуальной задачей.

Соединения деталей одежды должны иметь заданный запас прочности и надежности. Испытание швов при многократном растяжении показывает, что установленная, исходя из опыта работы, частота стежков, стачивающих челночных строчек, обеспечивает надежную работу соединительных швов во время носки изделий [2]. Однако в исследованиях не был рассмотрен вопрос интенсивности износа при воздействии циклических нагрузок на ниточный шов в пакете, что более соответствует реальным условиям эксплуатации изделия. При этом износ и повреждения ниточного шва происходит

за счет утомления под действием многократно действующей деформирующей силы. В этой связи, в качестве объекта исследования рассматриваем образцы пакетов одежды с соединительными швами, выполненными на машинах двухниточного челночного стежка, с учетом предъявляемых требований для соединительных швов.

Цель работы - анализ потери прочности ниточного шва при воздействии на него утомляющей, циклической нагрузки при двухосной деформации образца пакетов. При этом, прочность ниточных швов, после изнашивания (после обработки пакета циклическим деформированием), оценивались по разрывной нагрузке, по стандартной методике /"ГОСТ 28073-89/. Разрывная нагрузка определялась при растяжении полоски со швом, вырезанной из изношенного пакета, в направлении перпендикулярном шву.

Имитация износа пакета со швом при эксплуатации одежды проводилась на установке (рис. 1), позволяющей циклически нагружать и производить двухосное деформирование.

Устройство представляет собой вибратор, состоящий из кривошипа 1 закрепленного на валу электродвигателя (на чертеже не показан). На конце кривошипа 1 установочным винтом 2 закреплен эксцентричный палец 3. Ось пальца 3 шарнирно соединена с головкой шатуна 4. Вторая головка шатуна шарнирно соединена с ползуном 5, на который с помощью винта закреплен пуансон 6. При вращении вала электродвигателя постоянного тока пуансон 6 совершает возвратно-поступательное (вибрационное) движение по вертикали, деформируя на заданную величину пакет 7 со швом в середине, натянутого в кассете 9. Частота колебания пуансона 6 регулируется изменением частоты вращения главного вала электродвигателя, за счет изменения напряжения тока питания. Пакет материалов (проба) 7 закреплен кольцом 13 при помощи винтов 12. При закреплении пробы в кассете создается одинаковое распределяющее усилие в двух взаимно перпендикулярных направлениях на специальном приспособлении.

Для создания усилия взаимодействия пуансона с пробой в установке предусмотрено устройство, позволяющее регулировать начальное усилие контакта пробы с пуансоном. Для этого кассета с пробой 9 подпружинена пружинами 10. Усилие сжатия пружины 10 регулируется маховиком 18. При завинчивании маховика 18 винт смещается вниз и создает натягивающее усилие пружинами 10 через динамометр 19 и трос 15. Под действием натяжения троса 15 кассета 9 смещается вниз, сжимая пружины 10. Суммарное усилие сжатия пружин устанавливается по показанию динамометра 19. После установки необходимого усилия кассета 9 фиксируется сверху винтами и гайками 8. Положение электродвигателя с устройством вибрации пуансона так же может, при необходимости, регулироваться по высоте расположения.

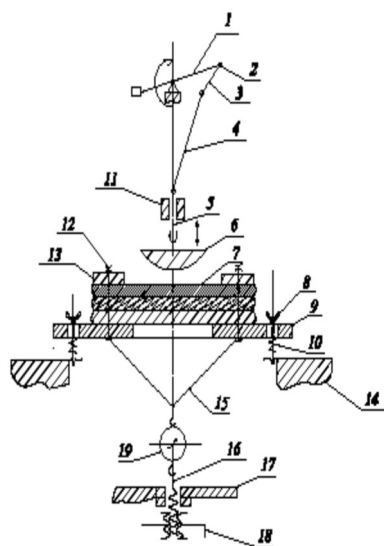


Рисунок 1. Установка для циклического деформирования пакета со швом (а- схема установки, б- фотография установки)

Основываясь на предложенной выше методике и экспериментальной установке, проведем практическое исследование. Образцы для испытания изготавливают размером 15x15 см. шов в образце располагают посередине, концы ниток челночной строчки завязывают узлом.

По результатам экспериментальных исследований были разработаны рекомендации по подбору пакетов одежды для спортсменов экстремального вида спорта, в частности для альпинистов.

#### СПИСОК ЛИТЕРАТУРЫ

1. Кокеткин И.П. Одежда: технология- техника, процессы- качество.- М.: Издательство МГУДТ. 2001.- 560 с.
2. Гущина К.Г. Эксплуатация свойства материалов для одежды и методы оценки их качества М.: Легкая и пищевая промышленность. 1984, с. 312.
3. Усенбеков Ж., Нурбай С.К., Ашимова Е.А. Исследование свойств пакета зимней одежды спортсменов. Известия высших учебных заведений Технология текстильной промышленности. №6 (370) 2017. с 200- 20

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# УДОВЛЕТВОРЕННОСТЬ КАЧЕСТВОМ ОДЕЖДЫ ДЛЯ ГОРНЫХ ВИДОВ СПОРТА

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За последние годы в нашей стране возросла популярность горных видов спорта и активного отдыха. В настоящее время зарубежные и отечественные производители предлагают большой выбор одежды для горных видов спорта в широком ценовом диапазоне, охватывающем практически все категории потребителей. Однако качественные изделия, соответствующие реальным условиям эксплуатации, учитывающие специфику этих видов спорта, изготавливаются из дорогих материалов и имеют достаточно высокую стоимость [1, 2].

В рамках выполняемой диссертационной работы «Совершенствование проектирования одежды для спортсменов экстремального вида спорта на основе рационального формирования пакетов материалов», проведено анкетирование альпинистов секции «ALPINE AZIA TEAM» и любителей горных видов спорта в количестве 60 человек в декабре 2018 года.

**Целью мониторинга** является повышение качества одежды для горного туризма и спорта, обеспечивающее максимальное комфортное состояние организма в горных условиях.

**Задача** путем опроса альпинистов и любителей горного туризма выявить удовлетворённость качеством используемой одежды.

Данное маркетинговое исследование будет носить описательный характер. Оно будет заключаться в простом описании тех или иных аспектов реальной маркетинговой ситуации, связанной со спортивной одеждой.

Для проведения исследования выбран один из методов полевых исследований, в частности, исследование с применением анкетирования. Участникам выборки будут розданы анкета, в которых представлен список из 15 вопросов с вариантами ответа. В каждом вопросе можно выбрать лишь один вариант ответа (самый подходящий для респондента) [3, 4].

Анализ половозрастных категорий респондентов показал, что горным туризмом и спортом из опрошенных занимаются 67% мужчин и 33% женщин в возрасте от 15 до 67 лет. Не удовлетворены удобством и кроем одежды, предлагаемой на современном рынке 67% опрошенных, качеством материалов - 35%, эксплуатационными свойствами - 50%, теплозащитными свойствами – 45%.

Анализ предпочтений в одежде для горного туризма и спорта показал, что 75% респондентов отдало предпочтение комплекту куртка и полукombineзон, комбинезону- 8% респондентов, куртка и брюки- 17%.

Анализ конструктивно-технических предпочтений показал, что респонденты желали бы иметь в одежде карманы на линии бедер - 67%, они должны быть прорезными - 56%,

прямоугольные с вертикальным входом в карман - 84%. 59% респондентов считают, что в изделия необходим капюшон, причем съемный от изделия. Для 59% мужчин наиболее удобными и практичными в эксплуатации является застежка-молния и кнопки - 25% опрошенных. Анализ покроя выявил, что большая часть респондентов (83 %) отдала предпочтение втачным рукавам, 7%- рукавам покроя «реглан».

Анализ специальных приспособлений для усиления прочности и износостойкости наиболее разрываемых частей костюма и для защиты тела показал, что все они необходимы для защиты тела, так как ветрозащитную юбку на куртке выбрало 26% респондентов, по низу брюк снегозащитные муфты – 27%, наколенники – 20%, усилители от трения – 27%.

Было уделено внимание и художественному оформлению одежды: подавляющее большинство опрошенных отдало предпочтение ядовито-зеленому (34%) и черному (17%) цветам, предпочитая их комбинировать (25%)

При обработке результатов социологического опроса было установлено, что наиболее распространенными среди мужчин и женщин являются размеры 42- 50, роста 160-185.

Рассмотрены наиболее часто используемых движений при занятии альпинизмом и другими горными видами спорта по которым определены факторы и зоны возможных повреждений одежды. Такой анализ позволило установить, какие участки изделия подвергаются наибольшему истирающим и разрывным нагрузкам. Такими зонами являются: плечевая область переда и спинки, область на уровне нижней части проймы, задняя часть брюк на уровне сидения, в области коленей и шаговых швов брюк по нижней части.

В процессе обработки результатов анкетного опроса установлена необходимость включения в ассортимент разрабатываемых изделий куртку и полукомбинезон, т.к. их использование для горного туризма и спорта обеспечивает наиболее комфортное состояние организма.

Особое внимание необходимо обратить на разработку конструктивно-технического решения с учетом основной претензии потребителей к неудобству пользования отдельными элементами конструкции полукомбинезона.

По результатам анализа установлен перечень условий обеспечения безопасности для горного туризма и спорта:

- проектирование одежды с высокими динамическими показателями конструкции с целью обеспечения удобства передвижения и выполнения любых технических приемов потребителей;
- разработка оптимального уровня массы одежды для обеспечения нормальных показателей функционального состояния организма;
- применение износостойких, воздухопроницаемых, гигроскопичных, обладающих высокой теплозащитной способностью материалов для обеспечения комфортных условий пододежного пространства;
- применение защитных элементов конструкции одежды для предохранения от механических повреждений и увеличения срока носки;
- обеспечение удобства снятия и надевания одежды, пользования отдельными элементами конструкции;
- соответствие сезону и метеорологическим условиям.

Анализ действующего ассортимента и показателей свойств спортивной одежды на основе анкетного опроса потребителей позволили сделать вывод о недостаточном соответствии предлагаемых на рынке изделий условиям эксплуатации при занятиях горным туризмом, что создает аварийные ситуации и снижает успешность восхождения. Актуальной задачей создания качественной одежды для туристов является обеспечение высоких эргономических показателей.

Таким образом, были установлены направления повышения потребительских свойств одежды для горного туризма и спорта, приведения в соответствие композиционного и конструктивного решения, повышения надежности и удобства пользования в соответствии с выявленными предпочтениями на данный ассортимент одежды. Совокупность эргономических свойств одежды для горного туризма и спорта во многом определяется выбором конструктивного решения и выбором материалов. Поэтому для целенаправленного обеспечения требуемого уровня показателей качества необходимо выполнить анализ свойств материалов, которые используются для изготовления спортивной одежды.

#### СПИСОК ЛИТЕРАТУРЫ

1. Афанасьева, Р. Ф. Гигиенические основы проектирования одежды от холода.- М.: Легкая индустрия, 1977. - 136 с ,
2. Делль Р.А., Афанасьева Р.Ф., Чубарова З.С. Гигиена одежды. -М.: Легпромбытиздат, 1991. - 160
3. Райхман, Э.П. Экспертные методы в оценке качества товаров [Текст]/ Э.П. Райхман, Г.Г. Азгальдов. - М.: Экономика, 1974.
4. Теоретические основы товароведения и экспертизы това- ров: учебник : в 2 ч. / М. А. Николаева. ИНФРА-М, 2014. 184 ст.

## Economic Sciences

# ECONOMETRIC MODELLING OF GDP GROWTH BASED ON EDUCATION LEVELS IN KAZAKHSTAN

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### Abstract

This article uses econometric modelling to determine the dependence of Gross Domestic Product (GDP) growth on the changes in the level of education based on the analysis of statistics of innovative development of the economy of the Republic of Kazakhstan for the period 2011-2022. The purpose of this article is to model the dependence of GDP economic growth rate on the rate of change in the level of education in the Republic of Kazakhstan.

The obtained correlation makes it possible to determine the GDP growth rate by changes in each factor of the model and to estimate the level of influence of structural changes in the level of education on the GDP growth rate.

According to the results of the analysis, the innovative factors of reproduction and renovation growth were identified for the complete development of innovation potential of Kazakhstan. In this regard, the need for further studies and search for the most effective mechanisms for modelling the innovative activities of enterprises in Kazakhstan has become relevant.

**Keywords**—Gross Domestic Product, modelling, innovative development, education, research and development (R&D), innovation statistics.

### Introduction

Recently, there has been particular expectations focused on the development of an innovation economy, where profits are not created by tangible production or by the concentration of financial centers. The main asset here is knowledge, which penetrates all social spheres and is the basis for future economic growth. Therefore, scientific knowledge and commercial use of new ideas, new systems, and technologies in various spheres of human activities are the main strategic factors of innovation economy growth.

Innovative industrial development implies the formation of new technological systems by creating fundamentally new forms of organization and mechanisms of interaction between all participants of the innovation process. Transition of the economy of the Republic of Kazakhstan to the innovative path of development is possible only since accelerated technological development of all branches of the real sector of the economy. At the same time, it is important to consider its current state to identify the most problematic areas and reverse negative trends, to form a selective scientific, technical and innovation component focused on the implementation of justified priorities, which will ensure successful development of a relatively narrow field of promising technological breakthroughs.

### A. *Literature review*

Dynamic regression model of economic growth is an important requirement for finding effective mechanisms for modelling innovation activity of enterprises. In this regard, the works of foreign and domestic authors show various concepts of innovative development of enterprises. In this research article, the authors emphasize that the negative impact of GDP growth on corporate innovation is stronger in less developed regions and that a reduction in research and development does not lead to a reduction in procurement from suppliers or a reduction in employee benefits. This study shows the specific impact of regional GDP growth targets based on China's unique political and economic situation [1]. Other studies examine the relationship between innovation inputs, outputs, and productivity. In addition, it examines the quantitative possibilities of linking global innovation mechanisms. To develop the methodology for this quantitative study, the authors used panel data from 105 countries and collected data from Global Innovation Index (GII), World Intellectual Property Organization (WIPO) and World Development Indicators (WDI) [2]. This study examines a rare case of the impact of local government innovation on development effectiveness by using data at the district level in Indonesia. The authors use the accumulated number of innovations (quantitative side) produced by each district between 2015 and 2022. [3]. We proposed a semi-automatic text processing method to rank and categorize educational innovation projects (EIP). Our approach to evaluate EIPs is based on a multidimensional ranking system that uses quantitative indicators for three main missions of higher education institutions, namely education, research, and knowledge transfer [4].

The literature review on econometric modelling of GDP growth based on education levels allows us to conclude that the relationship obtained allows us to determine the GDP growth rate based on the change in each factor of the model and to assess the level of influence of structural factors.

### B. *Materials and methods*

This article utilized official statistical data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, published on the website [5], as well as the main indicators of innovation and scientific statistics for 2011-2022 to perform modelling. This research used methods of data collection, systematization and analysis of data sources. Regression models were considered to determine the key factors directly affecting the value of GDP.

#### Main part

The following main indicators of science and innovative development of Kazakhstan were used in this study: domestic R&D expenditure; share of domestic R&D expenditure in gross domestic product; investment in fixed capital; volume of innovative products (goods and services), number of organisations (enterprises) engaged in R&D; number of employees performing R&D; research specialists; doctors of science; PhDs; PhD candidates; output of students of higher education organisations; number of students studying in organisations of technical and vocational, post-secondary education; number of graduates of organisations of technical and vocational, post-secondary education; number of graduates who have completed general secondary school; number of respondents total; level of activity in the field of innovation and of those with innovations. for 2011-2022

Establishing the correlation between economic growth and different groups of factors is an important diagnostic task that allows us to establish the type of economic growth characteristic of a given country in a given period of time. Regression models are an optimal tool for analysing, evaluating and forecasting economic growth, including the identification of key factors directly affecting the economic growth of an economic system. Analysis of the current state of science and innovative development of Kazakhstan based on the statistical data of the Bureau of National Statistics of the Republic of Kazakhstan [6].

We can conclude that, in general, over the past 12 years, there has been a positive trend in innovation statistics. Therefore, the most positive dynamics has been observed in the category of volume of GDP, the increase compared to 2011 was 73279931.0 million tenge, and domestic R&D expenditures were 78208.5 million tenge, while the share of domestic R&D expenditures from gross domestic product strengthened by 0.1 percent. Investments in fixed capital in 2022 equaled to 15251104 million tenge, which is higher than in 2011 (5010231 million tenge) by 10240873.0 million tenge. The volume of innovative products (goods and services) in 2022 reached 1643160.4 million tenge. In addition, over the last 12 years, there has been a positive trend in the number of organizations (enterprises) performing R&D: in 2022, this indicator was 2.0 units. The number of employees performing R&D in 2022 compared to 2011 was 4453.0 people.

The table below shows that the GDP for the period 2011-2022 increased by 259.5% and in 2022 reached 101522983.7 million tenge. If we consider the number of organizations (enterprises) engaged in R&D, we can observe some positive trends, which are expressed in an increase by 2 organizations. 412 organizations were engaged in R&D in 2011, while in 2022 there were 414. It should be noted that the number of employees performing R&D in 2022 increased by 24.7% comparing to 2011.

We will analyze the main indicators of innovation activity of enterprises based on the data of the Statistics Agency of the Republic of Kazakhstan (Figure 1).

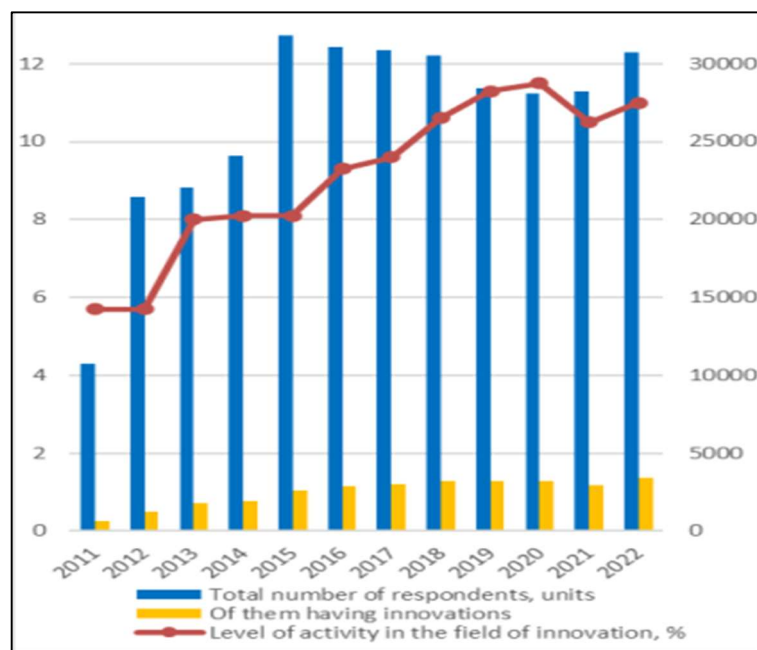


Fig.1 – Level of innovation activity in Kazakhstan

Figure 1 shows that the number of enterprises participating in the innovation survey for the period 2011-2022 increased from 10723 in 2011 to 30750. The number of enterprises with

innovations among respondents increased 5.5 times, i.e. from 614 to 3390. It affected accordingly the level of innovation activities of the enterprise, from 5.7 per cent in 2011 to 11 per cent in 2022.

Then, GDP growth dependence on changes in several determining factors, including the number of employed people in the economy of the Republic of Kazakhstan in terms of education levels, has been determined on the basis of econometric modelling.

The general form of the dynamic regression model of economic growth is represented by the following equation:

$$Y(t + 1) = f[Y(t), X_i(t), e(t)] \quad (1)$$

Where:

'Y(t)' – GDP in period 't';

'X<sub>i</sub>(t)' – state of 'i' factor of innovative economic growth at the end of period 't';

'e(t)' – forecast error in period 't'.

Regression analysis has been used for forecasting, analyzing time series, testing hypotheses, and identifying hidden relationships in data.

It should be noted that the small number of observations (n = 12) does not allow us to obtain high quality of the fourteenth regression model. In addition, the quality of the regression model depends on the mutual influence of independent factors: ideally, there should be no mutual influence. In the real economy, it is extremely difficult to find alternative growth factors due to their complex indirect and sometimes direct impact on each other. For example, expenditures on research and development contain a part of expenditures on fixed capital, and investment in fixed capital, in turn, indirectly depends on the amount of expenditures on technological innovation.

To circumvent these problems, it is proposed to assess the impact of each group of factors on the value of GDP separately, and subsequently to generalize the impact of all groups of factors on the basis of the geometric average. For this purpose, it is necessary to perform the following modelling steps:

- 1) construct three groups of regression models, each of which establishes the correlation between GDP and the corresponding groups of factors;
- 2) estimate the sensitivity coefficients of GDP growth rates to the rate of change of factors in each group presented above;
- 3) to estimate generalized GDP growth rates based on the joint influence of all groups of factors.

As a result, the obtained dependence allows us to establish the GDP growth rate from changes in each factor of the model and to estimate the level of influence of structural changes in employment on the GDP growth rate.

The following independent model factors have been considered as a possible set of factors affecting the value of GDP-Y:

- Investment factors of reproduction and renewal: X<sub>1</sub> - investments in fixed capital (million tenge).
- Innovation growth factors: X<sub>2</sub> - Internal R&D expenditures (KZT million).
- X<sub>3</sub> - Volume of innovative products (goods, services) (million tenge).
- Labour resources:
  - X<sub>4</sub> – Number of organizations (enterprises) performing R&D (units);
  - X<sub>5</sub> – Number of employees performing R&D (persons);
  - X<sub>6</sub> – Research specialists (persons);
  - X<sub>7</sub> – Doctor of Sciences (persons);
  - X<sub>8</sub> – PhDs (persons);

- X9 – Candidates of Sciences (persons);
- X10 – Graduated students of higher education organizations (persons);
- X11 – Number of students studying in organizations of technical and vocational, post-secondary education (person);
- X12 – Number of graduated students of organizations of technical and vocational, post-secondary education (person);
- X13 – Of them having innovations (person).

Each of the above factors was tested for the possibility of use in a linear model as an independent variable. The closeness of the relationship between each of the selected factors and GDP was established by using the paired correlation coefficient.

GDP dispersion diagrams from each model factor considered and the values of the pairwise correlation coefficients showing the following values  $Y$  from  $\text{Corr}(X1) = 0.98402$ ,  $\text{Corr}(X2) = 0.96645$ ,  $\text{Corr}(X3) = 0.96645$ ,  $\text{Corr}(X4) = 0.590646$ ,  $\text{Corr}(X5) = 0.05453$ ,  $\text{Corr}(X6) = 0.46252$ ,  $\text{Corr}(X7) = 0.30086$ ,  $\text{Corr}(X8) = 0.96981$ ,  $\text{Corr}(X9) = -0.1877$ ,  $\text{Corr}(X10) = -0.2683$ ,  $\text{Corr}(X11) = -0.5723$ ,  $\text{Corr}(X12) = -0.8535$ ,  $\text{Corr}(X13) = 0.80052$ .

Thus, it is correct to speak that all the correlation coefficients between GDP and the independent factors selected for the analysis were significant, i.e. able to have a noticeable impact on the GDP value.

Statistica 12 features were used to determine the relationships between GDP and each group of key factors based on regression. The results of regression analysis are presented in Table 1. Determination coefficients of R-square are sufficient to confirm the high reliability of the obtained results and indicate that all significant factors affecting the value of GDP were considered in the models. The Durbin-Watson (DW) statistics in the first ( $DW=0.858$ ) and second ( $DW=1.258$ ) models are in the range of 0.85-1.75. We will use the approximate rule: "if  $0.85 < DW < 1.75$ , there is no autocorrelation of residuals". For the third case of the model, the statistic ( $DW = 2.705$ ) falls into the zone of uncertainty (at the significance level  $\alpha = 0.05$ ) and it is impossible to state precisely about the presence or absence of autocorrelation.

TABLE 1 - Results of regression analysis

Investment factors of reproduction and renewal						
Regression Summary for Dependent Variable: Y (Основные показатели инв) R= ,98401694 R²= ,96828934 Adjusted R²= ,96511827 F(1,10)=305,35 p<,00000 Std.Error of estimate: 4234E3						
N=12	<b>b*</b>	Std.Err. of b*	b	Std.Err. of b	t(10)	p-value
<b>Intercept</b>			-4159951	3620296	-1,14906	0,277271
X1	0,984017	0,056312	6	0	17,47431	0,000000
Innovative growth factors						
Regression Summary for Dependent Variable: Y (Основные показатели инн) R= ,97980713 R²= ,96002202 Adjusted R²= ,95113802 F(2,9)=108,06 p<,00000 Std.Error of estimate: 5012E3						
N=12	<b>b*</b>	Std.Err. of b*	b	Std.Err. of b	t(9)	p-value
<b>Intercept</b>			-5579808	7300304	-0,764325	0,464240
X2	0,622879	0,156868	628	158	3,970732	0,003251
X3	0,379527	0,156868	16	6	2,419406	0,038648
Labor resources						
Regression Summary for Dependent Variable: Y (Основные показатели инно) R= ,99052910 R²= ,98114790 Adjusted R²= ,97407836 F(3,8)=138,79 p<,00000 Std.Error of estimate: 3650E3						
N=12	<b>b*</b>	Std.Err. of b*	b	Std.Err. of b	t(8)	p-value
<b>Intercept</b>			93336927	17056639	5,47218	0,000593
X8	0,688222	0,085576	19783	2460	8,04224	0,000042
X12	-0,483018	0,147253	-641	195	-3,28019	0,011185
X11	0,172184	0,110245	89	57	1,56183	0,156952

This fact may indicate the presence of distortions in the results of the analysis, primarily concerning the absolute indicators of real growth. Therefore, in the further analysis, to reduce errors, we will use incremental values. Therefore, for the observing period 't', the modelled relationships are as follows:

- dependence between GDP and investment factors of reproduction and renovation:

$$Y1 = -4159951 + 6 * X1 \quad (2)$$

- dependence between GDP and innovative growth factors:

$$Y2 = -5579808 + 628 * X2 + 16 * X3 \quad (3)$$

- dependence between GDP and labor resources:

$$Y3 = 93336927 + 19783 * X8 - 641 * X12 + 89 * X11 \quad (4)$$

Each of the models presented above describes the influence of a single group of factors on the value of GDP and, with the help of sensitivity analysis, will help to establish the relationship between the rates of their change.

*A. Estimation of sensitivity coefficients of GDP growth rates.*

It must be noted that changes in individual factors in the right-hand side of equations (2) – (4) affect the value of GDP in different ways. The sensitivity of GDP to changes in individual factors has been measured by the elasticity coefficient, which is calculated according to the following formula:

$$\mathfrak{E}_j = a_j * \frac{\bar{X}_j}{\bar{Y}} \quad (5)$$

Where:

'j' – represents one of the independent factors of economic growth used in equations (2) - (4);

$a_j$  – coefficients in equations (2) – (4) corresponding to factor 'j';

$\bar{X}_j$  – average value of the corresponding factor during the whole period of analysis;

$\bar{Y}$  – average value of GDP during the whole period of analysis.

The results of calculation of GDP elasticity coefficients in each group of independent factors are presented in Table 2. The modelling (2) - (4) was checked for realism by using the elasticity coefficients and average annual growth rates of the factors for 2011-2022.

TABLE 2 – Values of elasticity coefficients in the models of relationship between growth factors and GDP of the Republic of Kazakhstan

Group of independent factors	Factor	Elasticity coefficient
Investment factors of reproduction and renovation	Investments in fixed assets	1,004
Innovative growth factors	Internal R&D expenditure	0,852
	Volume of innovative products (goods and services)	0,256
Labor resources	Doctors of Philosophy PhD	0,307
	Number of students enrolled in technical and vocational and post-secondary education organisations	-6,003
	Number of graduates of technical and vocational and post-secondary education organisations	0,254

For instance, the largest changes in the GDP value can occur in case of increase in the number of Doctors of Philosophy PhD. Increase of this factor by 1% causes GDP growth by 35.80%, research specialists – 4.62%, PhDs – 3.42%, candidates of sciences – 2.31%, number of employees performing R&D – 2.29%, output of students of higher education organizations – 0.37%.

Over the last decade in the economy of the Republic of Kazakhstan there has been a stable trend to reduce the number of students studying in organizations of technical and vocational, post-secondary education, the number of graduates of organizations of technical and vocational, post-secondary education - the average annual rate decreases by -1.15% and -2.49% respectively.

GDP growth rate from the joint influence of factors of this group is 17.26 %  $(35.80 \cdot 0.307 + (-1.15) \cdot (-6.003)) + (-2.49) \cdot 0.254$ ).

The next most influential factor contributing to GDP growth is "Investments in fixed capital" (Table 2). Annual growth of this factor (X1) by 10.86 % provides GDP growth (Y) by 12.48 %.

Finally, the third most influential group of factors that can cause GDP growth is "Innovative growth factors" (Table 2). The joint influence of these factors on average increases GDP growth by 15.24 %  $(10.10 \cdot 0.852 + 25.94 \cdot 0.256)$ . Therefore, regression models allowed to establish the dependence of GDP growth rates on the autonomous influence of individual groups of factors and showed that the economic growth of the Republic of Kazakhstan in 2011-2022 was provided mainly by reproduction factors, i.e. had rather extensive character.

#### *B. Estimation of generalized GDP growth rates.*

Generalized GDP growth rate from the joint influence of all groups of independent factors is determined by the geometric average:

$$\overline{\Delta Y} = \sqrt[3]{\Delta Y_1 \times \Delta Y_2 \times \Delta Y_3} \quad (6)$$

Where:

$\Delta Y_1, \Delta Y_2, \Delta Y_3$  – are GDP growth rates caused by the influence of a group of independent factors 1, 2 or 3, respectively.

According to the performed calculations, the generalized GDP growth rate for the period 2011-2023 was

$$14,86\% = \sqrt[3]{12,48\% \times 17,26\% \times 15,24\%}.$$

With the help of the provided models it is possible to build scenario changes in GDP, giving the most possible changes in growth factors. In this case, the forecast of GDP rates can be calculated by taking into account the established elasticity coefficients.

#### Conclusion

In general, this analysis has shown certain positive trends for the period 2011-2022. However, comparing the results obtained with the indicators of developed countries of the world shows that we have not yet reached a sufficient level of innovation activity of enterprises, and that the efficiency of the use of expenditures on technological innovation is still insignificant.

Increase in the number of students enrolled in technical and vocational, post-secondary education organizations and graduates of technical and vocational, post-secondary education organizations. It is impossible to move to innovative economic growth at the expense of highly skilled workers without increasing the level of vocational education of post-secondary education personnel.

This analysis has shown that the economic growth of the Republic of Kazakhstan in 2011-2022 was ensured mainly by extensive factors: the number of employed in the economy of the Republic of Kazakhstan, primarily with professional education, and investment in fixed capital. The aggregate impact of the group of innovation factors was the weakest, so to obtain a tangible return and strengthen the contribution of innovation factors in ensuring the growth of the economy of the Republic of Kazakhstan, the rate of change of these factors should be the highest. In addition, the achievement of economic growth will necessarily be conditioned by an increase in the share of employment with higher professional education of workers with post-secondary education.

These calculations are rather illustrative and are not intended for forecasting real economic growth. The main task of modelling is to justify the choice of growth factors, determine the vector of changes for them and propose a way to assess the impact of these changes on GDP.

#### REFERENCES

- [1] Y. Sun, Y. Chen, W. Wu, "Short-term success and long-term failure? The case of GDP growth targets and corporate innovation," *Pacific-Basin Finance Journal*, 2024, 102308, ISSN 0927-538X, <https://doi.org/10.1016/j.pacfin.2024.102308>.
- [2] M. H. Nasir, S. Zhang, "Evaluating innovative factors of the global innovation index: A panel data approach, *Innovation and Green Development*," Volume 3, Issue 1, 2024, 100096, ISSN 2949-7531, <https://doi.org/10.1016/j.igd.2023.100096>.
- [3] R. Hilmawan, Y. Aprianti, R. Yudaruddin, R. Fenty, A. Bintoro, Suharsono, Y. Fitrianto, N. Wahyuningsih, "Public sector innovation in local government and its impact on development outcomes: Empirical evidence in Indonesia," *Heliyon*, Volume 9, Issue 12, 2023, e22833, ISSN 2405-8440, <https://doi.org/10.1016/j.heliyon.2023.e22833>.
- [4] B. Dauletbakov, E. Levner, (2014). Multi-attribute Classification of Text Documents as a Tool for Ranking and Categorization of Educational Innovation Projects. In: Gelbukh, A. (eds) *Computational Linguistics and Intelligent Text Processing. CICLing 2014. Lecture Notes in Computer Science*, vol 8404. Springer, Berlin, Heidelberg. [https://doi.org/10.1007/978-3-642-54903-8\\_34](https://doi.org/10.1007/978-3-642-54903-8_34)
- [5] Bureau of National Statistics of the Strategic Planning and Reform Agencies of the Republic of Kazakhstan. <https://stat.gov.kz/ru/industries/social-statistics/stat-edu-science-inno/dynamic-tables/>

# How to assess the quality of information services?

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## Abstract

Based on the analysis of existing methodological approaches to assessing the quality of information and information services, a new methodological approach, based on taking into account aspects of quality of the information and the process of its provision through various means is proposed. These means include television, radio, newspapers, magazines, newsletters and other printed publications, as well as the Internet.

**Key words:** information, information services, information services sector, methodological approach, quality, quality assessment, survey.

There are various methodological approaches to assessing the quality of information services. The assessment is carried out on the basis of taking into account certain properties and aspects inherent in information and information services. Such properties include relevance, accessibility, accuracy, reliability, timeliness, interpretability, representativeness, completeness, comparability, etc. In addition, in these cases, the quality of information and information services provided by libraries, information centers, the quality of electronic information services, of information services provided by certain organizations, etc. is assessed. [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11] However, assessing the quality of information services in the context of the development of the country's information services sector requires a slightly different approach – information services provided for commercial purposes throughout the country as a whole must be taken into account. In other words, when assessing the quality of a country's information services, one should evaluate the quality of services that are provided via television, radio, and in various printed media, which include books, newspapers, magazines, newsletters, etc. You also need to take into account the quality of electronic information services provided by local news agencies, etc. This approach to assessing the quality of information services in the country, being the most correct in the context of the development of the information services sector, will allow us to make specific proposals in the future.

Undoubtedly, speaking about which aspects should be addressed when assessing the quality of information services provided by a particular means of their provision, it should be taken into account that there are some of them that are common. However, there are also aspects that are specific to each means of their provision. That is why it is recommended to assess the quality of information services, first dividing them by type of means of their provision. It should also be noted that quality assessment should cover both aspects characterizing the quality of the information itself, and aspects that allow us to judge the quality of the information services provision process.

So, the following aspects of the quality of information services provided through local television and radio channels should be highlighted: relevance of information, its completeness, brevity, usefulness, correspondence to reality, accessibility of language, professional preparedness of persons providing information, as well as image and sound quality.

The following aspects of quality can be identified in information services provided in printed publications: relevance, completeness, brevity, usefulness, correspondence to reality, literacy of texts, accessibility of language and the level of professionalism of the authors of materials.

When assessing the quality of electronic information services, it is important to take into account the relevance of the information, its completeness, brevity, usefulness, correspondence to reality, literacy of electronic texts, language accessibility, and the professionalism of the persons providing the information. The frequency of updating information, the speed of provision of information services and the security of the resource should also be assessed.

The assessment should be carried out by survey, since the quality of provided information services can be judged based on the opinions of their consumers.

So, questions about assessing the quality of information services provided through various means of their provision should involve the problem of:

- relevance of local electronic information; of information provided by local television and radio channels; of information in local print media;
- completeness (sufficiency) of local electronic information; of information provided by local television and radio channels; of information in local print media;
- brevity (without distraction to unimportant details) of local electronic information; of information provided by local television and radio channels; of information provided in local print media;
- usefulness for the consumer of local electronic information; of information provided by local television and radio channels; of information published in local print media;
- compliance of local electronic information; of information provided by local television and radio channels; of information published in local print media, with reality (its reliability);
- accessibility of provision language of the local electronic information; of information provided by local television and radio channels; of information published in local print media;
- the level of professionalism of persons providing electronic information (for example, authors of e-materials); of persons providing information on local television and radio channels; of authors of materials published in local print media;
- literacy of compiled local e-texts; of texts published in local print media;
- quality of image and sound on local television and radio channels;
- frequency of updating local electronic information;
- speed of provision of local electronic information services (response speed of local websites to requests for e-information);
- security of local resources used in the consumption of electronic information services (cyberspace security).

## Conclusions

When assessing the quality of information services of a particular country in the context of the development of the information services sector in it, it is proposed to take into account aspects of the quality of these services provided on a commercial basis through all means of their provision (through local television and radio channels, local newspapers, magazines, newsletters and other printed publications, as well as those provided in electronic form). When assessing, both the quality of the information produced and the quality of the information services provision process should be taken into account. Assessing the quality of information services is possible by conducting a survey. Based on its results, it will be possible to draw certain conclusions and make recommendations on improving the quality of information services in order to develop the information services sector in the country.

## Bibliography

1. Информационное агентство «Республика». Оценка качества информационных услуг. URL: <https://rk.karelia.ru/otsenka-kachestva-informatsionnyh-uslug/>
2. Критерии оценки качества официальной статистической информации // Медицинская статистика и оргметодработа в учреждениях здравоохранения. 2019. №9. URL: [https://управление-здоровоохранением.пф/publ/medicinskaja\\_statistika/kriterii\\_ocenki\\_kachestva\\_oficialnoj\\_statisticheskoj\\_informacii/28-1-0-1081](https://управление-здоровоохранением.пф/publ/medicinskaja_statistika/kriterii_ocenki_kachestva_oficialnoj_statisticheskoj_informacii/28-1-0-1081)
3. Laumer, S., Maier, C., T.Weitzel. Information quality, user satisfaction, and the manifestation of workarounds: a qualitative and quantitative study of enterprise content management system users // European Journal of Information Systems. 2017. Volume 26, Issue 4. URL: <https://www.tandfonline.com/doi/full/10.1057/s41303-016-0029-7> DOI: [10.1057/s41303-016-0029-7](https://doi.org/10.1057/s41303-016-0029-7)
4. Evaluating the quality of online information / University of Wollongong. URL: <https://www.uow.edu.au/student/learning-co-op/finding-and-using-information/evaluating-the-quality-of-online-information/>
5. В Азербайджане утверждено решение о показателях качества интернет-услуг / Trend News Agency. URL: <https://www.trend.az/business/it/3845993.html>
6. Asogwa, B.E., Asadu, B.U., Ezema, J.U., etc. Use of SERVQUAL in the Evaluation of Service Quality of Academic Libraries in Developing Countries // Library Philosophy and Practice (e-journal). 2014. 1146.  
URL: <https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=2947&context=libphilprac>
7. Pitt, L.F., Watson, R.T., Kavan, C.B. Service Quality: A Measure of Information Systems Effectiveness. MIS QUARTERLY. 1995. Vol. 19, No 2. Pp. 173-187. URL: <https://www.jstor.org/stable/249687>
8. Klementova, J., Zavadsky, J., Zavadska, Z. The measurement and evaluation of the service quality through customers' satisfaction / Procedia Economics and Finance. 2015. 26. Pp. 126-130. URL: [https://www.researchgate.net/publication/283954612\\_The\\_Measurement\\_and\\_Evaluation\\_of\\_the\\_Service\\_Quality\\_through\\_Customers'\\_Satisfaction](https://www.researchgate.net/publication/283954612_The_Measurement_and_Evaluation_of_the_Service_Quality_through_Customers'_Satisfaction) DOI: [10.1016/S2212-5671\(15\)00893-X](https://doi.org/10.1016/S2212-5671(15)00893-X)
9. Темеров, Т.В. Проблема оценки качества информации и эффективности ее использования // E-Scio. 2019. №6(33). URL: <https://cyberleninka.ru/article/n/problema-otsenki-kachestva-informatsii-i-effektivnosti-ee-ispolzovaniya>
10. Исаев, Г.Н. Предпринимательство в информационной сфере. 2017. URL: [https://bstudy.net/622372/ekonomika/pokazateli\\_kachestva\\_informatsionnoy\\_produktsii\\_uslug](https://bstudy.net/622372/ekonomika/pokazateli_kachestva_informatsionnoy_produktsii_uslug)
11. Philip, G. Hazlett, S. Evaluating the service quality of information services using a new "P-C-P" attributes model // International journal of quality & reliability management. 2001. URL: <https://www.emerald.com/insight/content/doi/10.1108/EUM000000006070/full/html>

# EFFECTIVE MANAGEMENT OF WORKING CAPITAL IN DOMESTIC COMPANIES: METHODS AND PRACTICAL RECOMMENDATIONS

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**Abstract.** Currently, Working capital management is becoming a key aspect of financial strategy for enterprises in a rapidly changing economic environment. This text examines the relevance of the problem of working capital management in modern business, the specifics of its optimization and the impact on the financial condition of companies. In a rapidly changing economic environment, effective working capital management is becoming a key element of an enterprise's financial strategy. Optimized inventory levels prevent cost overruns and reduce the risk of product obsolescence. Effective management of accounts receivable and accounts payable affects liquidity and ensures a stable financial condition. In addition, in the context of globalization and accelerated pace of technological development, companies face increasing uncertainty. Skillful working capital management allows enterprises to flexibly and adapt to changing market conditions, reducing financial risks and ensuring stability. Using the example of three large domestic companies - Kazchrome, KazMunaiGas and KEGOC, various aspects of working capital management are studied, including accounting for cash, receivables and payables, inventories and the time value of finished products. The paper also provides a comparative analysis of the effectiveness of working capital management in these companies over the past three years.

**Key words:** Working capital, effective management, financial strategy, relevance, financial risks, adaptation, liquidity, globalization and technological development, stability, management strategies, competitiveness

## Introduction

**Relevance:** today, working capital plays an important role in the issue of profitability of any business. Controlling the change in cash flow, maintaining it normally, led everyone to the principle of working capital management. In the context of constant changes in the economic market, uncertainty of the external situation and increasing competition, the problem of

working capital management has become more complicated. Therefore, in order to reduce financial risks and ensure stability, enterprises are adapting to changes associated with effective working capital management. In this way, we can see how urgent the problem is.

In a rapidly changing economic environment, effective working capital management becomes the main element of the financial strategy of the enterprise. Optimized inventory levels prevent overspending and reduce the risk of goods becoming obsolete. Effective management of receivables and payables affects liquidity and ensures a stable financial position.

At the same time, in the context of globalization and the accelerated pace of technological development, companies face an increase in uncertainty. Skillful working capital management allows businesses to be flexible and adaptable to changing market conditions by minimizing financial risks and ensuring stability.

Thus, in modern business, the relevance of the topic of working capital is emphasized by the need to develop sustainable strategies for managing financial resources in order to achieve long-term success and growth of the enterprise.

Research problem (question): What is working capital? Why do companies need it?

The purpose of the general study: to analyze the mechanisms of its management by considering the general situation in working capital.

Responsibilities:

- Cash in the course of working capital management;
- Accounts receivable in the course of working capital management;
- Inventories in working capital management;
- Determination of the temporary cost of finished products;
- Analysis of the state of a particular domestic company over the past 3 years;

The subject of the study is domestic companies of the Republic of Kazakhstan.

## 1. Working capital management by Kazchrom

Kazchrom focuses on effective working capital management. As a company engaged in the production of ferroalloys of chromium, Silicon, manganese of different grades, it controls the distribution and return of assets.

Table 1. Assets, including current assets (thousand tenge)

Current assets	30.09.2021	30.09.2022	30.09.2023
Inventory	124 255 508	195 874 708	206 803 594
Trade and other receivables	187 449 758	302 758 854	234 414 697
Loans issued	58 254 966	179 824 737	6 606 457
Current income tax prepayments	100 878	77 423	20 435 708
Cash and its equivalents	178 887 950	136 059 583	16 060 423
Other	65 962	86 926	35 490
Total	549 015 012	814 682 231	484 356 369

Note: details kase.kz taken from the official website.

If we look at the data presented in Table 1, the indicators of current assets for three years are considered. According to 9-month data, the highest indicator of the total current assets of the company was in 2022. In the same period, in 2022, the company's net profit increased by 11.8% compared to the previous year. The profit of the mining company for the year increased by 200 million tenge and reached 1.3 trillion tenge. We can conclude that the increase in current assets is associated with this reason.

To consider or control the effectiveness of working capital in general, it is necessary to conduct a number of calculations, studies. Thus, we will use the following formulas to determine some aspects of kazchrom's working capital management.

Working capital efficiency management indicator:  $K_0 = P_n / CO$

Including:  $P_n$  - the volume of products sold;

$CO$  – average balance of working capital.

Working capital loading ratio:  $K_3 = CO / P_n$

Table 2. Working capital management (thousand tenge)

Indicator	30.09.2021	30.09.2022	30.09.2023
Profit	741 028 426	1 020 928 800	767 170 776
Working capital	549 015 012	814 682 231	484 356 369
$K_0$	741028426/549015012= 1,35	1020928800/814682231=1,25	767170776/484356369=1,58
$K_3$	549015012/741028426=0,74	814682231/1020928800=0,79	484356369/767170776=0,63

Note: details kase.kz taken from the official website.

As we can see in Table 2, the turnover of working capital for 9 months in 2023 was equal to 1.58. In 2022, the turnover was 1.25, lower than in the 3rd period.

The amount of working capital was spent on 1 tenge of products sold in 2021, 0.74 in 2022, 0.79 in 2023, and 0.63 in 2023. The lower the working capital loading ratio, the more efficiently it is used.

Next, it is necessary to calculate how long the working capital for the reporting period will return. To do this, we use the following formula.

Duration of one round:  $T = D / Co$

Including:  $D$  - the number of days. [7]

Table 3. Duration of working capital turnover

Duration of one lap	$T = D / K_0$ Including: $D$ - the number of days	30.09.2021	30.09.2022	30.09.2023
		$T = 270 / 1,35 = 200$	$T = 270 / 1,25 = 216$	$T = 270 / 1,58 = 171$

Note: the data is compiled by the authors.

As we found out in Table 3, for the 9-month reporting period, our working capital will move for 200 days in 2021, 216 days in 2022, and 171 days in 2023. The fastest lap duration

was reflected in the last 2023.

## 2. Working Capital Management by KazMunayGas

KazMunayGas is the national oil and gas company of Kazakhstan, which occupies a key position in this industry. The company carries out activities in the field of exploration, production, transportation and processing of hydrocarbons. Its strategic importance for the country's economy is emphasized by the importance of the energy sector for Kazakhstan.

In the context of cash management, KazMunayGas, like many companies in the industry, faces challenges and strives for an effective approach. One of the main elements of money management tactics is the optimization of working capital. The company strives to maintain a minimum level of inventory, effectively manage accounts receivable and optimize payment deadlines for suppliers.[2]

KazMunayGas also actively uses financial instruments to manage risks and ensure cash flow stability. This involves the use of derivatives to protect against fluctuations in oil and gas prices, which may affect the financial results of the company.[3]

An important element of money management tactics is accounting for inflation. KazMunayGas may use strategies aimed at protecting its financial resources from the effects of inflation, which may include investments in instruments that are well protected from inflation, or the use of financial instruments capable of compensating for losses caused by inflation.[4]

All these measures are taken in order to ensure the stability of the financial condition of the company, its effective development, investment in new projects and the possibility of maintaining competitiveness in conditions of a dynamic energy market.

Table 4. Cash flows from operating debt

<b>Current assets</b>	2023	2022	2021
Changes in VAT for reimbursement	22.638 млн.тг.	7.484 млн.тг.	56.955 млн.тг.
Changes in inventory	75.000 млн.тг.	104.690 млн.тг.	90.457 млн.тг.
Changes in trade receivables and other short-term assets	205.077 млн.тг.	103.647 млн.тг.	69.109 млн.тг.
Changes in trade and other accounts payable and liabilities under contracts concluded with buyers	131.118 млн.тг.	18.365 млн.тг.	324.479 млн.тг.
Changes in other taxes	56.450 млн.тг.	14.915 млн.тг.	8.137 млн.тг.

Note: kmg.kz

If we look at the data presented in Table 4, the indicators of current assets for three years are considered. According to 9-month data, the highest indicator of the total current assets of the company was in 2023.

Table 6. Working capital management

Indicator	2023 жыл	2022 жыл	2021 жыл
Profit	948 993 000	1 162 026 000	1 002 798 000
Working capital	550 994 409	654 455 476	548 436 366
$K_0$	948 993 000/ 550 994 409=1,72	1 162 026 000 / 654 455 476=1,71	1 002 798 000 / 548 436 366=1,82
$K_3$	550 994 409/948 993 000=0,58	654 455 476 / 1 162 026 000=0,56	548 436 366/ 1 002 798 000=0,54

Note: kmg.kz

As we can see in Table 6, the turnover of working capital for 9 months in 2023 was equal to 1.72. In 2022, the turnover was 1.71, lower than in the 3rd period. The amount of working capital was spent on 1 tenge of products sold in 2021, 0.54 in 2022, 0.56 in 2023, and 0.58 in 2023. The lower the working capital loading ratio, the more efficiently it is used.

Table 7. Duration of working capital turnover

Duration of one lap	$T = D/K_0$ Including: D- the number of days	30.09.2021	30.09.2022	30.09.2023
		$T=270/1,82=148$	$T=270/1,71=157$	$T=270/1,72=156$

Note: the data is compiled by the authors.

As we found out in Table 7, for the 9-month reporting period, our working capital will move for 148 days in 2021, 157 days in 2022, and 156 days in 2023. The fastest lap duration was reflected in 2022.

### 3. KEGOC company working capital management

KEGOC 2021-2023 in between, it showed dynamic changes in its financial structure, marked by positive and negative trends. During this period, the company's assets decreased, and its non-current assets also decreased in line with fixed assets. Current assets, on the contrary, increased, as well as in the segment of trade receivables and other financial assets. As a result of the increase in short-term liabilities, the share of long-term liabilities remained high.

Table 8. Assets, thousand tenge [1]

	2021	2022	2023	Өзгеріс
Non-current assets	997 044 761	873 932 789	876 701 837	-12%
Fixed assets	948 863 452	859 129 917	857 302 568	-10%
Intangible assets	2 899 418	3 453 791	3 134 208	-6%
Investment in an associate company	2 631 874	2 747 455	2 717 129	3%
Long-term receivables of related parties	545 465	514 613	416 733	-24%
Current assets	60 105 125	112 679 400	105 522 664	76%
Foundation	3 061 273	3 207 155	3 896 553	27%
Trade receivables	22 769 593	21 047 390	30 150 708	32%
All assets	1 057 886	986 612 189	982 224 501	-7%

**Note:** details are taken from the official website of "KEGOC"

According to the preliminary financial report for 2023, the company's assets amounted to млн 982,224 million. it decreased to tenge, which decreased by 7% compared to the same period last year. This decrease is 876,702 million. it can be seen that reaching the tenge led to a decrease in non-current assets by 10%[8].

Table 9. Working Capital Management (Mn TG)

Indicator	30.09.2021	30.09.2022	30.09.2023
Profit	56 767 548	80 678 722	38 169 789
Working capital	1 759 821	31 208 604	18 778 348
$K_0$	56 767 548/1759 821=1,32	80678 722/31 208 604=1,25	38 169 789/18 778 348=1,23
$K_3$	17 59821/56 767 548=0,3098	31 208 604/806 787 22=3,8449	18 778 348/38 169 789 =0,4919

As can be seen in Table 9, the levels of the 3rd stage are relative. In terms of profit and current assets, the profit indicator is between 32.234 and 2.0326, in terms of turnover between 0.3098 and 0.4919. Sold products 1 tenge- 2021-0,3098,2022-3,8449,2023- 0,4919 as you can see, a decrease in the coefficient of working capital management creates efficiency.

Table 10. Duration of working capital turnover

Бір айналым ұзақтығы	$T = D/K_0$	30.09.2021	30.09.2022	30.09.2023
	Оның ішінде: Д – күндер саны	$T=270/1,32=204,5$	$T=270/1,25=216$	$T=270/1,23=219,5$

In Table 10, the duration of one turnover is determined by the 9-month report 2021-204,5 2022-216,2023-219, 5 reflection. The longest turnover indicator is turnover in 2023.

#### 4. Comparative analysis

A comparative analysis is carried out to determine the type of asset financing for kazchrom, KEGOC, and KazMunayGas companies.

Table 11. Asset financing policy (thousand tenge)

Kazchrom company	KazMunayGas company	KEGOC company
Long-term liabilities: 1 101 776 539	Long-term liabilities: 14 111 864 000	Long-term liabilities: 876 701 837
Short-term liabilities: 226 544 477	Short-term liabilities: 3 488 227 000	Short-term liabilities: 54 490 538
Capital: 303 524 897	Capital: 655 000 000	Capital: 33 049 230
CO; SK+DO 226,544,477; 1,101,776,539+303,524,897=1,405,301,436 Total: 1,631,845,913 CU=13.8% SK+DO=86.2%	CO; SK+DO 3 488 227 000; 14 111 864 000+655 000 000=14 766 864 000 Total: 14,766,864,000 CU=23.6% SK+DO=76.4%	CO;UK+UP TO 54,490,538; 876 701 837+33 049 230=909,751 067 Crowds:108 ,981,986 KO=14% SK+UP TO=85.3%
Adheres to a conservative policy in asset financing	Adheres to a conservative policy in asset financing	Adheres to a conservative policy in asset financing

Note: the data is compiled by the authors.

It was found that kazchrom adheres to a conservative principle in asset management. That is, the company provides a high level of financial stability. But increases the cost of equity for financing [5].

According to KEGOC's preliminary financial report for 2023, the company's assets amounted to млн 982,224 million. it decreased to tenge, which decreased by 7% compared to the same period last year. This decrease is 876,702 million. this led to a decrease in non-current assets by 10%.

## Conclusion

For some enterprises, the correct management of working capital can cause difficulties. Basically, we are convinced that effective working capital management is a strategically important element that leads corporations to financial stability and high competition. Thus, we would like to present a number of proposals related to working capital raising:

1. through the introduction of new methods of financial monitoring, it is possible to increase the accuracy of performance assessment and increase the adoption of strategic decisions
2. Inventory Optimization: keep track of inventory levels to avoid excess or shortage of goods. This helps to use working capital more efficiently.
3. despite the decrease in assets and capital due to a number of factors, such as a reduction in non-current assets and a change in the asset revaluation reserve, the company must achieve an increase in net income and effective management of financial risks
4. stable cash flow indicators and the assessment of the FIU are at a level that allows you to count the risks of default on coupon payments at a low level.
5. improve the efficiency of processes: optimize business processes to reduce costs and accelerate capital turnover, which contributes to more efficient use of resources.

In conclusion, it should be noted that effective working capital management is a key factor in financial stability and successful operation of the enterprise. Understanding and active management of inventory, receivables and payables, as well as optimizing business processes allow the company to make the most of its resources.

A decrease in inventory, an improvement in payment terms and active interaction with suppliers and customers contribute to a decrease in the time of capital turnover. Proper credit management helps prevent financial risks and ensures liquidity stability.

Ultimately, the working capital management strategy must be carefully adapted to the specific specifics of the business. Constant monitoring and analysis of financial indicators allows the company to promptly respond to changes in the economic environment and maintain an optimal level of working capital in order to achieve financial stability and growth.

## Literature

1. Айналым капиталын басқару саясаты <https://cyberleninka.ru/>
2. «Kase.kz» ресми сайты <https://kase.kz/ru/issuers/KZCR/#g3y2023>
3. ҚазМұнайГаз компаниясының 2021 жылғы отчеты [Финансовые результаты деятельности 9М 2021.pdf \(kmg.kz\)](#)
4. ҚазМұнайГаз компаниясының 2022 жылғы отчеты [9M2022 FS RUS KMG Conso signed.pdf](#)
5. ҚазМұнайГаз компаниясының 2023 жылғы отчеты [9m23\\_FS RUS\\_KMG Conso.pdf](#)
6. АО Кегос ресми парақшасы. [URL:https://www.kegoc.kz/ru/corporate-governance/shareholder/](https://www.kegoc.kz/ru/corporate-governance/shareholder/)
7. Оқу құралы «Фирмалар Қаржысы», Купешова Б.Қ. 2016 ж, 202 бет <https://www.litres.ru/book/bayan-kupeshova/firmalar-k-arzhysy-26536892/>
8. АСКАРОВА Б.Т.1, УМИРЗАК А.А.Ы.1, КУПЕШОВА Б.К.1 , ҚАЗАҚСТАН РЕСПУБЛИКАСЫНЫҢ АҚША НАРЫҒЫ <https://elibrary.ru/item.asp?id=44851285>

# Тенденции в изменениях образовательных проектов на фоне экономического кризиса

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**Аннотация.** В данной статье рассматриваются и анализируются современные тенденции, которые наблюдаются в образовательных проектах и образовательных процессах, которые развивались в период или незадолго после пандемии с целью оценки из воздействия и сфер применения в условиях экономического кризиса. Это изменения в основном технологического характера, новые способы и инструменты, которые набрали популярность в последние годы.

**Введение.** Вопрос устойчивости образовательных процессов стал наиболее актуальным в последние годы. Пандемия COVID-19 серьезно повлияла на привычный ход вещей, нарушив стандартные процессы взаимодействия как на организационном, так и на индивидуальном уровнях. Особенно остро эта тема стоит из-за возможных социально-экономических проблем, которые могут быть вызваны различными факторами в будущем. Появился запрос на внедрение инновационных средств для того, чтобы сделать образовательные проекты более устойчивыми и доступными для большинства.

Реформы и изменения в системе, вызванные необходимостью, характеризовались хаотичностью и изменчивостью. Для преодоления последствий кризиса многие образовательные учреждения обратились в основной массе к услугам различных информационно-коммуникационных технологий. В частности, это касается ресурсов, которые предоставляют возможность настраивать онлайн-конференции, а также массовым образовательным онлайн курсам (МООК). Первые призваны заменить собой традиционные встречи “лицом к лицу”, предоставляя возможность живого общения и контроля в реальном времени. Вторые использовались еще до пандемии, однако получили новую волну востребованности ввиду своего удобства для размещения обучающих материалов.

Однако, в ходе обучения были выявлены множественные проблемы, которые зачастую были связаны с двумя факторами: техническая обеспеченность и техническая грамотность. Первый фактор оказал влияние преимущественно на студенческий состав - для полноценного участия в процессе обучения были необходимы стационарный компьютер или ноутбук, и периферийные приборы (веб-камера и микрофон), а также стабильное интернет-соединение. Основной проблемой стал интернет, поскольку различное географическое положение учащихся и используемый интернет-провайдер были крайне различны. А учреждения образования предоставить технические средства для связи могли далеко не всем. Второй фактор касался всех - как преподавательского состава, так и студенческого. Из-за отсутствия опыта постоянным пользованием подобными ресурсами в прошлом, возникали проблемы во многих процессах (1).

Образовательные проекты стремятся к инновациям, однако далеко не всегда проходят всеобъемлющий процесс их интеграции. Если организационно проводится необходимый объем работ, то остается открытым вопрос технической оснащенности и обучения персонала. Существующие проблемы, тем не менее, не являются критическими для распространения цифровизации в образовательных проектах.

Целью данного исследования является изучение возможностей современных инновационных технологий и методик, которые имеют потенциал увеличить устойчивость образовательных проектов в период экономических кризисов.

Возможности интеграции инновационных методик и технологий в области образования изучались во многих научных трудах. Однако, они в основном концентрировались на образовании в целом, придавая организационной стороне вопроса мало внимания.

Теоретическая значимость данного исследования заключается в изучении научных трудов, посвященных вопросу внедрения инновационных аспектов в образовательную деятельность. Данная работа позволяет обобщить опыт как отечественных, так и зарубежных исследований и представить общие черты и характеристики.

Практическая значимость данной работы представляется в создании теоретической базы, на основе которой могут быть проведены практические исследования в дальнейшем, расширяя обозреваемые вопросы.

**Литературный обзор.** Существует много различных научных работ, которые рассматривают инновации в образовательном процессе. Исследовательская работа, проведенная интернациональной командой, рассматривает возможности применения технологий виртуальной реальности (VR) и дополненной реальности (AR). Изучаются самые разные стороны вопроса, начиная от психологического здоровья заканчивая аспектами кибербезопасности. Обозреваются положительные, отрицательные стороны, а также риски, связанные с глубокой цифровизацией технологий (2).

Отечественные ученые также изучали возможности использования технологий дополненной реальности в связке с мобильными приложениями в рамках изучения физики. Работа показывает, что подобная наглядность в обучении подобных технических дисциплин положительно сказывается на обучаемости, поскольку при изучении сразу визуализируется принцип работы их в жизни (3)

Статья мексиканских исследователей затрагивает вопрос использования онлайн-площадок для организации конференций, приспособляемость студентов Университета Веракруса к новой реальности образовательного процесса. Работа построена на эксперименте с использованием Zoom и приложением для коммуникации и создания общего образовательного пространства Eminus (4).

Работа индонезийского исследователя рассматривает вопрос менеджмента человеческих ресурсов на всех уровнях образовательного процесса. В ней заложена идея, что эффективная работа с кадрами, применения персонализированного подхода и создание созидательной среды создает конкурентное преимущество. Имплементация такого подхода может значительно улучшить положение любого образовательного проекта на фоне других, особенно в период экономического кризиса, когда взвешивается каждый фактор (5).

Схожая тема исследуется в работе отечественных ученых, которые рассматривают этот вопрос уже на основе ресурса, предоставляющего возможность проходить онлайн курсы. При этом присутствует инструментарий, который позволяет создавать адаптивные задачи для студентов. Применение такого подхода привело к увеличению удовлетворенности от персонализированных курсов в сравнении с обычным курсом (6).

Подобное же исследование также было проведено отечественными учеными, однако с несколько иными результатами. В ней изучалась работа Moodle LMS в рамках адаптивного обучения. И хотя положительные стороны выделяются схожие, также отмечают и негативные стороны - сложность имплементации в сравнении с традиционными методами образования и малая ценность в плане практичности получаемых знаний (7).

Развитие информационно-коммуникативных технологий привлекло немалое внимание на отечественном рынке знаний. Исследование готовности преподавателей к

использованию ИКТ в своей работе было специализирована под цели изучения инклюзивного образования, однако их выводы могут быть использованы и в рамках темы, рассматриваемой в данной работе (8).

Работа американских исследователей рассматривает проблемы управленческого характера в период “локдауна” в образовательных учреждениях штата Иллинойс. В ней отмечаются как положительные, так и отрицательные стороны опыта взаимодействия в организационной структуре. Несмотря на попытки поддержания постоянных коммуникационных каналов и вводились изменения в принятие стратегических решений возникали проблемы по нескольким направлениям: администрации некоторых заведений были слишком медлительны и осторожны, не вводя изменений в процесс; те же, кто полностью принял принцип открытости, зачастую сталкивались с перегрузками, когда решения принимались чрезмерно долго и не могли похвастаться гибкостью в управлении (9).

**Методы.** Для того, чтобы исследовать новые тенденции, которые происходят в сфере образовательных проектов и образования в целом, потребуется ознакомиться с рядом литературных источников. Касается это в первую очередь научных статей, которые посвящены использованию новых технологий, методик или организационных изменениях в образовательной среде.

**Результаты.** Одним из наиболее популярных и востребованных направлений в вопросе инноваций в образовании являлись интернет-ресурсы. В первую очередь это касалось массовых открытых онлайн курсов (МООК), которые могли бы предоставить более гибкий процесс обучения для каждого индивидуального обучающегося. Предоставление студентам большей свободы в выборе изучаемых дисциплин воспитывает в них большую самостоятельность, а также гарантирует высокую эффективность обучения ввиду индивидуальных предпочтений. Это положительно скажется на их конкурентоспособности, что в дальнейшем может помочь в преодолении кризисного периода посредством повышения качества теоретических и практических знаний на рынке труда. Одновременно с этим они оказываются удобными для наиболее широкой прослойки населения, поскольку не требуют серьезных вкладов в техническое обеспечение с обеих сторон - на данный момент существует множество зарекомендовавших себя порталов, предоставляющих инструментарий для создания подобных курсов. Со стороны студентов же требуется только мобильное устройство и интернет-соединение, бесплатность курсов снимает потребность в дополнительных финансовых вложениях (10).

Более технологичное решение, которыми являются технологии VR и AR, в области образовательных проектов имеют ряд преимуществ и недостатков. Со стороны качества они могут предоставить больше возможностей для обучения, объединяя преимущества дистанционного образования, но не отрывая обучающихся от коллектива. Однако, главной проблемой является дороговизна - обе технологии на коммерческом рынке относительно недавно и для их применения нужны значительные капиталовложения. И если технологии дополненной реальности могут быть удешевлены, с соответствующим падением качества, то виртуальная реальность требует не только специфического оборудования, но и мощных процессорных мощностей. И в ситуации ограниченности ресурсов лишь часть от общих технологических решений в области могут быть имплементированы до разработки широко применяемых аналогов с тем же функционалом, но без серьезных материальных требований.

В условиях кризиса одним из наиболее острых вопросов становится конкурентность рынка. Поскольку ресурсы в данных обстоятельствах как у государства, так и у организаций и предпринимателей ограничены, идет переориентирование на полностью качественный набор кадров, что приводит к повышению конкуренции на рынке. Это может

способствовать к ухудшению положения наиболее уязвимых слоев населения, приводя к повальной безработице. Поэтому в вопросе реакции и инновации важно учитывать и их возможности чтобы не допустить ухудшения положения населения. И желательно не доводить к обострению конкуренции, формируя систему и взаимопомощи, выравнивая качество человеческого капитала. Этого можно добиться с помощью вкладов в образование, повсеместное расширение возможностей поступлений в учебные заведения и получения знаний в режиме онлайн. Этого добиться увеличением количества образовательных и исследовательских грантов и в целом всесторонней финансовой поддержкой образовательных учреждений (11).

Но если ресурсы значительно ограничены, то ситуацию можно решить переориентированием образовательных учреждений от долгосрочных курсов в пользу краткосрочных курсов с ориентацией на непосредственно актуальные проблемные зоны с возможностью междисциплинарного изучения. Это позволит не только сократить образовательный цикл и быстро наполнить рынок необходимыми кадрами, но и даст дополнительные возможности для более эффективной реорганизации бюджета.

При этом нельзя забывать о разностороннем развитии населения, чтобы они могли участвовать в различных сферах экономической и социальной жизни страны. В условиях кризиса в людях нужно воспитывать не только сугубо научные знания, но и поддерживать развитие их социальных навыков - повышать их способность к проявлению инициативы, поиску возможностей улучшения, лидерству и работе с конфликтами. В современном мире невозможно перестроить общество сугубо действиями государственного регулирования. Важно предоставить населению возможность к саморегулированию, чтобы они могли лучше приспособиться к своему индивидуальному положению. Гибкие структуры тяжелее привить студентам и организовать, особенно в образовательной сфере, поскольку она является одной из наиболее регулируемых в государственном управлении (12).

Но нужно помнить что всегда есть и инициатива от частных предпринимателей, чьи платформы для образования с гарантиями трудоустройства получили широкую огласку в период пандемии. С одной стороны — это идеальный пример адаптивности, когда люди видя спрос внесли свой вклад. Также они оказались фактором в популяризации дистанционного образования для широкой аудитории. С другой, есть риски, поскольку такие платформы больше направлены на практическое применение в конкретном направлении и курсы ведутся практиками, что может повлиять на общее формирование системы знаний студента. А недостаток контроля и регулирования легко может породить “дыру”, в которой будут формироваться мошеннические схемы.

Все вышеописанное ведет к тому, что качественное изменение образовательных проектов должно происходить на всех уровнях. Но в первую очередь, преподавательский состав и управление образовательных предприятий, как главные акторы на данном рынке, должны стать готовыми к изменениям. Поскольку кризис становится катализатором к изменениям, именно от них зависит эффективность реагирования. Происходят фундаментальные изменения - появляется больше технологических возможностей для всестороннего развития, а главным трендом стало уход инициативы в обучении от учителей и образовательных учреждений в сторону учащихся. Но из-за достаточно медленной “смены поколений” и роста возрастных людей в сфере эти изменения не внедряются своевременно, а эффективность снижается из-за недостатка цифровой грамотности, формированием которой многие учреждения не занимаются.

Образовательные проекты в данном случае выступают небольшой возможностью для маневра, которая позволяет одновременно привлечь новую аудиторию и опробовать новые форматы обучения, которые имеют потенциал повсеместного использования. И в данной сфере нет строгих ограничений, что позволяет университетам и компаниям привлекать

сторонних спикеров и преподавательский состав. Также это полезно для развития сотрудничества между университетами и их партнерами, новыми или старыми, послужить площадкой для передачи знаний.

**Выводы.** Экономический кризис — это не только потери, это еще и времена масштабных изменений. Пока главной целью стран и организаций становится восстановление глобального контроля над ситуацией, локально инициатива переходит к людям. Появляются инструменты и возможности, разработанные под определенные нужды, но находящие возможности глобализации. Методические и технологические решения, прежде применяемые в одной сфере, выходят за ее рамки находя практические повсеместные применения.

Изменения происходят и в людях, меняются их потребности и возможности. В этот период для них знания становятся необходимостью, потребностью, которая нуждается в удовлетворении. Рост конкуренции ведет к повышению востребованности образовательных проектов, которые могут дать хоть небольшое преимущество на рынке труда. При этом повышается спрос на качество образования и возможность персонализации, что приводит к появлению новых акторов, которые эти потребности и желания в состоянии удовлетворить.

Но эти изменения бывают чрезмерно скорыми, поэтому перед менеджментом образовательных проектов и учреждений становится колоссальная задача измениться во многих аспектах. Поэтому новую значимость приобретают организационные решения и возможности перестраивать свои процессы и встраивать инновационные методики и технологии в образовательный процесс.

### Список использованных источников

1. Ж.Б. Ахметова, Орынханова, Ж., Г.А. Сейдуллаева, & Э.И. Турсунбаева. (2023). Проблемы формирования цифровой грамотности преподавателей высших учебных заведений. Научный журнал «Вестник НАН РК», 401(1), 70–87. <https://doi.org/10.32014/2023.2518-1467.423>
2. Anwar, M. & Ullah, Inam & Ahmad, Shabir & Choi, Ahyoung & Ahmad, Sadique & Wang, Jing & Khursheed, Khursheed. (2023). Immersive Learning and AR/ VR-Based Education. 10.1201/9781003369042-1.
3. Mukhtarkyzy, K., Abildinova, G., & Bayan, K. (2023). Advantages of using mobile apps in physics lessons at school. Научный журнал «Вестник НАН РК», 402(2), 182–193. <https://doi.org/10.32014/2023.2518-1467.464>
4. Canal-Martínez, Margarita & Del Callejo, Diana & Hákim-Krayem, Mónica & Reyes-Sanchez, Carlos. (2022). Online education: Educational innovation the Integrative Project Educational Experience during the COVID-19 pandemic using the Eminus and Zoom platforms (Universidad Veracruzana). Interconectando Saberes. 10.25009/is.v0i14.2737.
5. Prasetyo, Purwo. (2024). The Role of Innovation in Human Resources Management of Higher-educational Institution.
6. Zhilmagambetova, R., Kopeyev, Z., Kusmanov, K., Kabenov, D., & Jakina, A. (2023). Personalized adaptive learning: analysis, comparison, conclusions. Научный журнал «Вестник НАН РК», 403(3), 102–113. <https://doi.org/10.32014/2023.2518-1467.496>
7. Zhilmagambetova, R., Mubarakov, A., Kopeyev, Z., & Alimagambetova, A. (2023). Management of the learning process using adaptive personalized learning systems. Научный журнал «Вестник НАН РК», 402(2), 115–122. <https://doi.org/10.32014/2023.2518-1467.458>
8. Ш.Ж. Арзымбетова, Оралбекова, А., С.Л. Махмудова, & К.И. Махмудова. (2023). Readiness of teachers to use information and communication technologies (ict) in conditions of inclusive education. Научный журнал «Вестник НАН РК», 402(2), 37–47. <https://doi.org/10.32014/2023.2518-1467.453>
9. DeMartino, Lindsay & Weiser, S.. (2021). Administrative Leadership in Times of a Global Health Crisis: Voices and Images From the Field. *Frontiers in Education*. 6. 10.3389/educ.2021.617857.
10. Zubkov, Artyom. (2023). Development of Professional Foreign Language Competence of Economics Students with MOOCs during the Pandemic. *Education Sciences*. 13. 1010. 10.3390/educsci13101010.
11. Vîrjan, D. & Manole, A. & Stanef-Puica, Mihaela & Chenic, A. & Papuc, C. & Huru, Dragos & Banacu, Cristian-Silviu. (2023). Competitiveness—the engine that boosts economic growth and revives the economy. *Frontiers in Environmental Science*. 11. 10.3389/fenvs.2023.1130173.
12. Wahl, Dario & Münch, Jürgen. (2021). Industry 4.0 Entrepreneurship: Essential Characteristics and Necessary Skills. 10.1109/ICE/ITMC52061.2021.9570258.

# “Working Capital Management” and “Corporate Governance and ESG” to analyze the effectiveness of financial resource management in the context of sustainable development and social responsibility of companies

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## Annotation

This article analyzes the impact of effective working capital management on the financial stability and growth of companies in the context of corporate governance principles and ESG aspects. Using the example of three Kazakhstani companies - Kazatomprom, Mangistaumunaigas and Zhaiykmunai- the financial indicators for the last three years were studied, as well as an analysis of the measures taken to manage working capital and comply with the principles of corporate governance and ESG. The results show that companies that successfully integrate ESG principles into their management strategy usually demonstrate more efficient use of working capital and higher financial stability. The authors identify the key factors of successful working capital management within the framework of corporate governance and ESG and offer practical recommendations for other companies seeking to improve their financial performance and comply with the principles of sustainable development and social responsibility. In modern business, working capital management is the main aspect of the financial management of the organization. Working capital is a set of funds necessary to ensure the operational activities of the company, including the purchase of raw materials and materials, the production, storage of finished products, the sale of goods and services. Working capital management is aimed at optimizing the turnover of assets and ensuring a sufficient level of liquidity for the smooth functioning of the business. In this introduction, consider the main aspects of working capital management, for example, the identification of its components, management methods and factors affecting the effectiveness of this process.

Working capital management plays an important role in the financial health of the enterprise, affecting its ability to ensure current operations and growth. The main goal of working capital management is to optimize the relationship between the current assets and liabilities of the

company in order to reduce the costs of storing assets and maximize cash flow. To do this, it is necessary to effectively manage inventory, receivables and payables, as well as assess the need for additional financing. In this introduction, we will consider the main strategies and tools for managing working capital, as well as their impact on the financial stability and competitiveness of the enterprise.

The relevance of working capital management is manifested in the context of a modern dynamic economic environment in which companies face a number of difficulties and opportunities:

1. efficient use of resources: in the face of competition and market variability, companies should strive to make the most of their resources, including working capital. Working capital management allows you to optimize processes and reduce the costs of maintaining stocks, receivables and payables.

2. ensuring liquidity: effective working capital management allows companies to ensure a sufficient level of liquidity to cover current operations and liabilities. This is especially important during periods of temporary financial difficulties or market instability.

3. improve financial stability: proper working capital management contributes to improving the financial stability of the company, reducing its dependence on external financing and liquidity deficit risks.

4. investment optimization: working capital optimization allows companies to free up funds to invest in Business Development, Research and development of new products and services, which contributes to their competitiveness and growth in the market.

All these factors indicate the importance of working capital management as the main aspect of the financial management of the enterprise in the modern economic environment.

### **1.1 the concept of corporate governance and its essence**

Corporate governance is a system of principles, policies, procedures and practices that govern the activities of a company and its interaction with various stakeholders. It includes ways to organize the management structure of companies, make strategic decisions, allocate resources and control their activities.

The basic principles of corporate governance include:

1. transparency and accountability: corporations must provide truthful and accurate information about their activities to their stakeholders, including shareholders, investors, employees and the public.

2. responsibility and independence: governing bodies, such as the Board of Directors, must act in the interests of the company and its shareholders, ensuring independence from managed structures.

3. compliance with the law and ethical standards: corporations must act in their activities in accordance with the law and high standards of ethics.

4. Equality of shareholders: all shareholders should have equal rights and opportunities to receive information about the company and influence strategic decision-making.

5. taking into account the interests of stakeholders: corporations must take into account the interests of all stakeholders, including employees, customers, suppliers and society as a whole.

6. professional competence and management efficiency: management bodies must be competent and effective in managing the company's strategic decisions and resources.

Effective corporate governance contributes to the sustainable development of the company, increasing its value, increasing investor confidence and ensuring long-term successful activities.

## 1.2 corporate governance models

There are several models of corporate governance that companies use in different countries and environments. Main models:

### 1. Anglo-American model:

- In this model, the emphasis is on the role of shareholders. The emphasis is on protecting the interests of shareholders and maximizing their profits.
- The board of Directors is the main governing body. The council usually consists of independent directors and a chairman who is not an executive head.
- This model is characterized by a high level of market orientation and flexibility in decision-making.

### 2. continental-European model:

- In this model, the emphasis is on protecting the interests of all stakeholders, including employees, suppliers and society as a whole.
- The board of directors usually consists of representatives of various stakeholders, including employees and government representatives.
- This model is characterized by a high level of Social Responsibility and participation in management.

### 3. Japanese model:

- In this model, management is often focused on long-term relationships and cooperation.
- The board of Directors is usually made up of external and internal directors who work closely with the company's management.
- A lot of attention is paid to consensus and collective decision-making.

### 4. mixed model:

- Many countries adopt a mixed approach that combines elements of different models depending on specific conditions and cultural characteristics.
- For example, some companies may include both independent directors and representatives of employees in the board of directors. These models are only general concepts, and each company can adapt its management system according to the specific needs, strategy and goals of the business.

## 2.1 ESG model

ESG is an abbreviation that stands for environmental, Social, and Governance (environmental, social, and governance) criteria. The ESG model is a system for assessing and managing sustainability and social responsibility factors that affect the activities of a company and its interaction with the environment and society.

Here is a detailed description of each of the three ESG components:

### 1. Environmental(Environmental):

- Environmental criteria assess the impact of business on the environment. This includes resource management, energy efficiency, the use of renewable energy sources, emission and waste reduction, and chemical processing.

### 2. Social (Social):

- Social criteria assess the impact of business on society and people. This includes working conditions, employee rights, public relations, participation in the local community, combating corruption, diversity and inclusion, and other aspects that affect public well-being.

### 3. Governance (Management):

- Management criteria assess the quality of corporate governance and control over the company's activities. This includes the structure of the Board of Directors, transparency of financial statements, compliance with legislation, ethical standards, the level of corporate leadership and other factors related to effective management.

The ESG model helps companies evaluate their activities taking into account a wide range of factors that can affect their reputation, risks, and cost. Integrating ESG criteria into strategy and management helps companies not only achieve financial goals, but also create long-term value for shareholders and other stakeholders and promotes sustainable development and social responsibility in business.

## 2.2 Analysis of companies on ESG

Name	MangystauMunayGas	Kazatomprom	Zhaiykmunay
Environmental factors	<ol style="list-style-type: none"> <li>1) monitoring and reduction of greenhouse gas and pollution emissions into the environment during gas production and production.</li> <li>2) introduction of energy-saving technologies and waste management to reduce the negative impact on the environment.</li> <li>3) protection of biodiversity and natural resources in gas production zones.</li> </ol>	<ol style="list-style-type: none"> <li>1) reducing carbon emissions</li> <li>2) uranium mining</li> <li>3) Energy Efficiency</li> <li>4) waste processing</li> </ol>	<ol style="list-style-type: none"> <li>1) compliance with requirements and monitoring related to emissions and pollution.</li> <li>2) Investing in renewable energy and reducing the amount of energy consumption.</li> </ol>
Social factors	<ol style="list-style-type: none"> <li>1) ensuring the safety and health of employees at the workplace.</li> <li>2) development of local communities through investments in infrastructure, education and health.</li> <li>3) respect for workers' rights and support for diversity and inclusion in the workplace.</li> </ol>	<ol style="list-style-type: none"> <li>1) employment of the population</li> <li>2) worker safety</li> <li>3) Infrastructure Development</li> <li>4) allocation of money for charitable projects</li> </ol>	<ol style="list-style-type: none"> <li>1) risk assessment, improving the professionalism and safety of employees.</li> <li>2) establishing open relations with state bodies, local communities, the population and other stakeholders.</li> </ol>
Management factors	<ol style="list-style-type: none"> <li>1) Open management and long-term strategic planning.</li> <li>2) independent audit support and ethical standards in corporate culture.</li> <li>3) Risk Management in the company's activities and compliance with legal norms and standards..</li> </ol>	<ol style="list-style-type: none"> <li>1) management structure.</li> <li>2) Corporate Policy and transparency</li> <li>3) ethical principles and compliance with norms</li> <li>4) Risk Management System</li> <li>5) Innovation and technological development.</li> </ol>	<ol style="list-style-type: none"> <li>1) setting goals and objectives that ensure the achievement of the economic goal, while maintaining environmental and social responsibilities.</li> <li>2) have an open, effective management system that regulates the activities of the Enterprise.</li> </ol>

### 3.1 working capital management of Kazatomprom

Kazatomprom is the National Atomic company of Kazakhstan, which deals with all aspects of nuclear energy and the nuclear sector. It was founded in 1997 and is one of the largest uranium producers in the world. The main goal of Kazatomprom is to ensure the energy security of Kazakhstan and its economic development by expanding activities in the field of nuclear energy, medical radiation, industrial use of nuclear energy and other related sectors. As it is a large company, it has strong control over its assets.

Table 1. Working capital management (million tenge)

Indicator	30.09.2021	30.09.2022	30.09.2023
Profit	331.311	779.547	864.613
Working capital	770.543	919.377	1.038.130
$K_0$	0,4	0,8	0,8
$K_3$	2,32	1,17	1,2

Formulas used:  $K_0 = P_n / CO$

$$K_3 = CO / P_n$$

Now it is necessary to calculate the return time of working capital. We use this formula for this:  $T = D / CO$

Table 2. Duration of working capital turnover

Duration of one lap	$T = D / K_0$ Including: D-the number of days	30.09.2021	30.09.2022	30.09.2023
		$T = 270 / 0,4 = 675$	$T = 270 / 0,8 = 337$	$T = 270 / 0,8 = 337$

The fastest lap movement that we found according to the result was in the year 23 and 22, and in 2021 it was 675 day

### 3.2 management of working capital of Mangistaumunaygas.

The company is engaged in the development, production and sale of hydrocarbons in the Mangystau region, in the west of Kazakhstan. The shareholder of the group is " Mangistau Investments B. V. " (MIBV), half of which is owned by KazMunayGas NC and China National Petroleum Company.

The ownership share belongs to Caxpyx-Kazruas (20%) and the National Bank of the Republic of Kazakhstan (10%). The Government of Kazakhstan is the sole shareholder of Samruk-Kazyna. "CNPC Exploration and Development Company LTD" is owned by "China National Oil Company" (KNNA), a state-owned enterprise of China.

The company's registry office is located in Aktau, Kazakhstan. The interim consolidated financial statements are approved by the general director and acting First deputy general director, as well as by the deputy general director for Economics and finance- chief accountant.

Table 3. Assets, including current assets (thousand tenge)

Note: details kase.kz taken from the official website.

Looking at the data provided in Table 1, you can see the indicators of current assets for three quarters of three years.

Table 4. Working capital management (thousand tenge)

Indicator	30.09.2021	30.09.2022	30.09.2023
Profit	547 770 794	694 246 932	633 549 024
Working capital	583 773 964	586 378 104	646 804 668
$K_0$	547 770 794/583 773 964=0,9	694 246 932/586 378 104=1,2	633 549 024/646 804 668=0,9
$K_3$	583 773 964/547 770 794=1,06	586 378 104/694 246 932=0,84	646 804 668/633 549 024=1,02

Note: the data is compiled by the authors.

Using the Formula 2 in Table 4, I determined the indicators of the efficiency of the use of working capital.

$$K_0 = P_n / CO$$

Where,  $K_0$ - is the turnover ratio of working capital, turnover

$P_n$ -volume of products sold, tenge;

$CO$ - average working capital balance, tenge;

$$K_3 = CO / P_n$$

Where,  $K_3$  is the working capital loading ratio.

As can be seen in Table 4, the indicators for the 3rd quarter were comparable. The circulation level shows the level from 1.06 to 1.02. The amount of working capital was spent on 1 tenge of products sold in 2021-1.06; in 2022-0.84; in 2023-1.02. It can be seen that with a low working capital loading ratio, mobile use is possible.

Table 5. Duration of working capital turnover.

Duration of one lap	$T = D / K_0$ Including: D-the number of days	30.09.2021	30.09.2022	30.09.2023
		$T = 270 / 0,9 = 300$	$T = 270 / 1,2 = 225$	$T = 270 / 0,9 = 300$

Note: the data is compiled by the authors.

It is necessary to find out how long the working capital will return in the reporting period, and you

№	Current assets	30.09.2021	30.09.2022	30.09.2023
1	Main funds	403 274 459	429 626 719	421 397 214
2	Other non-current assets	20 975 148	14 413 209	14 819 019
3	Inventory inventory	12 647 720	29 880 373	27 847 298
4	Trade and other receivables	42 491 889	47 154 579	40 872 957
5	Loans issued	11 039 877	14 624 501	20 294 789
6	Current income tax prepayments	17 437 960	22 670 016	27 740 495
7	Cash and its equivalents	75 906 911	28 008 707	93 832 896
8	Total	583 773 964	586 378 104	646 804 668

can find it using the following formula.

Duration of one round:  $T = D / K_o$

Where: D-is the number of days in the period (360.90).

According to Table 5, for the 3rd quarter period, our working capital will move for 300 days in 2021, 225 days in 2022, and 300 days in 2023.

### 3.3 working capital management of the Zhaiykmunai company

Ural oil company is a large company engaged in the production and transportation of Kazakhstani oil. Working capital management is considered important for the company.

Table 1. Assets, including current assets (thousand dollars)

Current assets	30.09.2021	30.09.2022	30.09.2023
Inventory	33,135	31 991	29 817
Prepayment and other short-term assets	9,298	8 959	5 793
Corporate income tax prepayment	499	455	
Trade receivables	8,730	25 313	12 407
Cash and cash equivalents	70,753	61 827	12 351
Total	122,415	128 545	60 368

Note: details kase.kz taken from the site.

Based on the data in Table 1, this table shows the current assets of the Ural oil company for three years. The peak period for this indicator was in 2022. And in 2023, the value of current assets fell. This can be attributed to the company's tax evasion.

To consider and control the efficiency of working capital, we need to make a number of calculations.

Working capital efficiency management indicator:  $K_o = P_n / CO$

Where:  $P_n$ -is the volume of products sold;

CO– average balance of working capital.

Working capital loading ratio:  $K_3 = CO / P_n$

Table 2. Working capital management (thousand dollars)

Indicator	30.09.2021	30.09.2022	30.09.2023
Profit	50 354	47 742	35 958
Working capital	122 415	128 545	60 368
$K_o$	0,41	0,37	0,59
$K_3$	2,43	2,69	1,67

Note: details kase.kz "I'm sorry," she said.

Table 3. Duration of working capital turnover

Duration of one lap	$T = D / K_o$ Including: D-the number of days	30.09.2021	30.09.2022	30.09.2023
		T=658	T=729	T=457

Note: details kase.kz from the site

As we can see from the result in the table, the fastest lap was in 2023

### 3.4 comparative analysis

A comparative analysis is carried out to determine the type of asset financing for the companies Kazatomprom, Mangistaumunaygas, Zhaikmunai.

Table 9. Asset financing policy (thousand tenge)

Kazatomprom company	Mangystaumunaygas company	Zhayykmunai company
Long-term liabilities: 169.254	Long-term liabilities: 74.124.997	Long-term liabilities: 1.261.924
Short-term liabilities: 389.154	Short-term liabilities: 70.760.824	Short-term liabilities: 341.358
Capital: 1.174.871	Capital: 323.875.152	Capital: 2.669.729
KO; CK + DO 169,254+389,154=558408 Total: 558408 KO= 14% CK+DO=82.4%	KO; CK+ДО  KO=3% CK+ДО=2.9%	KO; CK+ДО 1.261.924+341.358=1.603.282 Total: 1.603.282 KO=17% CK+ДО=85%
Uses a conservative approach to asset financing	Uses a conservative approach to asset financing	Uses a conservative approach to asset financing

Note: the data is compiled by the authors.

### 3.5 Conclusion

ESG (Environmental, Social, Governance) criteria are necessary for modern companies not only as a means of increasing the stability and responsibility of the enterprise to society and the environment, but also as key elements of Successful Business Management. The integration of ESG principles into the company's strategy contributes to improving reputation, reducing risks, attracting investment, provides a competitive advantage and contributes to the creation of a stable and prosperous business in the long term. Thus, ESG criteria are an integral part of modern corporate governance and strategic development of companies. ESG factors are becoming increasingly important for investors, consumers and society as a whole. Companies that actively integrate ESG policies into their activities can achieve significant benefits, including better access to financial resources, increased consumer confidence, and improved results in the long term. Given the growing challenges associated with climate change, social injustice and ethical issues, ESG factors are an integral part of a sustainable and responsible business capable of succeeding in the future. Working capital management plays a key role in the financial health of an organization, regardless of its size or industry. Effective working capital management not only contributes to the optimization of the company's operational activities, but also increases its competitiveness, financial stability and growth capacity. In conclusion, it should be noted that working capital management requires constant monitoring, analysis and adaptation to changing market conditions. Companies that understand the importance of effective working capital management can provide a competitive advantage and sustainable development in the long term.

### 3.6 References

1. [https://www.kazatomprom.kz/ru/media/view/finansovie\\_rezultati\\_ao\\_nak\\_kazatomprom\\_za\\_2022\\_god](https://www.kazatomprom.kz/ru/media/view/finansovie_rezultati_ao_nak_kazatomprom_za_2022_god)
2. <https://kase.kz/ru/issuers/KZAP/>
3. <https://www.mmg.kz/kz>
4. <https://kase.kz/ru/issuers/ZHMN/#g3y2023>
5. <https://www.pwc.com/kz/en/assets/pdf/esg-ds-report-rus.pdf>

6. [https://total.kz/ru/news/finans/38\\_milliardov\\_tenge\\_iz\\_budzheta\\_pitalas\\_nezakonno\\_p\\_oluchit\\_too\\_zhaikmunai\\_v\\_zko\\_date\\_2024\\_01\\_05\\_11\\_27\\_38](https://total.kz/ru/news/finans/38_milliardov_tenge_iz_budzheta_pitalas_nezakonno_p_oluchit_too_zhaikmunai_v_zko_date_2024_01_05_11_27_38)
7. <https://inbusiness.kz/ru/last/rejting-ekologicheskoy-otvetstvennosti-neftegazovyh-kompani>
8. <https://pps.kaznu.kz/2/Main/FileShow2/9422/126/446/181/КупешоваБаянКуанышбековна/2014/2>
9. FINANCE OF FIRMS.Kupeshova B.K. 30.10.2017
10. 2. Ermekbayeva, B.J.Corporate finance: studies. manual / Bayan Zhundibaevna Ermekbayeva, Bayan Kuanyshbekovna Kupeshova; KazNU named after al-Farabi; edited by B. Zh. Ermekbayeva.- Almaty: Kazakh University, 2007.
11. Kupeshova, B. K.Corporate Finance for students of economic specialties/ B. K. Kupeshova, G. M. Sauanova; Al-Farabi Kazakh National University, Faculty of Economics and Business, Departments. "Finance".- Almaty: FEiB, UL., 2008.

# Analysis of Cash Flows of Manufacturing Companies Over the Last 3 Years in Working Capital Management Process

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## Abstract

**Relevance:** Currently, working capital plays a crucial role in ensuring business profitability. Market uncertainty, changes in the economic environment, and intensified competition make working capital management a complex task. Enterprises are compelled to adapt to these changes to mitigate financial risks and ensure stability. Determining the time value of cash, accounts receivable, inventory, and finished goods in working capital management considering inflation is important for accurately assessing the actual value of these assets and liabilities in conditions of changing purchasing power. This allows companies to make informed decisions regarding financial resource management, reduce loss risks, and optimize asset utilization.

**Research Problem:** In working capital management, what is the relevance of the time value of cash, accounts receivable, inventory, and finished goods?

**Overall Research Objective:** To study the methods and approaches for determining the time value of cash, accounts receivable, inventory, and finished goods in the process of working capital management to enhance enterprise financial management efficiency.

### Duties:

- Cash flows in working capital management;
- Accounts receivable in working capital management;
- Inventory in working capital management;
- Determination of the time value of finished goods;
- Analysis of the state of a specific domestic company over the last 3 years.

The research objects are domestic companies in Kazakhstan. In the contemporary market environment, effective working capital management is an integral part of any enterprise's success strategy. For companies like Kazakhmys JSC, KazAzot JSC, and Caspian Oil JSC, optimal management of cash, accounts receivable, inventory, and finished goods becomes a primary factor in achieving financial stability and competitiveness in the market.

The subsequent part of the paper proposes a detailed analysis of the cash flows, accounts receivable, inventory, and finished goods of each company over the specified period to identify trends, problematic areas, and potential avenues for improving working capital management.

**Keywords:** time value, cash flows, accounts receivable, inventory, finished goods, working capital management, inflation, assessment, financial stability.

## 1. Analysis of Kazakhmys Company's Working Capital Management

Kazakhmys is a company operating in the coal, metals, energy, and manufacturing sectors in Kazakhstan. It is one of the most cost-effective structures in Kazakhstan. The company's operations span from coal to metals. Kazakhmys became the main structure of the Kazakhmys program in 2004. The company pays special attention to efficient working capital management. It is primarily engaged in the extraction and processing of copper ore, cathode copper, copper cathodes, as well as refining and sales of precious metals.

Table 1. Assets, Including Current Assets (thousand tenge)

Current Assets	30.09.2021	30.09.2022	30.09.2023
1. Inventory	187 350	227 816	173 802
2. Trade and other accounts receivable	21 262	25 880	37 356
3. Loans granted	456 850	487 410	490 113
4. Prepayments for current income tax	202 817	233 454	327 196
5. Cash and cash equivalents	28 562	26 350	14 425
6. Other	132 420	123 341	115 439
<b>Total</b>	<b>1 029 261</b>	<b>1 124 251</b>	<b>1 158 331</b>

Note: Details from kase.kz were taken from the official website.

Based on the data presented in Table 1, we observe the indicators of current assets over three years. According to the figures for the first 9 months, the highest total current assets of the company occurred in 2023. During the same period, the net profit of the company in 2023 increased by 3.4% compared to the previous year. The profit of the mining company for the year reached 18.4 billion tenge.

Table 2. Working Capital Management (thousand tenge)

Indicator	30.09.2021	30.09.2022	30.09.2023
Revenue	11 315 000	18 070 000	18 400 000
Operating Expenses	883 475 000	1,14 трлн	1,35 трлн
$K_0$	$11315000/883475000 = 0,12$	$18070000/114000000 = 1,58$	$18400000/135000000 = 1,36$
$K_3$	$883475000/11315000 = 78,07$	$114000000000/18070000 = 63087,9$	$135000000000/18400000 = 73369,5$

Note: Details from kase.kz were taken from the official website.

In 2023, the liquidity of operating expenses amounted to 1.36 times for 9 months. When compared with 2022 in three phases, the liquidity decreased to 1.58. The total amount of operating expenses for the items sold in 2021 was 78.07, in 2022- 63,087.9, and in 2023- 73,369.5 tenge. Given the decrease in the liquidity coefficient of operating expenses, it indicates its more efficient utilization.

To calculate how many times the operating expenses will be repeated in the next period, we need to use the following formula: Duration of one operation:  $T = D / Co$ , where: D- number of days.

Table 3. Duration of Operating Expenses

Duration of one operation	Duration of one operation: $T = D / Co$ D- number of days.	30.09.2021	30.09.2022	30.09.2023
		T=270/0,12=225	T=270/1,58=170	T=270/1,36=198

Note: Details from kase.kz were taken from the official website.

As indicated in the third table, over a 9-month accounting period, the duration of one operation for 2021 was 225 days, for 2022- 170 days, and for 2023- 198 days. The shortest duration of one operation was observed in the last quarter of 2023.

## 2. Study of KazAzot Company

KazAzot is a company in the Republic of Kazakhstan engaged in the production and sale of fertilizers, chemicals, and nitrogen-containing substances. It is currently one of the largest state-owned chemical plants in Kazakhstan. The company specializes in the production of coal nitrogen-containing substances, ammonia, temporarily scarce chemicals, and other chemical products.

Table 4. Assets, including current assets (thousand tenge)

Current Assets	30.09.2021	30.09.2022	30.09.2023
1. Trade and other accounts receivable	8 560 250	7 568 239	3 126 058
2. Inventories	94 520 000	84 002 107	75 298 558
3. Advances on purchases	852 014	789 408	590 401
4. Prepayments based on current income tax	30 562 000	27 199 913	24 188 597
5. Cash and cash equivalents	2 852 122	2 683 342	2 534 579
6. Other	137 346 386	122 243 009	105 738 193

Note: Details from kase.kz were taken from the official website.

Based on the information provided in the fourth table, it can be inferred that the indicators of current assets have increased over the three years. The highest indicator of the total amount of current assets was in 2021 according to the 9-month data. Additionally, during this period, the company's net profit in 2021 increased by 2.5% compared to the previous year.

Table 5. Working Capital Management (thousand tenge)

Indicator	30.09.2021	30.09.2022	30.09.2023
Revenue	15140000000	17750000000	28600000000
Working Capital Management	48 870 000 000	55 230 000 000	75 200 000 000
$K_0$	15140000000/48 870 000 000 =0,309	17750000000/55 230 000 000=3,213	28600000000/75 200 000 000=0,372
$K_3$	48 870 000 000 /15140000000=3,227	55 230 000 000/17750000000=3,111	75200000000/28600000000=2,629

Note: Details from kase.kz were taken from the official website.

In the fifth table, the liquidity of working capital was 0.372 tenge for 9 months in 2023. When compared with three phases in 2022, the liquidity was significantly higher at 3.213. The value of the working capital for each tenge of goods sold was 3,227 in 2021, 3,111 in 2022, and 2,629 in 2023. Since the working capital turnover coefficient was low, it indicates its more efficient utilization.

To calculate how long it takes for the working capital to return in the next period, we need to use the following formula: Duration of one operation:  $T = D / Co$ , where: D- number of days.

Table 6. Duration of Operating Expenses

Duration of one operation	Duration of one operation: $T = D/K_0$ D - number of days.	30.09.2021	30.09.2022	30.09.2023
		$T=270/0,309=873$	$T=270/3,213=840$	$T=270/0,372=725$

Note: Details from kase.kz were taken from the official website.

As stated in the 6th table, over a 9-month accounting period, the duration of working capital was 873 days in 2021, 840 days in 2022, and 725 days in 2023. The longest duration of working capital was observed in the last quarter of 2023.

### 3. Study of CaspiMunai Company

"CaspiMunai" is an oil and gas exploration, production, and trading company located in the Republic of Kazakhstan. It is recognized as one of the largest oil and gas companies in Kazakhstan. CaspiMunai operates conventional open-pit mines, processes and refines oil and gas internally, places emphasis on profitable production, and increases the volume of crude oil production for export.

Table 7. Assets, including current assets (thousand tenge)

Current Assets	30.09.2021	30.09.2022	30.09.2023
1. Trade and other accounts receivable	20 523 000	17 662 530	12 205 249
2. Inventories	10 562 150	14 366 779	36 436 560
3. Advances on purchases	625 100	562 450	498 600
4. Prepayments based on current income tax	2 998 578	4 908 948	5 930 544
5. Cash and cash equivalents	1 410 286	2 060 820	2 156 499
6. Other	36 119 114	39 561 527	57 227 452

Note: Details from kase.kz were taken from the official website.

In the 7th table, the performance indicators of the company's current assets over three years are compared based on the data for the 9-month period. The highest indicator of the total current assets of the company was observed in 2023. Moreover, in this period, there was a 5.7% increase compared to the previous year in terms of the company's net profit.

Table 8. Management of working capital (thousand tenge)

Indicator	30.09.2021	30.09.2022	30.09.2023
Revenue	28 560 000 000	49 550 000 000	49 000 000 000
Working Capital Management	99 690 000 000	16 326 000 000	19 712 000 000
$K_0$	$28560000000/9969000000 = 0,286$	$49550000000/16326000000 = 3,035$	$49000000000/19712000000 = 2,48$
$K_3$	$99690000000/2856000000 = 349$	$16326000000/4955000000 = 329$	$19712000000/4900000000 = 402$

Note: Details from kase.kz were taken from the official website.

In the 8th table, the efficiency of working capital was 2.48 times over the 9-month period in 2023. When compared with the same period in 2022, it decreased by 0.286 times. The total working capital amounted to 349 thousand tenge in 2021, 329 thousand tenge in 2022, and 408 thousand tenge in 2023, based on the data provided. Since the working capital turnover ratio decreased, it indicates its more efficient utilization. To calculate how long it takes for working capital to turn over in the next period, we will use the following formula:

The duration of one cycle:  $T = D / Co$ , where D represents the number of days.

Table 9. Duration of Operating Expenses

Duration of one operation	Duration of one operation: $T = D/K_0$ D - number of days.	30.09.2021	30.09.2022	30.09.2023
		$T = 270/0,286 = 944$	$T = 270/3,035 = 889$	$T = 270/2,48 = 108$

Note: Details from kase.kz were taken from the official website.

In the 9th table, based on the 9-month period, our working capital turnover for 2021 was 944 days, for 2022 it was 889 days, and for 2023 it was 108 days. The fastest turnover of working capital was observed in the last period of 2023.

#### 4. Comparative Analysis

A comparative analysis is conducted to identify the type of financing of assets among Kazakhmys, KazAzot, and CaspiMunai companies.

##### 11. Asset Financing Policy (thousand tenge)

Kazakhmys Company	KazAzot Company	Caspian Oil Company
Long-term liabilities: 1,100,589,233	Long-term liabilities: 2,458,998,897	Long-term liabilities: 589,248,639
Short-term liabilities: 125,111,558	Short-term liabilities: 556,238,789	Short-term liabilities: 49,562,874
Capital: 303,524,897	Capital: 787,476,848	Capital: 330,049,230
The company adopts a conservative policy in financing its assets.	The company adopts a conservative policy in financing its assets.	The company adopts a conservative policy in financing its assets.

Notice: The information was provided by the authors.

#### Summary

During the study of the liquidity, accounts receivable, inventory, and temporary pricing situation, it can be beneficial to conduct a comparative analysis of asset management processes for KazMunayGas, KazAzot, and Caspian Oil companies.

Firstly, each company has its own unique characteristics and challenges in managing its capital. However, the general trend towards optimizing cash utilization, reducing accounts receivable, efficiently managing inventory, and minimizing the time taken to produce finished goods should be considered.

Secondly, effective management of assets plays a crucial role in the financial profitability of businesses. Enhancing cash availability, reducing accounts receivable, improving inventory management, and production processes optimization contribute to efficiency, cost reduction, and debt servicing capability enhancement.

Lastly, employing individualized methods for managing capital assets allows each company to achieve good results. This includes developing and implementing effective financial strategies, automating asset management processes, and continuously monitoring and analyzing financial indicators.

In conclusion, effective asset management is a fundamental element of a successful business strategy and requires attention and effort from company leadership. Providing recommendations for improving asset management contributes to financial improvement and sustainable growth in the long term.

**The utilized resources are as follows:**

- "Firm Financials" by Bayan Kupeshova;
- "Financial Reporting as an Indicator of Financial Management of an Enterprise" by Bayan Kupeshova;
- Financial information for "KaspiMunai" company:  
<https://kase.kz/en/issuers/KMCP/#g3y2021>;
- Financial information for "KazAzot" company: <https://kase.kz/en/issuers/KZAZ/#g3y2023>;
- Financial information for "KazMunaiGas" company:  
<https://kase.kz/en/issuers/KSNF/#g3y2021>.

# Analysis of Cash Flows of Producing Companies 2020-2022 years in Working Capital Management Process

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## Introduction

Any company aims to adhere to the principle of spending less and earning more. For companies, efficient use of working capital is the main goal of planning, and for that purpose, they work well with financial indicators. Organization, evaluation and analysis of short-term assets create an optimal environment for improving working capital. That's why companies are working efficiently to ensure liquidity and stability indicators and manage working capital in the course of their activities.

While coping with various economic difficulties, maintaining one's liquidity and stability, working consciously with short-term and long-term receivables and payables shows a positive result of the financial situation. In addition, it allows to adapt to the development of scientific and technical progress.

For this purpose, enterprises are distinguished by efficient use of resources, planning and defining the future.

**Research problem (question):** What is working capital? What is an asset financing policy?

The purpose of the general research is to study the working capital and consider what asset financing policy the company follows.

**Duties:**

- Analysis of the situation of a real domestic company in the last 3 years;
- Cash in the course of working capital management;
- Spare funds during working capital management;
- Asset financing policy.

Domestic companies of the Republic of Kazakhstan were taken as the subject of research.

## 1. Working capital management of Rahat LOTTE JSC

Rahat LOTTE JSC is the only confectionery enterprise in Kazakhstan that has mastered the production of special products for people with diabetes. The range includes low-calorie chocolates, candies, cookies and wafers to name a few, and replaces sugar with natural alternatives.

Table 1. Current assets of Rahat LOTTE Company.

	2022	2021	2020
Inventories	28 355 549	16 833 693	17 908 089
Accounts receivable	1 429 800	1 645 420	1 299 757
Advances given	5 387 304	3 954 193	3 168 324
Advance payment of corporate income tax	238 981	442 436	295 481
Other current assets	815 787	538 545	541 002
Cash and cash equivalents	8 308 984	12 857 188	15 204 585
Set	44 536 405	36 271 475	38 417 238
Income	83 502 509	65 433 477	62 364 561

Note: Details from kase.kz were taken from the official website.

Table 1 show indicators of current assets for three years. According to the annual report, the highest indicator of the company's current assets was in 2022, as we can see in Table 1, the income of 2022 is much higher than the income of the previous year.

Table 2. Rahat LOTTE company working capital management

	2022	2021	2020
Income	83 502 509	65 433 477	62 364 561
Current assets	44 536 405	36 271 475	38 417 238
Indicators of the efficiency of the use of working capital (CU)	1,874927018	1,803992724	1,623348378
Amount of working capital spent on 1 tenge of sold product (K3)	0,533354094	0,554325961	0,616010718
Duration of one round in days (T)	192,0074737	199,5573459	221,7638585

Note: data compiled by the authors.

In Table 2, we have calculated the total working capital efficiency using different formulas. The Formulas:

Working capital efficiency management indicator:  $Ko=Pn/CO$

In the figure: Pn- the volume of the sold product;

CO is the average balance of working capital.

Working capital load factor:  $K3=CO/Pn$

Duration of one cycle in days Co:

$T=D / Co$ ,

Here, D is the number of days in the period (360, 90)

As we can see in Table 2, the indicators of efficiency of use of working capital in 2022 are 1.87, which is the highest indicator in 3 years, and the lowest was 1.62 in 2020.

The highest indicator of the amount of working capital spent on 1 tenge of sold products was 0.61 in 2020, and the lowest was 0.53 in 2022.

As for the duration of the cycle, the best indicator was 192 days in 2022, and the lowest indicator was 221 days in 2020. This means that in 2022 the cycle will consist of only 192 days.

Table 3. Asset Financing Policy of Rahat LOTTE Company

	2022	2021	2020
Current assets	44 536 405	36 271 475	38 417 238
Long-term assets	23 278 774	23 9540 48	21 459 140
Commitment to capital	58 433 323	52 039 401	51 397 136
Set	126 248 502	112 264 924	111 273 514
Share of short-term assets	35%	32%	35%
Share of capital with long-term assets	65%	68%	65%

Note: data compiled by authors

As we can see in table 3, it can be said that Rahat company follows an aggressive policy. This is because the share of short-term assets is 35%, and the share of capital with long-term assets is 65%.

## 2. Management of turnover of Bayan Sulu JSC

Bayan Sulu JSC is one of the largest companies in Kazakhstan engaged in the production of confectionery products. A company that aims to effectively manage its working capital, wants to increase profits and has its own place in the country's economy.

Table 4. Financial Position of Bayan Sulu Company

Years	2020	2021	2022
Current assets	31 290 570	29 610 536	40 188 183
Long-term assets	15 454 233	15 787 599	16 452 236
Capital and liability	46 744 803	45 398 135	56 640 419

Note: Details from kase.kz were taken from the official website.

This table shows short-term and long-term assets, capital liabilities of Bayan Sulu JSC. As we have seen, short-term assets, long-term assets and capital were high in 2022.

Table 5. Current assets of Bayan Sulu Company

Current assets	2020	2021	2022
Funds	8 652 878	7 499 806	17 189 953
Advance income tax payment	-	140 057	-
Accounts receivable and other receivables related to the main activity	6 377 139	7 066 422	8 854 299
Cash and cash equivalents	16 260 553	14 904 251	14 143 931
General	31 290 570	29 610 536	40 188 183

Note: Details from kase.kz were taken from the official website.

The table shows Short-term assets and their items in 2020, 2021, 2022.

Table 6. Management of working capital (thousand tenge)

Years	2020	2021	2022
Indicators of working capital efficiency:	1,43413063	0,93294755	1,215
1 tenge is the amount of spent working capital	0,69728655	1,07187162	0,82
Duration of one round in days	251,023157	385,873783	296

Note: the table is compiled by the authors

The answers to reports on working capital management are shown: working capital utilization efficiency and Turnover ratio reverse turnover ratio working capital loading ratio. We calculated the amount of working capital spent on 1 tenge of the sold product, the duration of one cycle in days.

Table 7 Asset Financing Policy of Bayan Sulu Company

Current assets	2020	2021	2022
Long-term assets	44 874 765	27 625 077	48 831 132
Capital and liability	31 290 570	29 610 536	40 188 183
Set	15 454 233	15 787 599	16 452 236
The share of K.m.a	93 489 606	90 796 270	113 280 838
N.M.A. + capital share	33%	33%	35%
Current assets	67%	67%	65%

Note: the table is compiled by the authors

Looking at the indicators in Table 7, we can conclude that Bayan Sulu company follows an aggressive policy, because the share of short-term assets is 35%.

### 3. Comparison of data of Bayan Sulu and Rahat LOTTE companies

Table 8. Comparison of Rahat Company and Bayan Sulu Company

Rahat Company	Bayan Sulu Company
Short-term assets- 44,536,405	Short-term assets- 40,188,183
Long-term assets- 23,278,774	Long-term assets- 16,452,236
Capital and liabilities- 58,433,323	Capital and liabilities- 56,640,419
Ko is 1.874927018	Ko- 1,215
K3 is 0.533354094	K3 is 0.82
T- 192.0074737	T- 296
Share of short-term assets	Share of short-term assets
Long-term assets + capital share	Long-term assets + capital share
Adheres to an aggressive policy in asset financing	Adheres to an aggressive policy in asset financing

Note: data compiled by authors.

As we can see in Table 8, the financial indicators of Rahat Company and Bayan Sulu Company are the same, and both companies follow an aggressive policy in financing assets.

### Conclusion

To sum up, LOTTE Rahat joint-stock company is one of the largest confectionery production facilities in Kazakhstan with a 75-year history.

"Bayan Sulu" JSC is one of the largest enterprises producing confectionery, sugar and flour products in the Republic of Kazakhstan. It was opened in December 1974 as the Kostanay Confectionery Factory, and in September 1993 it was reorganized as "Bayan Sulu" JSC. Large companies that have been operating in Kazakhstan for more than half a century.

Effective management of working capital of JSC "LOTTE Rakhat" and JSC "Bayan Sulu" is the main factor of financial stability and successful operation of the enterprise. In the company, inventory of equipment, organization of short and long-term receivables and payables, planning and active work with them are considered their main services. For any company, efficient use of its resources and high profits are the goals of those companies.

A decrease in the price of raw materials, an improvement in the payment terms of receivables, and active cooperation with suppliers and buyers will contribute to the reduction of capital turnover time. To prevent financial risks and ensure the stability of the company's liquidity: correct and optimal management of debtors and creditors is the main activity.

It is very important to adapt the working capital management plan to all the features of the business. Planning, monitoring and analysis of all financial indicators allows companies to respond positively to economic conditions, to maintain the optimal level of working capital, to increase stability and liquidity. If we look at all the financial indicators of the companies in the course of performing their duties, the consequences of the pandemic that occurred in 2019 affected the years 2020-2021, despite this, in 2022, the companies formed their stable conditions.

#### List of used literature

- Financial information for "Rahat LOTTE" company: <https://kase.kz/ru/issuers/RAHT/#>
- Financial information for "Bayan Sulu" company: <https://kase.kz/ru/issuers/BSUL/#>
- "Financial Reporting as an Indicator of Financial Management of an Enterprise" by Bayan Kupeshova;
- "Firm Financials" by Bayan Kupeshova;

# ОЦИФРОВКА, ЦИФРОВИЗАЦИЯ И ЦИФРОВАЯ ТРАНСФОРМАЦИЯ

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## АННОТАЦИЯ

*Современная экономика основана на постоянном совершенствовании: улучшаются, модернизируются и изобретаются новые модели управления, продукты и системы. Такое развитие в последние годы напрямую связано с понятием «цифровизация»*

*Цель статьи – понять смысл таких терминов, как оцифровка, цифровизация, цифровая трансформация и провессти четкие грани между ними. Для достижения данной цели в статье приводится множество определений данным терминам, основными из них являются термины с IT Glossary-a Gartner-a. Поскольку шумиха вокруг цифровой трансформации продолжает сохраняться, термины "оцифровка", "цифровизация" и "цифровая трансформация" вступают в противоречие, увеличивая уровень шумихи и добавляя путаницы.*

*Актуальность темы раскрывается в этих трех терминах, которые имеют разные значения – или, по крайней мере, мы можем сделать их разными в зависимости от того, к какому авторитету мы прислушиваемся.*

*Многие люди входят в заблуждение недооценивая силу и важность цифровой трансформации, тем самым ставя под угрозу само выживание их организаций.*

**Ключевые слова** – оцифровка, цифровизация, цифровая трансформация, IT глоссарий Gartner-a.

## DIGITIZATION AND DIGITAL TRANSFORMATION

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## ANNOTATION

*The modern economy is based on continuous improvement: new management models, products and systems are improved, modernized and invented. This development in recent years is directly related to the concept of “digitalization”*

*The purpose of the article is to understand the meaning of terms such as digitization, digitalization, digital transformation and to draw clear lines between them. To achieve this goal, the article provides many definitions of these terms, the main ones being terms from Gartner’s IT Glossary. As the hype around digital transformation continues, the terms “digitization,” “digitalization,” and “digital transformation” are colliding, increasing the level of hype and adding to the confusion.*

*The relevance of the topic is revealed in these three terms, which have different meanings - or at least we can make them different depending on which authority we listen to.*

*Many people are misled into underestimating the power and importance of digital transformation, thereby jeopardizing the very survival of their organizations.*

**Keywords** – digitization, digitalization, digital transformation, Gartner IT glossary.

Начиная с последней четверти XX в. развитие информационнокоммуникационных технологий обеспечило трансформацию и объединение разрозненных национальных рынков в высококонкурентную глобализированную рыночную среду. Начало XXI в., в свою очередь, ознаменовалось дальнейшим развитием данной тенденции, обусловленным расширением информационно-коммуникационной инфраструктуры, активным внедрением сетевых и мобильных технологий. В научной и научно-практической литературе данные процессы отождествляются с формированием так называемой «цифровой экономики» и обозначаются сразу несколькими терминами: «цифровизация», «цифровая трансформация», «дигитизация», «цифровая экономика». При этом в своей совокупности наблюдаемые тенденции формируют комплекс количественных и качественных изменений на многих уровнях и во многих сферах социума. Например, в сфере производства освоение цифровых технологий способствует дальнейшей автоматизации и снижению всех видов издержек, положительно влияя на производительность труда. В коммерческой деятельности цифровые технологии ускоряют и облегчают процессы заключения и реализации контрактов, что снижает транзакционные издержки и повышает динамичность сферы обращения. Затрагиваются такие экономически значимые сферы, как взаимодействие социума с государством, создание и потребление общественных благ. Однако эти процессы не ограничиваются узкими технико-экономическими рамками. Цифровая трансформация влияет на индивидуальное поведение и человеческие отношения в целом. В рамках цифровизации органично соединяется социальное и техническое, трансформируются социальные практики, научный дискурс, общественные нормы, характер и способы потребления, а также социальная структура и инфраструктура. Цифровой мир и социум постоянно взаимодействуют в многообразных аспектах, будь то технологии, технологические системы, артефакты или данные, соединяясь и взаимодополняя друг друга. Если на ранних этапах информатизации информационно-коммуникационные технологии были, в первую очередь, предметом инновационной активности, а на стыке XX и XXI вв. – ее ключевым инструментом, то сегодня они становятся источником необходимости в инновациях. В связи с комплексными многомерными изменениями общества предприятия сталкиваются с накапливающимися требованиями заинтересованных сторон, будь то изменяющиеся потребности, способы коммуникации, подходы к обслуживанию, управлению и прозрачности деятельности. Непрерывно изменяющаяся внешняя среда требует от экономических субъектов стратегической переориентации и постоянной приоритизации множества целей. Таким образом, цифровая повестка актуализирует исследования характера, направлений, и, в особенности, специфики инновационной активности в экономике на современном этапе. Требуют дальнейшей разработки вопросы сущности процессов и соотношения понятий цифровизации, дигитизации и цифровой трансформации, взаимосвязи и взаимообусловленности данных процессов с инновационной деятельностью, роли и места в данном контексте организационно-управленческих инноваций, что и является целью данной статьи.

Оцениваемые количественно технические процессы оцифровки и цифровизации выступают как элементы более широкого, качественного процесса «цифровой трансформации». Ю. И. Грибанов рассматривает цифровую трансформацию в первую очередь с экономической точки зрения и определяет ее как «перевод элементов социально-экономической системы в цифровое пространство для взаимодействия с использованием максимума потенциала внедренных цифровых технологий» (цит. по [6, с. 35]). Более широкий, междисциплинарный подход использует в своих работах А. Ю. Косенков, характеризующий цифровую трансформацию как «комплекс многомерных трансформаций, выраженных в первую очередь в изменении параметров информационных процессов социальной реальности, трансформации институциональной структуры, социального

пространства, к появлению новых практик и других процессов» [7, с. 247]. Г. Виал выработал универсальное определение цифровой трансформации, применимое на различных уровнях исследования. По его мнению, под цифровой трансформацией следует понимать «процесс, направленный на улучшение объекта путем инициирования значительных изменений его свойств за счет сочетания информационных, вычислительных, коммуникационных и сетевых технологий» [10, с. 118]. Таким образом, категорию дигитизации / оцифровки можно представить как составную часть процесса цифровизации, которая, в свою очередь, является неотъемлемой составляющей цифровой трансформации. Соотношение между данными категориями визуализировано на рисунке 1. Многомерность процессов цифровой трансформации отражается в специальных ее определениях, касающихся отдельных сфер и областей социума. Так, Т. Кудрявцева определяет цифровую трансформацию как «использование оцифрованной информации и цифровых технологий для внесения изменений в бизнес-процессы и бизнес модели» [11, с. 150]. Сходной точки зрения придерживаются М. Эллинг и М. Леманн, которые интерпретируют цифровую трансформацию как «интеграцию аналогового и цифрового миров с новыми технологиями, улучшающими взаимодействие с клиентами, доступность данных и бизнес-процессы» [12, с. 363].

Как отмечает Э. В. Павлыш, «инфраструктура ИКТ способствует экономическому росту, поскольку она является ключевым инструментом обработки информации и, таким образом, – главным посредником инновационного процесса помимо финансовых ресурсов и материальной инфраструктуры. Но поскольку инфраструктура является инструментом, ее нельзя рассматривать как самостоятельный фактор. Использование инфраструктуры ИКТ зависит от качества пользователей и, с другой стороны, от качества учреждений, ответственных за взаимодействие между различными компонентами в рамках инновационных систем на разных уровнях экономического пространства». При этом на организационном уровне анализа цифровая трансформация – это процесс, в котором комбинации цифровых технологий (информационных, вычислительных, коммуникационных и сетевых) создают и усиливают структурные и функциональные сдвиги в обществе и отрасли, вызывая потребность в стратегических ответных мерах организаций по использованию цифровых технологий для изменения своих цепочек формирования стоимости. Это, в свою очередь, предопределяет необходимость принятия и реализации управленческих решений относительно внедрения новых технологий и изменений в способах выполнения и организации работы. На внешнем контуре организации подобные решения обуславливаются параллельно идущей цифровой трансформацией заинтересованных сторон, таких как поставщики, конкуренты и клиенты. Таким образом, цифровая трансформация является одновременно специфическим для организации внутренним процессом и результатом внешнего воздействия со стороны более широкой бизнес-системы. В то же время трансформация бизнеса реализуется на основании управленческих решений о стратегическом внедрении и интеграции конкретных цифровых технологий с сопутствующими изменениями в бизнес-процессах и методах работы. Цифровизация и цифровая трансформация слишком часто рассматриваются в широком контексте для предприятий, экономики и общества и, таким образом, остаются слишком абстрактными в разрезе организационно-управленческой деятельности и организационно-управленческих инноваций. Организационно-управленческие инновации – это «различные изменения в процессах, технологиях, подходах управления, применение которых выводит на новый уровень развития традиционно сложившиеся процессы принятия управленческих решений». Организационноуправленческие инновации «реализуются посредством совершенствования бизнеспроцессов, методов организации работ и методов осуществления внутренних и внешних коммуникаций, направлены на повышение

эффективности деятельности организации путем снижения административных и транзакционных издержек» [12, с. 24].

Программы инновационного развития, нормативно-правовое обеспечение и инновационная политика на общегосударственном и региональном уровнях сконцентрирована, в первую очередь, на продуктных и процессных инновациях. Организационно управленческий аспект инновационной деятельности при этом отходит на второй план. Специальная роль и значение организационно-управленческих инноваций как неотъемлемого компонента инновационной системы в условиях цифровой трансформации не акцентируется и, как правило, самостоятельно не исследуется. Таким образом, пренебрежение институциональной основой интенсификации инновационных процессов в условиях цифровой трансформации приводит к недостаточной их эффективности вследствие дефицита адаптивности и гибкости управленческих систем в динамичной рыночной среде. Как справедливо замечает Н. П. Беляцкий, «причиной разрыва между уровнем технологической вооруженности и производительностью является то, что темп внедрения новых технологий опережает скорость цифровой восприимчивости» [14, с. 27]. Так, С. Ю. Солодовников и Т. В. Сергиевич в работе [13] предлагают четыре стратегических направления цифровой трансформации бизнес-моделей, среди которых выделяют «цифровую трансформацию системообразующих подсистем и процессов предприятия, не обеспечивающих напрямую рост его экономической эффективности и капитализации, а отвечающих за функционирование и устойчивость системы в целом» [13, с. 449]. Организационно-управленческие инновации в данном случае представляют собой структурный инструмент адаптации предприятия и отрасли в целом к трансформирующейся под воздействием цифровых технологий экономической реальности.

Цифровая трансформация же как многомерный комплекс изменений в формате социального взаимодействия является одновременно и предпосылкой, и результатом организационно-управленческих инноваций, при этом последние отвечают не только за финансовый результат предприятий, но за эффективность и результативность адаптации хозяйствующих субъектов к новой реальности. Организационноуправленческие инновации как проводник организационных изменений обеспечивают те качественные изменения в организации, которых требует динамичная, высококонкурентная цифровая бизнес-среда (рисунок 1).

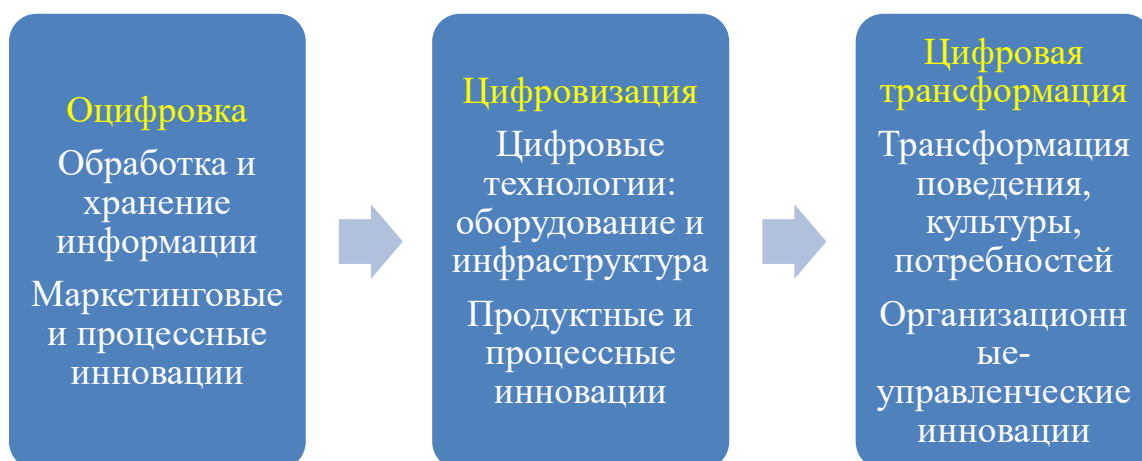


Рисунок 1 – Взаимосвязь оцифровки, цифровизации и цифровой трансформации с отдельными категориями инноваций

Источник: составлено автором.

Выводы. Проведенное нами исследование позволяет сформулировать ряд основных выводов: – во-первых, не отрицая взаимосвязанность и взаимообусловленность процессов «дигитизации», «цифровизации» и «цифровой трансформации», следует четко разграничивать данные явления, по сути, масштабам и характеру влияния на экономику. «Дигитизация» (перевод информации на цифровые носители) и «цифровизация» (внедрение информационно-коммуникационных технологий и соответствующее преобразование социотехнических систем) – технико-технологические составляющие «цифровой трансформации» – качественного многомерного явления, представляющего собой комплекс фундаментальных изменений социальных отношений под воздействием информационно-коммуникационных технологий и выходящее далеко за рамки технологических и экономических структур; – во-вторых, процессы цифровизации и дигитизации в экономическом плане органично взаимосвязаны с инновационной средой. Дигитизация ускоряет информационные процессы, позволяет сократить транзакционные издержки и стимулирует коммуникационные и маркетинговые инновации. Цифровизация является одновременно фактором и предметом технологических инноваций, в первую очередь продуктных и процессных; – в-третьих, цифровая трансформация больше связана со стратегическим мышлением и изменениями, а не с технологиями. Успешные усилия по трансформации зависят от готовности (адаптированности) организации к цифровой реальности. Цифровая трансформация требует структурных изменений, реорганизации внутриорганизационных процессов и моделей взаимодействия с внешней средой. Ключевым инструментом, обеспечивающим цифровую зрелость предприятия, являются нетехнологические (организационно-управленческие) инновации. Итак, цифровая «зрелость» организаций определяет их стратегическую конкурентоспособность в условиях цифровой трансформации социально-экономической реальности. Обеспечение цифровой зрелости реализуется через организационноуправленческие инновации. В этих условиях дополнительной проработки требуют вопросы форм, методов и основные направления внедрения организационноуправленческих инноваций в экономике страны, а также

механизмов их стимулирования и контроля со стороны государства, что и представляет собой перспективное направление наших дальнейших исследований.

#### Список использованных источников

1. Савельев, И. И. Цифровая экономика и цифровизация: понятие, сущность, значение / И. И. Савельев, Н. В. Абдуллаев // Экономика и управление: проблемы, решения. – 2018. – Т. 2., № 11. – С. 13–18.
2. Ильина, Е. М. Теоретико-методологические основы цифровой трансформации / Е. М. Ильина // Иппокрена. – 2020. – № 2 (37). – С. 31–42.
3. Bumann, J. Action Fields of Digital Transformation – A Review and Comparative Analysis of Digital Transformation Maturity Models and Frameworks / J. Bumann, M. Peter. – Digitalisierung und andere Innovationsformen im Management. – Basel : Gesowip, 2019. – 343 p.
4. Ценжарик, М. К. Цифровая трансформация компаний: стратегический анализ, факторы влияния и модели / М. К. Ценжарик, Ю. В. Крылова, В. И. Стешенко // Вестник Санкт-Петербургского университета. Экономика. – 2020. – Т. 36., Вып. 3. – С. 390–420.
5. Плотников, В. А. Цифровизация производства: теоретическая сущность и перспективы развития / В. А. Плотников // Известия СПбГЭУ. – 2018. – № 2. – С. 16–24.
6. Шиплюк, В. С. Сущность категории «Цифровизация» и ее место в технологическом развитии / В. С. Шиплюк // Вестник Владимирского государственного университета имени А. Г. и Н. Г. Столетовых. Серия: Экономические науки. – 2020. – № 3(25). – С. 23–39.
7. Косенков, А. Ю. Процессы цифровизации: сущность, ключевые векторы и стратегии исследования / А. Ю. Косенков // Философские исследования. – 2021. – № 8. – С. 242–249.
8. Козырев, А. Н. Цифровая экономика и цифровизация в исторической ретроспективе / А. Н. Козырев // Цифровая экономика. – 2018. – № 1. – С. 5–19.
9. Floridi, L. The Onlife Manifesto: Being Human in a Hyperconnected Era / L. Floridi. – New York : Springer, 2015. – 264 p.
10. Vial, G. Understanding digital transformation: a review and a research agenda / G. Vial // The Journal of Strategic Information Systems. – 2019. – Vol. 28, № 2. – P. 118–144.
11. Кудрявцева, Т. Ю. Основные понятия цифровизации / Т. Ю. Кудрявцева, К. С. Кожина // Вестник Академии знаний. – 2021. – №3 (44). – С. 149–151.
12. Eling, M. The impact of digitalization on the insurance value chain and the insurability of risks / M. Eling, M. Lehmann // Geneva Pap. R. I. – 2018. – Iss. 43(3). – P. 359–396.
13. Солодовников, С. Ю. Направления совершенствования бизнес-моделей промышленных предприятий в Республике Беларусь в условиях цифровизации / С. Ю. Солодовников, Т. В. Сергиевич // Наука и техника. – 2022. – Т. 21, № 5. – С. 444–450.
14. Csedo, Z. How does Digitalization Affect Change Management: Empirical Research at an Innovative Industrial Group / Z. Csedo, M. Zavarko // European Journal of Business and Management. – 2017. – Vol. 9, № 36. – P. 1–5.

# The Importance Of Communication In Human Resource Management

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## Abstract

The success of modern organizations is created by people, whose effective management is a significant challenge. The effectiveness of communication has a special role in the process of human resources management.

In the article, we discuss the role and importance of communication in human resources management, the problems characteristic of the communication process in organizations and ways to solve them.

**Key issues:** communication, management, human resources management.

Effective management of the communication process in human resource management is an important task. We can say that communication determines the life of the organization, it is a process that ensures the exchange of information throughout the organization. Although the role of the human resources management manager is to be a communication ambassador, managing the communication process in organizations is an important challenge, there are often cases when the human resources management manager cannot ensure the establishment of correct and open relationships between employees, which is often the merit of the leadership. For the effectiveness of communication processes, it is important for the managers of the organization to understand its importance and support the human resources management department to improve the communication process.

In an organization, a properly implemented communication process, in the horizontal and vertical direction of management, provides a joint action to achieve a common goal, which is a prerequisite for the existence of the organization.

Communication is a complex process. Great care is needed when receiving information, and especially when giving it, so that uncertainty does not lead to unfortunate consequences. We can safely say that the communication skills of the person responsible for human resources management are directly related to the effectiveness of management. It is important for the manager to understand and correctly manage the components of the communication process, including:

- 1) conception of an idea;
- 2) coding of the idea;
- 3) selection of transmission channel and transmission of information;
- 4) decoding of received information (Robbins., S. P, 2018).

Dissemination, transmission and reception of information are elements of communication. Information is at the center of communication and its proper management allows all types of messages to be disseminated. It should be noted here that the components of information are: the person transmitting information, information, the means of information transmission, or the channel, and the recipient of information - the person for whom the information is intended.

Quantitative and qualitative research methods were selected for the study of problems typical for communication processes. Questionnaires and in-depth interviews were conducted using a pre-selected questionnaire. A questionnaire selected during the electronic survey explored the challenges of human resource management in modern organizations. The retrieved

information was processed in EXCEL and SPSS software. As a result of the information analysis, important challenges were identified and appropriate recommendations were prepared to solve them. The results of the study along with the recommendation section were sent to the individuals participating in the study.

As a result of the analysis of the information obtained as a result of the research, it was determined that the communication processes in the organizations are blocked, this has a negative impact on the relations between the employees, well-being and motivation. Managers' communication skills are problematic. The majority of respondents believe that managers have not developed such communication skills as: listening, speaking, sharing other people's opinion and showing respect to the speaker. During the conversation, they use the phone, keep the door of the room open, do not listen carefully and often address them rudely. As a result of the research, it was determined that a large part of the managers have not completed any training course in the direction of communication. This manifests itself in wrong communications in the organization. The communication skills of employees are also problematic, which hinders the effectiveness of communication. HR managers interviewed during the interview process openly talk about such difficulties as: useless meetings with employees, incorrectly formulated communication goals, incorrectly selected time, misunderstood instructions and recommendations.

As a result of research, it was determined that dysfunctional relationships between employees damage organizational culture, cause conflicts and make people toxic.

The role of modern technologies in organizations is great, however, organizations lag behind technical progress. Existing technologies hinder the production, updating and detection of errors in databases. As a result, the quality of communication processes decreases and the spent resources increase. In addition, there are cases when organizations give unequal access to high-quality technologies to employees, which causes them discrimination and is wrong.

As a result of the research, it was determined that proper attention is not paid to the correct selection of communication methods. Managers start communication spontaneously, which is why the results are often disastrous, because an incorrectly chosen method is useless and does not bring anything.

It is important for the leader to increase the importance of communication, to provide different types of resources, to talk, to listen and to find out what worries them, what they need, and in general, what is their vision of the organization's activities.

in relation to To facilitate communication processes without obstacles, to eliminate all the factors that hinder it. Not to intimidate employees with his position, instructions and orders. It gave them the opportunity to openly talk about problems, to openly justify their views and arguments. In order to successfully implement communication processes, it is possible to organize various kinds of social meetings, including excursions and sports events, which ensure the implementation of casual, informal communication. The process should be managed by the human resources management department and actively implement team building and team bonding activities among them.

Internet communication processes are problematic in organizations, therefore it is important to increase investment in this direction. An intranet may be used as an Internet-based means of communication. The mentioned mechanism will significantly increase the speed of information exchange, reduce information costs and ensure fast execution of tasks. Employees should be able to e-mail questions and suggestions to their upper management without hindrance and receive prompt feedback.

It is important for the organization to take care of improving the communication skills of the employees. It is necessary for both of them to develop listening, speaking, reporting and analyzing skills. Each participant in the communication process should be individually interested

in the effective management of the process in order to be able to transmit, listen, analyze and remember the necessary information. It is important to increase the degree of trust in the relations between the manager and the employees. The more the employees trust the manager, the easier it is to solve problems. It is important for the manager to establish unanimity among the employees.

In conclusion, we can say that an important challenge in the management of human resources is to create a healthy organizational climate, where the relations between the manager and the employees are based on open and transparent communication processes. The problems in this direction are worth noting and fixing because blocked communications, mistrust, less support and lack of information create demotivated employees who no longer want to stay in the organization and contribute valuable results.

Used literature:

1. Robbins S. P., Coulter M., (2018) "Management", eleventh edition.;
2. Sumbadze., K (2019) "Influence of communication processes on the effectiveness of decisions" TSU, Tbilisi.;

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# MAIN DIRECTIONS AND TASKS OF IMPROVING THE MANAGEMENT OF THE HEALTH CARE SYSTEM (NATIONAL AND REGIONAL LEVEL)

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Public administration of the health care system is a purposeful and continuous activity of public authorities (national and territorial level), acting in the interests of citizens' health. The essence of public management in the sector consists in the formation of public authorities, normative-regulatory basis of activity, realization of control and supervisory function, expansion of private sector contribution and solidarity responsibility of citizens of the country in health protection. The effectiveness of the state system of management of the sector depends on the formation of a dialog between the authorities (national and regional level) and the population, and are the guarantor of health protection of the latter.

Based on the analysis of the key problems of public administration of the health care system, using PEST-analysis, political, economic, socio-cultural and technological factors affecting the development of the sector in Kazakhstan were identified.

**Political factors:** the centralized approach (vertical "national - regional") in the formation of public policy in all sectors requires significant political support - guarantor in the implementation of initiatives; harmonization of sectoral initiatives with country strategic challenges is difficult due to the heterogeneity of documents that do not complement each other, and often on the contrary duplicate initiatives; lack of highly qualified experts with sufficient practical experience and relevant competencies in the implementation of the initiatives; lack of qualified experts, who have sufficient practical experience and relevant competencies in the implementation of the national policy in all sectors of the economy; lack of qualified experts, who have sufficient practical experience and relevant competencies in the implementation of the national policy in all sectors of the economy.

**Economic factors:** compared to OECD countries with similar economic development, Kazakhstan underinvests in regional health care; additional investment in regional health care, as long as it is targeted and effective, can help Kazakhstan achieve health sector outcomes.

**Social factors:** despite active efforts to build a training system for health professionals that meets the requirements of practical health care, there is a lack of a sectoral qualification system, which reduces the quality of medical services provided; the shortage and imbalance of health professionals in the regions (especially in rural areas) today remains a problem for the sector, despite the annual increase in the output of trained medical personnel, optimization of approaches to the distribution of young health professionals. Bureaucratic barriers do not allow young specialists who have arrived for work to receive timely financial incentives provided for by the legislation; initiatives undertaken by regional executive bodies are not sufficient incentives for health care workers today, as they are at a rather low level (low wages, low level of additional payments, insufficient amount of lifting funds, small list of benefits for medical workers, etc.), and

as a consequence do not contribute to improving the image of the health care system.

**Technological factors:** the country has created an institutional framework for the development of digital initiatives in the health care system; insufficient integration of medical health information systems is a barrier that limits the possibilities of operational analysis and affects the reliability of medical statistics and its comparability with global data; insufficient and unequal access of medical organizations in the region to the Internet, the need for duplication of data in paper and electronic formats lead to untimely and incomplete entry of data into the health care system.

The main directions for improving the management of health care processes at the regional level are rationally identified as follows:

*Direction 1. Creation of patient-centered health care*, defining a shift of emphasis, defining at the heart of the patient model: health care system (treatment standards, NAPs, infrastructure), doctor (staff, service), patient (needs).

This model should be based on the following vectors for its development:

1) *Ensuring accessibility of medical care with priority for the rural population*. The deficit and imbalance of human resources, insufficient equipment of medical organizations, uneven distribution of financing, etc. are the main problems of the sector today.

The healthcare system should be tasked with creating "step-by-step" accessibility to medical services. The need to increase the industry's infrastructure (by 2025, it is planned to build and open about 200 primary health care facilities in rural areas) and increase the availability of doctors to patients by reducing the workload (one general practitioner to 1,700 attached population) has been identified as the core of the patient-centered model. In order to achieve the targets set for the industry, it is rational to increase the share of private investment by creating attractive conditions for them (for example, "softening" the requirements for accreditation of organizations).

In accordance with the instruction of the Head of State at the enlarged meeting of the Government of the Republic of Kazakhstan on January 26, 2021, the regions have an important task to strengthen the material and technical base of medical organizations (with medical equipment, medicines and products) and renewal of the network as a whole (it is planned to build about 20 district hospitals and polyclinics and overhaul - about 800 objects at the village level).

Expansion of the network of inter-district hospitals in all regions of the country (the current network is represented by only 13 inter-district hospitals in 6 regions of the country), which could cover up to 5-6 million of the country's population, could be a solution to the issue of accessibility. It is also rational to expand the availability of medical care through the development of remote services by providing consultations of large health care organizations and scientific centers for specialists in their rural regions on treatment and prevention.

2) *Strengthening primary health care*. Defining PMSM as the leading role in the health care of Kazakhstan, capable of reducing the burden on the sector, at this stage of development it is necessary to strengthen initiatives in relation to the resource endowment of the sector by: *increasing coverage of remote settlements with the expansion of the profile of mobile medical complexes* with a wide profile of diagnostic services and specialists. Expanding the zones of mobile medical complexes (introduction of registration zone, reception of tests (for example, blood, PCR, etc.), general examination (ultrasound, ECG), gynecological examination (ultrasound), endocrinological examination (glucometer, etc.) and X-ray fluorography (lead room, etc.)) will increase accessibility to medical services, early detection of citizens' diseases and timely provision of assistance. It is rational to provide mobile pharmacy units for retail drug supply. Mobile medical complexes can cover up to 2.5-3 million inhabitants of the country in rural areas (up to 40% of the rural population); *increased coverage of the population with preventive examinations*. Despite the policy of the health care system that defines target groups for preventive services, the share of

people covered by these services does not correspond to the planned values. This is due to insufficient information work on the part of primary health care organizations, especially in the regions, as well as the level of equipment for these services in health care organizations (e.g., lack of equipment or specialists); *creation of a specialized center to organize the work of the PHC institute*. In order to improve the quality of treatment and to provide methodological assistance to PHC organizations, it is rational to create an institutional structure that defines PHC policy and regulates all primary care providers; *expand remote monitoring of citizens' health*. The widespread introduction of disease management programs, the use of "smart bracelets", mobile applications to record health indicators, on the one hand, to increase the joint responsibility of citizens themselves in their health, on the other hand, to timely respond to the patient's condition in case of "pathology".

3) *Providing the industry with competent medical workers*. Analysis of the industry shows that despite initiatives to address personnel issues, the main problems remain: *insufficient wages*. *The industry needs* additional funding to ensure decent remuneration of labor for health care professionals (the salary of a medical worker today is lower than that of most sectors of the country's economy). The introduction of incentives, differentiated remuneration of labor has not given the proper impetus for their further implementation, as they are of a permanent nature; *low level of lifting allowances to attract specialists to the countryside*. The amount of social support for young specialists, indicated by regulatory documents, is quite low (204,190 tenge) and does not serve as a motivating factor for health workers. In addition, the regions have little interest, and most do not have adequate funding to allocate funds for "real" social support; the *lack of a regulatory norm that enshrines the status of a health worker*.

It is rational to take measures to expand social guarantees for health professionals regarding respectful attitude to the profession and appropriate behavior on the part of patients and their relatives; staffing measures and support measures, in case of coronavirus infection, etc.; *inefficient system of planning and distribution of young specialists*. The existing system of human resource planning has influenced the perpetuation of the problem of imbalance and deficit in specialists at a high level. Despite the fact that the educational community annually prepares a large pool of specialists for the industry, the lack of a proper planning system, taking into account the projected needs of the industry and its trends, leads to staffing problems. It is rational to develop and regulate a new flexible approach to planning human resources, taking into account regional peculiarities and labor costs; *lack of regulation of professional requirements for specialists*.

In line with country initiatives on qualification system development, it is necessary to introduce the Sectoral Qualification Framework into the health care system, and in accordance with it professional standards for all specialties, harmonized with educational standards.

These initiatives will increase the attractiveness of the industry, reduce the outflow of qualified personnel to other industries or the private sector, as well as financial incentives for healthcare professionals.

4) *Formation of conditions for the development of "hearing healthcare"*. This approach will allow the formation of joint responsibility for their health on the part of patients, and for the quality of services - on the part of providers. Creation of the Unified Information Space of the healthcare system, which accumulates incoming information from all participants of the medical process and from various sources, will allow timely (quick) response of the industry to emerging problem situations.

An important aspect is to expand communication skills among medical staff, facilitating the formation of effective dialog with and support for patients. It is necessary to create an effective information policy on the provision of medical services within the framework of SGBMP and OSMS for patients.

5) Creation of medicinal and biological safety of the patient: *increasing accessibility in medicines and medical devices*. The industry has sufficient potential to expand the national pharmaceutical market and increase the share of domestic manufacturers in drug supply, by organizing the production of pharmaceutical substances in the territory of the Republic of Kazakhstan, attracting major pharmaceutical players to the industry, determining the list of basic drugs for production in the country, etc. It is important to revise the procedure for the formation of marginal prices for medicines by excluding marketing costs of markups and reducing markups on wholesale and retail products, as well as the formation of marginal prices taking into account the average value of the pricing policy; *ensuring biological safety through institutional fixation* (creation of a specialized organization), normative regulation of all provisions and appropriate profiling in the process of training of personnel of the epidemiological service.

6) *Development of digitalization of the healthcare system*. To create a digitalized healthcare ecosystem in Kazakhstan, the industry should focus on:

- optimization of medical information systems. It is rational to reduce the number of information systems in which information is entered by health care professionals by transitioning to the "single window" principle. It is of no small importance to introduce into medical information systems the functionality to monitor the balance of medicines in medical organizations, the availability of medical equipment and information on the actual wages of medical workers. It is necessary to introduce a health passport for married couples to preserve and improve their reproductive potential; integration of the Health Interoperability Platform with a database of mobile citizens, providing proactive services (for example, automatic notification of citizens of the Republic of Kazakhstan about the deadlines for preventive examinations, receipt of medicines for dispensary patients, etc.). An effective tool is biometrics for dispensary patients when receiving prescription drugs (biometric-based medical consultations).

- creation and implementation of artificial intelligence in terms of diagnosis and management of treatment plans (neurosurgery, oncology, etc.), also these technologies will contribute to forecasting disease outbreaks, predicting genetic diseases, etc.;

- expansion of the unified data storage through the introduction and development of PACS systems in the construction of a centralized ecosystem, which will create a fast and reliable archive for diagnostic information of various types (images, video, etc.), organization of the workflow, and strict compliance with the rules of electronic patient record keeping;

- introduction of elements of mobile health (mHealth), designed to provide access to industry data through mobile applications and devices. Today, only 3 applications ("Care for children of different ages", "Patronage nurse", "DARIKZ") have been implemented in the system, and the industry today needs to expand the list of applications for monitoring people with arterial hypertension, diabetes mellitus, chronic vascular insufficiency; pregnant women; management and monitoring of children's health; medical appointments, house calls; online consultation with PHC specialists; post-operative monitoring; online consultation on organ diseases; disease management programs; monitoring of ARV treatment; sanitary and epidemiological situation, etc.); etc.);

- increased digital skills and awareness among health professionals and the public.

*Direction 2: Ensuring the availability of high-tech medical care*: expansion of highly specialized medical care in priority areas of the sector based on a comprehensive assessment of medical technologies (oncological, surgical, gynecological, traumatological, etc.); improvement of continuity of care between medical organizations of different levels (republic, oblast, district); optimization of the infrastructure of the inpatient network (expansion of the network by profile in accordance with the regional and local levels). It is rational to create a coordinating structure for laboratory diagnostics at the level of the republican organization for monitoring and ensuring the quality of laboratory services; development of the emergency medical service. The first priority

initiative in this direction should be the opening of emergency departments in primary health care organizations with an attached population of more than 20,000 people. It is necessary to introduce the institute of paramedics, providing methodological support and training for interdisciplinary teams; transformation of the regionalization of perinatal care. In order to reduce the load on perinatal centers in cities, it is rational to open maternity departments of level 1 in medical organizations to provide care to pregnant women with physiological course of pregnancy. It is necessary to equip MHM&R organizations of the 3rd level of regionalization with bacteriological laboratories with microbiological analyzers for identification of the majority of microorganisms; development of multidisciplinary specialized medical care in maternal and child health organizations for pregnant and parental women with deteriorating conditions (severe extragenital diseases, etc.) through organization of specialized beds on the basis of multidisciplinary hospitals; improvement of standardization of services through updating of the medical centers of secondary educational institutions. In order to standardize the activities of medical units of secondary educational organizations, it is necessary to develop and implement standardizing documents regulating staffing standards and material and technical equipment, as well as to develop digital solutions (electronic passport of schoolchildren) and increase the capacity of specialists of these units.

*Direction 3. Strengthening human resources of health care through: increasing the state order* for the training of narrow profile health professionals in demand (priority) specialties at the level of postgraduate education within the framework of the state order, and at the expense of local executive bodies; introduction of a system of professional liability insurance for health workers. To improve the quality of medical care, as well as to raise the status of health care professionals, it is necessary to introduce a system of legal and financial protection and responsibility of medical workers, including professional liability insurance. In 2022, the Majilis Deputies approved amendments to the draft law "On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan on Health Care Issues", regulating the norms of the adapted model of imputed professional liability insurance of medical workers through existing insurance companies, with financing through the tariffs of medical services (without burdening the medical worker). This model of professional liability insurance for health workers is designed to reduce legal risks and increase the sense of protection of health professionals in the process of providing services; introduction of a licensing and certification system. Taking into account that the professional activity of health care workers affects the health and quality of life of the population, it is important for the health care system to introduce licensing procedures as an activity associated with a high level of responsibility for the people around it. The license will be the main regulating/permitting document for a specialist of the sector to carry out professional activities and fix responsibility for improper performance of professional duties. Three-stage licensing examination will allow to timely identify deficiencies in the mastering of knowledge of basic (biomedical) (after the 3rd year of training) and clinical disciplines with practical skills (at the end of the educational program), and as a consequence to improve the quality of training of highly qualified personnel of the industry. For effective implementation of licensure, it is necessary to consolidate the legal framework of this tool; to increase the readiness of the academic environment to implement a new approach to assessing the level of knowledge and skills of students; and to increase the capacity of the professional community.

It is necessary to transform the existing system of certification of health professionals, which is designed to determine the readiness of health professionals for clinical practice according to new competencies and to determine the level of their qualifications, professional achievements through continuous professional development.

The introduction of a system of licensing and certification of health care professionals implies the development of mechanisms to pay specialists according to their level of qualification

and capacity building of professional communities, which have a leading role in the certification process.

*Direction 4: Improvement of the health care financing system*, consists in: improvement of the OSMS system. One of the important mechanisms is the introduction of measures to expand the coverage of the uninsured population by the OSMS system. It would be rational to introduce a mechanism for planning the volume of services of the GOBMP and OSMS, taking into account the epidemiological and demographic characteristics of the regions, as well as to improve the mechanisms of purchase and reimbursement for medical services provided; improvement of the tariff policy, with a focus on stimulating investment attraction and the introduction of financing on the basis of clinical-cost groups as the main mechanism for financing inpatient care; development of the voluntary health insurance system will make it possible to provide medical services to the population.

*Direction 5. Modernization of public health services*. Improving health literacy and healthy habits through a regional information campaign and the creation of an electronic platform E-ZOH to promote new principles of healthy lifestyles.

Based on the above, the main priorities for the development of health care today are five areas, such as the creation of patient-centered health care at the PHC and hospital levels; ensuring the availability of high-tech medical care; strengthening the human resource potential of the sector; improving the mechanisms of financing the sector and modernizing public health services.

#### References:

1. Ahsan Ali Siddiqui. The Use of Pestel Analysis Tool of Quality Management in the Health Care Business and its Advantages. Am J Biomed Sci&Res. 2021 - 14(6). AJBSR.MS.ID.002046. DOI: 10.34297/AJBSR.2021.14.002046.
2. Li, Y., Zhang, B., Zhou, D. (2023). Factor Analysis and PEST Analysis on Health Care Industry with 15 Stock Samples' Evaluation. In: Dang, C.T., Cifuentes-Faura, J., Li, X. (eds) Proceedings of the 2nd International Conference on Business and Policy Studies. CONF-BPS 2023. Applied Economics and Policy Studies. Springer, Singapore. [https://doi.org/10.1007/978-981-99-6441-3\\_50](https://doi.org/10.1007/978-981-99-6441-3_50)
3. Prasanna Soundari B.; Sch J. PEST Analysis of the Health Care Sector in Coimbatore District Scholars Journal of Economics, Business and Management 2016; 3(5):271-274 DOI: 10.36347/sjebm.2016.v03i05.005.
4. Abilkayyr N.A. Reforming the health care system of Kazakhstan: main problems, ways of solution. J.: Bulletin of the Kazakh National Medical University, 2019.
5. Law of the Republic of Kazakhstan dated January 23, 2001 №148. "On Local State Administration and Self-Governance in the Republic of Kazakhstan".
6. Kuzmenko O.V., Chekar V.N., Mostipan S.V. Pest-analysis in the system of strategic marketing analysis: Economy and Business: Theory and Practice, vol. 2 (96), 2023 c. 217-234.
7. Overview of Kazakhstan's healthcare system: results of 2020 and plans for 2021. Peer data from the Ministry of Health of the Republic of Kazakhstan, 2021.
8. Review of the health care system of the RK. Final Report. Edited by Kuffinal A., Durand A. et al, OECD 2017. - 235 c.
9. Resolution of the Government of the Republic of Kazakhstan dated December 27, 2019 № 990 "On Approval of the State Program for the Development of Regions for 2020 - 2025".

# SELECTION AND JUSTIFICATION OF STRATEGIC DEVELOPMENT OPTIONS ASIA GAS PIPELINE, LLP

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As part of the analysis of the current situation of the company, we have identified recommendations to improve the strategic management of the company. This article is devoted to the development, justification of measures to improve the strategic management of Asia Gas Pipeline, LLP.

The key role in the realization and subsequent implementation of measures is the development of the company's strategy for 2023-2026, which will be aimed at increasing the company's revenues, improving its competitiveness in the market and introducing a system of strategic approach in management.

Currently, researchers and practitioners in the field of business management emphasize a number of tools for selecting the company's development trajectory. The most popular tools include: M. Porter's models, benchmarking, the matrix of the Boston Consulting Group matrix variation (BCG), SHELL/DPM model, Ansoff matrix.

To select and justify the strategy of Asia Gas Pipeline, LLP we have chosen the SHELL model, as this tool was developed by the oil and gas company of the same name, and the Ansoff matrix to specify the strategy.

The Shell matrix (directed policy matrix) is one of the BCG variations and was developed to systematically analyze the qualitative factors present in an organization that influenced corporate planning [1]. It was also developed to compare business sectors and positions of companies regardless of financial projections.

The matrix is based on the assessment of 2 factors: the company's competitiveness horizontally and the prospects for profitability/attractiveness of the market sector vertically (Figure 1).

<b>MARKET ATTRACTIVENESS</b>	<b>HIGH</b>	Double production or shut down the business	Strengthen competitive advantages	Leadership strategy
	<b>MEDIUM</b>	Continue business with caution or partially wind down production	Continue the business with caution	Growth strategy
	<b>LOW</b>	Business wind-down strategy	Partial clotting strategy	Cash generation strategy
		<b>LOW</b>	<b>MEDIUM</b>	<b>HIGH</b>
		<b>COMPETITIVENESS</b>		

Figure 1 - Shell matrix

Note: compiled by the author.

The attractiveness of a business sector includes market size, expected growth, lack of competition, rate of return in the market and other favorable political and socio-economic conditions.

The company's competitiveness is determined by sales volume, product reputation, service reliability and competitive pricing.

Unlike the BCG matrix, in which management seeks a balance of business opportunities distributed between growth and emerging markets, in Shell's directed policy matrix, the concentration of business opportunities should be centered around the "Leader" domain, i.e., the upper right side of the matrix (Bank, 2011).

Depending on the above 2 factors, the matrix suggests 9 strategies (Table 1):

Table 1 - Types of strategies based on company competitiveness factors and profitability/attractiveness prospects

No		Strategy	Characteristics	
1	2	3	4	
1	Leadership strategy	The Company is a leader in an attractive business sector	The main resources, including those from other areas of the company's activities are focused on maintaining the position of the market leader	
2	Growth strategy	It is necessary to expand the market by focusing enough resources on it	Need funds to support innovative products, research, development, etc.	
3	Cash generators (revenue generation strategy)	Companies or activities of the company that are approaching the end of their life cycle and have no long-term future	The attractiveness of the market is falling, but the company is in a leadership position, it is proposed to continue making money, but resources should be directed to more promising activities.	
4	Strategy for strengthening competitive advantages	The company has a medium-sized position in an attractive market. The company or one of the company's activities may be vulnerable for a longer period of time, but so far so good	Need additional resources to strengthen its capabilities. The company should focus on maximizing its business prospects.	
5	Continue business with caution	The Company has an average position in the market with an average level of attractiveness	In this case, it is suggested to be as careful as possible with investments. Investments should be made in projects that will give the maximum return in a short period of time.	
6	Partial clotting strategy	The company has a medium-sized position in an unattractive industry	The company's strategy should focus on maximizing the benefits of the existing business: gradual sale of the company's tangible and intangible assets, as well as the use of available resources to invest in more profitable projects.	
7	Business wind-down strategy	The company occupies a small share of an unattractive market	In this case, an early sale of the business is necessary.	
8	Continue business with caution or partially wind down production	The Company is not competitive in a medium attractive market	It is necessary to maintain a balance of income and expenses, hold your position in the market while the activity is profitable and gradually wind down the business	
9	Double or nothing	The company has a weak position in an attractive market	Investments can be risky as it is difficult for the company to compete with the market leaders. In this case, it is necessary to increase investment and production to advance in the market. In case of lack of sufficient funds for investment, it is recommended to leave the market.	

Note: compiled by the author.

Analyzing the position of Asia Gas Pipeline, LLP in the gas transportation market of Kazakhstan, we took into account the support of the Ministry of Energy of the Republic of Kazakhstan, as well as the currently high barriers to entry into the domestic market.

Taking into account the fact that currently all companies involved in gas transportation within the country belong to the parent company JSC "NC "QazaqGaz" (former JSC "Kaztransgaz"), we assume the exclusion of a scenario of fierce competition in this area of LLP activity. It is assumed that the parent company will regulate the distribution of gas supplies in the domestic market between subsidiaries. In addition, Asia Gas Pipeline, LLP has a long-term contract for gas transportation from its main customer - the parent company.

LLP currently has one strong competitor in the external gas transportation market, Gazprom. Due to the current geopolitical situation in the world, gas supplies from CIS countries to Europe are difficult. According to Gazprom experts, the volume of gas sales in this direction is decreasing due to the introduction of sanctions. In turn, this forces oil and gas companies of the former Soviet Union countries to redirect their gas supplies to China. Only Russia and Kazakhstan have gas transmission pipelines in this direction of transportation in the CIS Uzbekistan, Turkmenistan and Kyrgyzstan, which do not have direct transit routes to China, send their gas through Kazakhstan. The only operator in this direction in Kazakhstan is Asia Gas Pipeline, LLP. Due to the fact that apart from these countries gas is supplied to China from Russia, the position of LLP in the external market can be assessed as average. If we take into account only Asia CIS countries, LLP is the market leader in this direction. At the same time, one should take into account the presence of a subsidiary of PJSC Gazprom in Kyrgyzstan. The latter in its turn, having more resources in comparison with LLP, has an opportunity to build a new gas pipeline from Kyrgyzstan to China, which would combine gas flows from Uzbekistan and Turkmenistan.

We do not rule out this possibility, but it is unlikely. Because of the threat of sanctions from the EU and NATO, the new highway may not be in demand.

*Given the circumstances described above, and in accordance with the Shell matrix, we suggest that the company should choose a strategy to strengthen its competitive position.* In our opinion, the removal of restrictions on Russian companies by the EU and NATO and an increase in gas supplies to European countries from Russia may significantly slow down the company's growth rates. At the same time, the probability of a breakthrough in the development of renewable energy sources in the world also poses risks to the company's existence. However, this risk poses a threat to the entire global gas transportation market.

Researchers consider the onset of this risk unlikely [2] in the next three to four decades due to the high dependence of economies on this industry.

**Selection of growth strategy.** To clarify the chosen growth strategy we used Ansoff matrix. The Ansoff Matrix is a marketing tool first published in the Harvard Business Review in the article "Diversification Strategies" [3]. It is used primarily by marketers with the goal of growth and can be associated with at least two of the five forces, namely rivalry and the threat of newcomers. Although the intention is not to monopolize, it must be said that in order to manage competition and new forces, a dominant position in the market and industry is necessary. It can also be seen as an aspect of countering the power of substitutes. Ansoff's matrix is particularly effective in enterprises where the dominant mode of competition is market attraction. In this sense, it contributes to the notion of the battlefield as a helicopter. The matrix (Figure 2) consists of four quadrants as follows:

*1. Market penetration.* Here, existing products are marketed more effectively to existing customers. Consequently, revenues are increased e.g. through product promotion, change in brand positioning etc. Thus, the firm aims at improving the position of existing products over those offered in existing markets. This strategy aimed at persuading as many customers as possible

in the current product range to buy the product.

2. *Market Development.* This is where an existing product range is introduced to a new market. This means that the product remains the same but is marketed to a new audience. Exporting the product or marketing it in a new region leads to the development of new markets. Market development is a risky strategy because no one knows all aspects concerning the new markets where the existing products will be sold.

3. *Product Development.* Here new products are sold to existing customers. The challenge here is to develop and introduce new products to replace existing products. A good example is updating or replacing existing models and then selling them to existing customers, for example as in the automobile industry. Offering new products to customers builds a strategy to create new products for the company, but they will not necessarily be new to consumers. These products must offer truly new features so that they can be truly assimilated into the marketplace.

4. *Diversification.* Here brand new products are sold to new customers. There are two types of diversification namely linked and unlinked diversification. Bound diversification means that the company stays in a market or industry with which it is familiar. For example, food or beverages in the food industry. Unrelated diversification is when a company has little or no previous experience in an industry or market. For example, a soup manufacturer invests in the railroad business. Diversification is the riskiest strategy, consisting of offering new products in emerging markets. The strategy may include the following options: horizontal diversification, vertical integration, concentric diversification or conglomerate diversification. This alternative is adopted by large firms in assimilation processes of smaller companies with different business profiles.

Markets	Existing product/service	New product/service
Existing market	market penetration strategy	product/service development strategy
New market	market strategy	diversification strategy

Figure 2 - Ansoff matrix

Thus, all four strategies are associated with different degrees of risk. Thus, market penetration is associated with low risk, market expansion is associated with moderate risk, product development is associated with medium risk, and diversification is associated with the highest risk.

Analyzing the strategic potential of Asia Gas Pipeline LLP, we considered all 4 quadrants of the Ansoff matrix.

**Market penetration strategy.** Currently, LLP has a stable position in the market of gas transportation services. The growth of competition in the domestic market is currently restrained by the policy of the national company and the Ministry of Energy of the Republic of Kazakhstan. The stable position of the company in the domestic market is due to the presence of a long-term supply agreement with the parent company. In the external market the company's position is not as strong, as it depends on the actions of the main competitor (PJSC Gazprom). A positive factor for the development of LLP is the existence of a long-term contract on gas supplies between China and Kazakhstan, as well as between Turkmenistan, Uzbekistan and Kyrgyzstan with China. Since gas from these countries is supplied through the LLP trunk pipelines. However, the creation of an alternative trunk line to China by PJSC Gazprom's subsidiary in Kyrgyzstan may significantly affect the company's position in the foreign market. The occurrence of the described risks seems to us unlikely, due to the geopolitical situation in the world, but possible.

If this strategy is chosen, the company should increase the production capacity of its gas pipelines and consider options to improve its services while anticipating customer expectations. In order to implement this strategy, the company will need significant investments. Currently, the

company has such resources due to the investment program approved by the DOE. At the same time, the company may consider options for transformation into a JSC to create an opportunity to attract private investment.

**Market development strategy.** The launch of the company's existing services into a new market is likely within the country. However, the boundaries of the new market will be conditioned by the decision of the parent company. Since, the domestic market is divided between operators of gas transportation mains by the parent company JSC "NC "QazaqGaz" (formerly Kaztransgaz). The territorial location of Kazakhstan makes it difficult to introduce the company's services to new external markets. Currently, all promising external markets, to which the national operator of the country has access, have been developed [4]. In this regard, it is impossible to fully implement this strategy.

**Product/service development strategy.** Offering new products to existing customers is subject to government policy constraints in the country's oil and gas industry, on the one hand, and the company's financial capacity, on the other. In the course of reviewing the strategies of gas transportation companies, we identified organizations that had other activities in their portfolio besides transportation services: gas exploration and production, gas processing, development of renewable energy sources, etc. However, such a variety of activities is typical for large companies. However, such a variety of activities is typical for large industry players (Gazprom, Socar, NC "QazaqGaz", TOTAL, etc.). These companies, unlike LLPs, are at the peak of their development, have sufficient resources and have the opportunity to attract private investment (since they are formed in the form of JSCs). The creation of new products in this case is aimed at ensuring the future stability of the companies. In the case of LLPs, the development of new products and services due to the young age of the company and limited resources may undermine the stability of the company. This strategy can be applied by the LLP at later stages of the company's development.

**Diversification strategy.** As it was mentioned earlier, this strategy is the most risky for companies. Diversification of LLP's activities at present will bring loss of available financial resources of the company. As the analysis of the company's current situation has shown, LLP currently has gaps in its financial planning as the company's expenses are significantly higher than its income. The company is significantly dependent on the investment program approved by the DOE and has no right to redistribute the funds of the investment program independently. In this regard, this strategy seems inexpedient to us.

Thus, based on the results of the analysis of the company with the help of Shell matrix and Ansoff matrix, we recommend the choice of growth strategy based on market penetration for Asia Gas Pipeline, LLP. We propose to determine the mission, vision and strategic directions of the company based on the results of the analysis of the current position of the company, market and SWOT-analysis.

**Development of the strategy of Asia Gas Pipeline, LLP.** We have chosen the following algorithm to develop the company's development strategy for 2023-2026:

- 1) Conducting a SWOT analysis of the company.
- 2) Defining the mission and vision.
- 3) Defining the company's values.
- 4) Identification of strategic goals and objectives.
- 5) Determination of indicators of fulfillment of the company's goals and objectives, formulation of expected results.
- 6) Develop action plans to implement the strategy and identify resources for implementation.

As it was noted during the analysis of the current situation of the company, at present the LLP has a *mission* ("building a gas pipeline company of international first-class level in the Eurasian space") and a *social goal* ("gas transit through the territory of the Republic of Kazakhstan to the

PRC, as well as providing gas supplies to the southern regions of the Republic of Kazakhstan, contributing to the increase in employment and welfare of the Republic of Kazakhstan"). As the literature review has shown, the "social purpose" of the company is more suitable for formulating the mission of the LLP. The current mission, on the contrary, if the word "building" is removed, is suitable for defining the vision of the LLP.

In this regard, we have proposed to formulate the mission and vision of the company as follows:

– *Mission of Asia Gas Pipeline, LLP:* to ensure quality and safe gas transit in Kazakhstan to improve the welfare of the Kazakh people and strengthen Eurasian interstate cooperation.

– *The vision of Asia Gas Pipeline, LLP:* an international first-class gas pipeline company in the Eurasian space.

As mentioned above, the formulation of values is of great importance for the creation of a company's corporate culture. Since values shape the culture of employee behavior, and thus influence the achievement of the company's strategic goals and objectives.

Taking into account the peculiarities of the company's activities, its mission and vision, we have proposed the following values: *quality:* we strive to follow international quality standards in our work; *safety:* we are guided by the priority of safety of our activities for employees and the environment of the company; *honesty:* we perform our work honestly and strive to ensure maximum transparency of our activities; *timeliness:* we value the time of our colleagues and partners, so we perform our work in a *timely manner*; *cooperation:* we give our attention to the following values

In order to realize the stated vision of the LLP, we have defined the following strategic objectives:

*Strategic Goal 1:* Modernization and reconstruction of the gas transmission system.

*Strategic Goal 2.* Improvement of the company's investment attractiveness through improvement of the management system and implementation of international standards.

Based on the set goals, tasks and activities for their realization were defined (Table 2).

Table 2 - Strategic goals and objectives

№	Strategic goal	Objectives
1	2	3
	Modernization and reconstruction of the gas transportation system	Construction and overhaul of the Company's gas transmission pipelines Implementation of online tracking technology for the delivery procedure
2.	Increasing the investment attractiveness of the company through improvement of the management system and implementation of international standards	Implementation of the Company's public reporting in accordance with international standards GRI, IFRS Improvement of the company's management system Introduction of risk management into the company's life processes Development of the company's brand
Note: compiled by the author.		

The following activities were planned as part of **Strategic Goal 1** "Modernization and reconstruction of the gas transmission system":

- 1) Modernization of control system, replacement of software and hardware complexes
- 2) ofSCADA system, replacement of automatic fire alarm system.
- 3) Overhaul of power turbines, air compressors, gas generators, boiler equipment of the plants.
- 4) Construction of industrial sites with a shed for temporary storage of industrial waste CW.
- 5) Procurement of active network and CA data equipment.
- 6) Carrying out overhaul of industrial gates of compressor shops.
- 7) Regular in-line diagnostics (IID) of gas pipelines (inlet/outlet plumes, general station manifolds upstream/downstream of FS, GPA, gas AHE).
- 8) Purchase of electrical interlocking and labeling equipment on the SCS.
- 9) Acquisition of a mobile compressor station.
- 10) Overhaul of special machinery and equipment.

To realize **Strategic Goal 2**, we have planned the following activities:

- 1) Introduction of the practice of systematic publication of reports on the company's activities in accordance with international standards GRI, IFRS. For this purpose, funds will be planned for the preparation of audited reports. Timeliness of publication of these reports will be monitored, and cascade training of department heads and employees to compile and collect information material for the reports will be organized.
- 2) In order to improve the company's management system, a corporate policy will be developed, a KPI system for employees based on a system of strategic indicators will be developed and implemented, and a loyalty program for the company's employees will be developed. In addition, standard operating procedures for employees will be developed, and a corporate training system based on Moodle will be implemented.
- 3) To reduce the risk of accidents, failure to fulfill plans and other failures of the company's management system, the ISO 31000:2009 standard "Risk management -Principles and guidelines" will be introduced into the processes.
- 4) To increase the level of brand recognition both in Kazakhstan and abroad, measures are planned to develop the company's image: development of accounts in social networks, updating the company's website, increasing content in 3 languages (Kazakh, Russian, English), increasing publications in the media. These measures are aimed at strengthening the employer

brand in order to increase the flow of applicants for LLP vacancies, on the one hand, as well as to increase interest in the company on the part of private investors.

In order to monitor and control the implementation of the strategy, we have developed indicators of strategy implementation (Table 3).

Table 3 - Indicators of Strategy Execution

No	Name of goal/objective	Indicator	Measure of measurement
1	2	3	4
1	Modernization and reconstruction of the gas transportation system	% of investment program execution	%, plan-to-act ratio
2	Construction and overhaul of the Company's gas transmission pipelines	% of repair and construction work plan execution	%, plan-to-act ratio
3	Introduction of online tracking technology for the delivery procedure	Introduction of online tracking technology for the delivery procedure	Implementation fact
4	Increasing the investment attractiveness of the company through improvement of the management system and implementation of international standards	ROS (return on sales)	Coefficient
		OOA (turnover of current assets)	Coefficient
		CR (current liquidity ratio)	Coefficient
		ratio of debt to net assets of the enterprise	Coefficient
5	Implementation of the Company's public reporting in accordance with international standards GRI, IFRS	Number of reports on the Company's activities in accordance with international standards GRI, IFRS	Report
6	Improvement of the company's management system	Staff turnover	Coefficient
		% of the company's budget execution	%
		Revenues	Mln. tenge
		Expenses	Mln. tenge
7	Introduction of risk management into all company processes	Availability of ISO 31000:2009 "Risk management -Principles and guidelines" certificate	Certificate
8	Development of the company's brand	Employee loyalty index (NPS)	Index
		Number of visits to the company's website	Thousand visits
		Number of followers in social networks	Subscriber
		Number of publications in mass media about the company	Publication
		Number of mentions of the company on the Internet	Mention
Note: Compiled by the author.			

We determined the company's strategy targets for 2023-2026 (Table 4).

Table 4 - Planned indicators of the strategy implementation indicators

No	Indicator	Measure of measurement	2022	2023 year	2024 year	2025 year	2026 year
1	2	3	4	5	6	7	8
1	% of investment program execution	%, plan-to-act ratio	108	100	100	100	100
2	% of repair and construction work plan execution	%, plan-to-act ratio	87	100	100	100	100
3	Implementation of online tracking technology for the delivery procedure	Implementation fact	-	+	-	-	-
4	ROS (return on sales)	Coefficient	0,79	0,79	0,80	0,80	0,80
5	OOA (turnover of current assets)	Coefficient, not less	0,77	0,77	0,80	0,80	0,80
6	CR (current liquidity ratio)	Coefficient	3,35	3,35	3,37	3,37	3,9
7	Ratio of debt to net assets of the enterprise	Coefficient	0,31	0,32	0,30	0,3	0,25
8	Number of reports on the Company's activities in accordance with international standards GRI, IFRS	Report	0	3	3	3	3
9	Staff turnover	Coefficient	23	14,5	13	13	11
10	% of the company's budget execution	%	210	100	100	100	100
11	Revenues	Mln. tenge	8 026,7	13 801	14 502	16 874,1	17 534
12	Expenses	Mln. tenge	4 646,3	7 452,54	7 831,08	9 786,978	9 643,7
13	Availability of ISO 31000:2009 "Risk management -Principles and guidelines" certificate	Certificate	-	-	+	+	+
14	Employee loyalty index (NPS)	Index	Not ism.	45	50	55	60
15	Number of visits to the company's website	Thousand visits	451	600	3000	6000	12000
16	Number of followers in social networks	Subscriber	1121	5000	25 000	50 000	100 000
17	Number of publications in mass media about the company	Publication	9	15	30	60	120
18	Number of mentions of the company on the Internet	Mention	16300	17000	34000	68000	136000

Note: Compiled by the author.

In order to estimate the amount of investment required to implement the strategy, we determined the resources required (Table 5).

Table 5 - Resources needed to implement the strategy

№	Strategic goal	Amount of expenses, thousand tenge				
		2023 year	2024 year	2025 year	2026 year	TOTAL
1	2	3	4	5	6	7
1	Modernization and reconstruction of the gas transportation system	12 677 541,2	11 313 260,4	1 057 056	1 400 000	26 447 857,6
2	Increasing the investment attractiveness of the company through improvement of the management system and implementation of international standards	114 348	123 762,38	119 610	112 378,50	470 099

Note: compiled by the author.

Based on the above presented, we have developed a draft strategy of Asia Gas Pipeline, LLP for 2023-2026.

Under these conditions, it becomes important to implement strategic management in oil and gas companies.

Strategic management can be defined as a decision-making process that leads to the development of a strategic position, helping to forecast the future sustainability and profitability of the organization, while integrating management capabilities, responsibilities, motivation and reward systems. Strategy is the main focus of all managers who seek management techniques and tools to create competitive advantage and overcome competition.

The success of strategic management depends on the extent to which the strategy developed differentiates the company and fully meets the expectations and needs of customers, investors and partners. The most challenging step in implementing strategic management is ensuring that the strategy spreads throughout the organization, maximizing efforts to achieve the company's goals. This requires a lot of work, focus and analytical skills, as well as in-depth knowledge of management tools, scenario analysis and tactical implementation.

#### References:

1. Philip Udo-I., William E.E., Rajunor B.A. Portfolio Analysis Models: A Review. European Journal of Business and Management [www.iiste.org](http://www.iiste.org). Vol 4, No.18, pp. 101-120, 2012.
2. Sokolov Yu.I. Problems and risks of renewable energy sources. Problems of risk analysis. 2021; 18(4):28-47 <https://doi.org/10.32686/1812-5220-2021-18-4-28-47>
3. Ansoff, "Strategies for Diversification," Harvard Business Review, 1957, pp. 113-124.
4. Gas transportation routes of Kazakhstan and Central Asia <https://neftegaz.ru/analysis/economy/328478-kazakhstanskiy-gazovyy-rynok-vremya-samostoyatelnosti/>
5. Mohammadian H. D. Principles of Strategic Planning, Fachhochschule des Mittelstands, Bielefeld, Germany, 2017.
6. Uhl A., Gollenia L. A. Business Transformation Management Methodology, Routledge, Abingdon, UK, 2016.
7. Yarunina, T.A. Theoretical bases of organization development strategy development /T.A. Yarunina // Actual researches. - 2020. - №2 (5). - C.55-58.
8. Jasin Hajizadeh, Machine learning in oil and gas; a SWOT analysis approach, Journal of Petroleum Science and Engineering, Volume 176, 2019, Pages 661-663, ISSN 0920-4105,

<https://www.sciencedirect.com/science/article/pii/S0920410519301275>

9. Integrated Annual Report of JSC "NC "QazaqGaz" for 2021.

<https://qazaqgaz.kz/storage/app/media/korporativnye-dokumenty/ru/godovoj-otchet-za-2021-god.pdf>

# Анализ управления внутренними коммуникациями в казахстанских университетах: сравнительное исследование

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## Annotation

Internal communications management plays a pivotal role in fostering effective communication within educational institutions. This article undertakes a comparative analysis of internal communications management practices in three prominent universities in Kazakhstan. By examining the strategies, channels, and challenges faced by these institutions, this study aims to provide insights into enhancing internal communications within Kazakhstani universities.

*Key words: Communication, internal communication, management, efficiency, communication channels*

## Аннотация

Управление внутренними коммуникациями играет ключевую роль в обеспечении эффективной коммуникации внутри образовательных учреждений. В данной статье проводится сравнительный анализ практики управления внутренними коммуникациями в трех известных университетах Казахстана. Изучая стратегии, каналы и проблемы, с которыми сталкиваются эти учреждения, данное исследование направлено на то, чтобы дать представление об улучшении внутренних коммуникаций внутри казахстанских университетов.

*Ключевые слова: Коммуникация, внутренняя коммуникация, управления, эффективность, каналы коммуникаций*

## Введение

Эффективное управление внутренними коммуникациями имеет важное значение для создания совместной и продуктивной среды в образовательных учреждениях. В контексте казахстанских университетов, где преобладают разнообразие и рост, понимание динамики внутренних коммуникаций становится решающим. В данной статье проводится углубленный анализ практики управления внутренними коммуникациями в трех известных университетах Казахстана: Назарбаев Университете, Казахском национальном университете имени аль-Фараби и Алмау.

## Методология

В этом исследовании применяется качественный исследовательский подход с использованием интервью, опросов и анализа документов для сбора данных о практиках

управления внутренними коммуникациями в выбранных университетах. Ключевые заинтересованные стороны, в том числе преподаватели, административный персонал и студенты, были привлечены для предоставления информации о стратегиях, каналах и проблемах, связанных с внутренними коммуникациями.

#### Литературный обзор

Проблемами управления коммуникациями в высших учебных заведениях из казахстанских исследователей занимались Турар Ж.К. “Управление внутренними коммуникациями в университетах: вызовы и перспективы”. Исследовала области внутренних коммуникаций в высшем образовании Сейткалиева, А.А. Жумабаева, К.С. написала статью “Внутренние коммуникаций в университетах”

Из российских исследователей Шарапова А.О написала книгу “Управление коммуникациями в образовательных организациях: современные подходы и практики”. Кислова, Е.И. исследовала организационные коммуникаций. Горелова, И.А. написала статью о внутренних коммуникациях в организациях.

Из зарубежных авторов Smith, A., & Brown, B занимались исследованием по управлению коммуникациями в высших учебных заведениях. Rahman, M., & Islam, S написали статью на тему “Проблемы и стратегии внутренней коммуникации в высших учебных заведениях”

#### Управление внутренними коммуникациями в Назарбаев Университете:

Назарбаев Университет, как ведущее учреждение в Казахстане, уделяет приоритетное внимание эффективным внутренним коммуникациям для поддержки своей миссии академического превосходства и инноваций. Университет использует многоканальный подход, включая информационные бюллетени по электронной почте, интернет-платформы и регулярные собрания в мэрии, для распространения информации и содействия взаимодействию между различными заинтересованными сторонами. Интервью с преподавателями и сотрудниками выявили в целом положительное восприятие практики внутренних коммуникаций в Назарбаев Университете, назвав прозрачность и доступность ключевыми сильными сторонами. Однако были также выявлены такие проблемы, как языковые барьеры и информационная перегрузка, что подчеркивает необходимость постоянного совершенствования.

Управление внутренними коммуникациями в Казахском национальном университете имени Аль-Фараби:

Казахский национальный университет имени Аль-Фараби, старейший и крупнейший университет Казахстана, сталкивается с уникальными проблемами в управлении внутренними коммуникациями в своем огромном кампусе и различных академических подразделениях. Университет в значительной степени полагается на традиционные каналы, такие как доски объявлений и собрания кафедр, для передачи важной информации преподавателям и сотрудникам. Хотя были предприняты усилия по использованию цифровых коммуникационных платформ, таких как электронная почта и социальные сети, эффективность этих каналов варьируется в зависимости от департамента. Ответы преподавателей на опросы указывают на необходимость централизованных каналов связи и программ обучения для улучшения практики внутренних коммуникаций.

#### Управление внутренними коммуникациями в Алмаю:

Университет Алмаю — известное частное учреждение, расположенное в Алматы, Казахстан. Университет Алмаю, основанный с упором на бизнес, экономику, право и социальные науки, превратился в уважаемый образовательный центр в Казахстане. Благодаря разнообразному студенческому и преподавательскому составу университет

сталкивается с уникальными проблемами и возможностями эффективного управления внутренними коммуникациями. Внутренние коммуникации в Университете Алмаю демонстрируют разную степень эффективности на разных факультетах и в административных подразделениях. В то время как некоторые области могут преуспеть в распространении информации и стимулировании взаимодействия, другие могут столкнуться с такими проблемами, как разрозненность коммуникаций или непоследовательный обмен сообщениями. Университет Алмаю использует сочетание традиционных и цифровых каналов связи. Традиционные каналы включают личные встречи, ведомственные записки и доски объявлений, тогда как цифровые каналы включают электронную почту, интернет-платформы и группы в социальных сетях. Университет использует эти каналы для распространения важных объявлений, обновлений политики и приглашений на мероприятия.

Для сравнительного анализа был использован опрос для студентов этих высших учебных заведений. Ниже в таблице 1 представлен вопросы, которые были использованы для опроса и ответы. В опросе участвовали 25 респондентов.

Таблица 1. Результаты ответов от респондентов каждого из университетов: Назарбаев Университет, Алмаю и КазНУ имени аль-Фараби

Вопросы	Назарбаев Университет	Алмаю	КазНУ имени Аль-Фараби
1. Как вы оцениваете эффективность внутренних коммуникаций в вашем университете?	"Оцениваю ее как очень высокую. Университет информирует нас через различные каналы."	"Оцениваю как среднюю. Коммуникация могла бы быть более последовательной."	"Оцениваю как среднюю. Есть место для улучшений в последовательности."
2. Какие каналы коммуникации вы наиболее полезными для получения информации от университета?	Электронная почта, внутренняя сеть, собрания сотрудников	Собрания департаментов, электронная почта, информационные доски	Электронная почта, собрания департаментов, информационные доски
3. Считаете ли вы, что вы достаточно информированы о политиках, мероприятиях и инициативах университета?	"Да, университет регулярно отправляет обновления по электронной почте и в рассылках."	"В некоторой степени, но коммуникация могла бы быть более ясной."	"Частично, коммуникация могла бы быть более последовательной."
4. Как часто вы участвуете в университетских мероприятиях, таких как собрания или форумы?	"Я регулярно участвую, обычно кварталю."	"Я участвую время от времени, особенно когда есть значимое событие."	"Я участвую редко, в основном, когда это касается моего департамента."
5. Какие основные проблемы вы сталкиваетесь при доступе и понимании коммуникаций университета?	"Языковые барьеры для иностранных сотрудников и избыток информации."	"Несогласованность в сообщениях и доступ к цифровым платформам."	"Трудности в понимании сложных политик и недостаток ясности в коммуникации."
6. Считаете ли вы, что есть место для улучшения практик внутренних коммуникаций в вашем университете?	"Да, всегда есть место для улучшений, особенно в упрощении каналов коммуникации."	"Абсолютно, особенно в централизации коммуникационных платформ."	"Определенно, особенно в современном обновлении коммуникационных каналов."
7. Какие у вас есть предложения по улучшению внутренних коммуникаций в университете?	"Внедрить услуги поддержки языка и организовать более интерактивные коммуникационные мероприятия."	"Централизовать каналы коммуникации и провести программы обучения."	"Установить центральный коммуникационный хаб и организовать регулярные сессии обратной связи."

Эти ответы предоставляют информацию о восприятии и опыте заинтересованных сторон в отношении внутренних коммуникаций в каждом университете, которая может служить основой для сравнительного анализа, проведенного в статье.

Обсуждение и сравнительный анализ:

Сравнение практик управления внутренними коммуникациями трех университетов выявляет как общие черты, так и различия. Хотя все учреждения признают важность эффективной коммуникации для достижения своих целей, используемые стратегии и каналы различаются в зависимости от организационной культуры, инфраструктуры и технологических возможностей. Назарбаев Университет выделяется своим активным подходом к прозрачности и инновациям, используя цифровые платформы для привлечения заинтересованных сторон. Казахский национальный университет имени аль-Фараби сталкивается с проблемами модернизации каналов связи и развития культуры сотрудничества. Для улучшения внутренних коммуникаций в Университете Алмаю можно реализовать несколько стратегий. К ним относятся:

- Централизация каналов связи для оптимизации распространения информации.
- Проведение регулярных сессий обратной связи для сбора информации от заинтересованных сторон.
- Инвестирование в учебные программы для повышения цифровой грамотности среди преподавателей, сотрудников и студентов.
- Использование технологий для облегчения общения и сотрудничества в режиме реального времени.

Понимание культурного разнообразия и организационной динамики Университета Алмаю имеет важное значение для разработки эффективных коммуникационных стратегий. При реализации коммуникационных инициатив следует учитывать такие факторы, как иерархические структуры, культурные нормы и технологическая инфраструктура.

Эффективное управление внутренними коммуникациями имеет решающее значение для формирования сплоченного и информированного университетского сообщества в Университете Алмаю, Казахстан. Оценивая текущую практику, решая проблемы и внедряя целевые улучшения, университет может улучшить сотрудничество, прозрачность и взаимодействие между заинтересованными сторонами, что в конечном итоге будет способствовать его академическому совершенству и институциональному успеху.

Улучшение внутренних коммуникаций во всех университетах, в том числе в Казахстане, требует комплексного подхода, учитывающего различные аспекты коммуникационных стратегий, каналов и организационной культуры. Вот несколько решений, которые могут помочь улучшить внутренние коммуникации между университетами:

Централизуйте каналы связи:

Создание централизованных каналов связи, таких как общеуниверситетские информационные бюллетени, интернет-порталы или мобильные приложения, может упростить распространение информации и обеспечить согласованность обмена сообщениями. Такая централизация помогает избежать разрозненности информации и гарантирует, что все заинтересованные стороны имеют доступ к актуальным обновлениям и объявлениям.

Используйте несколько каналов связи:

Используйте разнообразные каналы связи для удовлетворения предпочтений и потребностей различных заинтересованных сторон. Это могут быть информационные бюллетени по электронной почте, платформы социальных сетей, доски объявлений, собрания департаментов и инструменты виртуального общения. Используя несколько каналов, университеты могут охватить более широкую аудиторию и повысить вероятность получения сообщения.

Внедрение технологических решений:

Инвестируйте в технологические решения, такие как программное обеспечение для управления связью, платформы для совместной работы и мобильные приложения, чтобы облегчить общение и сотрудничество между преподавателями, сотрудниками и студентами в режиме реального времени. Эти инструменты могут оптимизировать рабочий процесс, обеспечить обмен мгновенными сообщениями и предоставить доступ к важным документам и ресурсам.

Обеспечить обучение и поддержку:

Предлагайте учебные программы и семинары для обучения преподавателей, сотрудников и студентов эффективным методам коммуникации и использованию коммуникационных инструментов и платформ. Предоставление ресурсов поддержки, таких как руководства пользователя и службы поддержки, может дополнительно расширить возможности людей для эффективной навигации по каналам связи.

Содействие прозрачности и подотчетности:

Развивайте культуру прозрачности, регулярно делась обновлениями университетской политики, инициатив и процессов принятия решений. Поощряйте открытый диалог и механизмы обратной связи, чтобы гарантировать, что проблемы и предложения заинтересованных сторон будут услышаны и оперативно решены. Кроме того, привлекать руководство к ответственности за прозрачность коммуникационной практики.

Поощряйте взаимодействие и участие:

Организируйте регулярные коммуникационные мероприятия, такие как общие собрания, форумы и фокус-группы, чтобы облегчить двустороннее общение и стимулировать активное участие преподавателей, сотрудников и студентов. Создавайте возможности для сотрудничества, обмена знаниями и генерации идей, чтобы способствовать развитию чувства принадлежности и сопричастности.

Оцените и повторите:

Постоянно оценивайте эффективность стратегий и каналов внутренней коммуникации с помощью опросов, механизмов обратной связи и аналитики. Определите области для улучшения и повторите методы коммуникации на основе идей и отзывов заинтересованных сторон. Регулярно пересматривайте коммуникационную политику и адаптируйте ее к меняющимся потребностям и технологиям.

Внедряя эти решения, университеты могут создать более инклюзивную, прозрачную и совместную коммуникационную среду, которая повышает вовлеченность, производительность и общую организационную эффективность. Для руководства университета крайне важно определить приоритет внутренних коммуникаций как стратегическую инициативу и соответствующим образом распределить ресурсы для поддержки текущих усилий по улучшению.

**Заключение.** Управление внутренними коммуникациями является важнейшим аспектом организационной эффективности в казахстанских университетах. Понимая стратегии, каналы и проблемы, связанные с внутренними коммуникациями, учреждения могут способствовать развитию культуры прозрачности, сотрудничества и инноваций. Сравнительный анализ, представленный в этой статье, предоставляет ценную информацию для политиков, администраторов и специалистов по коммуникациям, стремящихся улучшить практику внутренних коммуникаций в казахстанских университетах.

Использованные источники:

1. Сагинтай, С.К. (2018). Управление внутренними коммуникациями в высшем учебном заведении: аспекты и практики. Вестник КазНУ. Серия правоведение, (1), 210-216.
2. Сафин, Р.Т. (2019). Организационные аспекты внутренних коммуникаций в университете: проблемы и перспективы. Научный вестник Казахского национального педагогического университета, 2(45), 78-85.
3. Абдрахманова, Г.С. (2020). Эффективность внутренних коммуникаций в университетском пространстве: вызовы и возможности. Наука и образование: современные тенденции развития, 6(24), 102-108.
4. Ибраимова, А.Ж. (2017). Особенности управления внутренними коммуникациями в казахстанских университетах. Вестник КазНУ. Серия экономическая, (3), 88-95.
5. Каримова, С.Н. (2019). Современные подходы к управлению внутренними коммуникациями в университетах: опыт Казахстана. Проблемы современной науки и образования, 4(45), 172-179.
6. Мустафина, Г.С. (2018). Роль внутренних коммуникаций в управлении персоналом в вузе. Научные ведомости БелГУ. Серия: гуманитарные науки, 36(12), 210-216.
7. Жумагулов, Н.Т. (2020). Оптимизация внутренних коммуникаций в университете: опыт Казахстана. Вестник КазНУ. Серия социология, социально-политические и правовые исследования, (2), 55-63.
8. Турганбаев, Е.Б. (2019). Стратегии управления внутренними коммуникациями в казахстанских университетах: теория и практика. Интеграция образования, 2(10), 145-152.
9. Алтынбаев, А.А. (2018). Внутренние коммуникации в университете: проблемы и пути их решения. Научные труды Уральского государственного университета, (1), 78-84.
10. Темирбаева, З.С. (2017). Организационные аспекты внутренних коммуникаций в университете: анализ ситуации и пути совершенствования. Наука и образование: современные тенденции развития, 3(21), 98-105.
11. Концепция развития высшего образования Республики Казахстан до 2025 года. (Министерство образования и науки Республики Казахстан, 2017).
12. Отчет о состоянии внутренних коммуникаций в казахстанских университетах. (Национальный центр статистики образования, 2020).
13. Smith, A., & Brown, B. (2019). Internal Communication in Higher Education Institutions: A Literature Review. *Journal of Higher Education Management*, 12(2), 45-60.
14. Jones, C., & Smith, D. (2018). Improving Internal Communications in Universities: Best Practices and Case Studies. *International Journal of Educational Management*, 32(5), 812-829.
15. Rahman, M., & Islam, S. (2020). Challenges and Strategies of Internal Communication in Higher Education Institutions: A Review. *Higher Education Studies*, 10(3), 112-128.

# PROBLEM ASPECTS OF ENSURING ENVIRONMENTALLY SAFE NATURE USE DURING THE POST-WAR RECONSTRUCTION PERIOD OF UKRAINE

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## Abstract

The study of the socio-economic aspect of ecologically safe nature management during the post-war recovery period of Ukraine is presented and provides grounds for stating the existence of serious, not fully realized by both scientists and practitioners, problems regarding the provision of a socially oriented component of mechanisms for implementing the system of effective nature management in the practice of post-war economic reconstruction.

The war against the Russian invaders, which is currently ongoing in Ukraine, is causing enormous damage to the environment. In this connection, we should be talking about ecocide, which is carried out by the Russian aggressor on the territory of Ukraine, which is part of his genocidal policy against the Ukrainian people [1]. All this greatly complicates the generally difficult ecological situation that has existed in Ukraine since pre-war times. Therefore, it will be especially urgent after the war, during the reconstruction period, to implement effective nature protection activities in Ukraine, which will include measures for ecologically safe nature use.

The natural environment of those regions where active hostilities are currently taking place will obviously require long-term work to clean up their consequences, followed by long-term reclamation. And, based on this, additional anthropogenic pressure on nature in the form of intensive nature use in post-war Ukraine seems inappropriate.

However, at the same time, it should be noted that the use of natural resources in modern Ukraine is actually the type of economic activity that provides the main inflows of funds to the revenue part of the state budget and provides jobs and the opportunity to receive income for the majority of the population. This happens because in our country, during the last pre-war decades, the process of transformation of the industrial economy into a raw economy took place.

In a country with a raw material model of the economy, the main revenues to the state budget come from the export of one or more types of raw materials, and all other economic sectors are declining, except for the few that are engaged in the production of types of raw materials that have export value. The deep conditioning of the existence of the specified situation lies in the rent nature of income from the exploitation of natural resources, which does not stimulate those who receive them to qualitatively increase the efficiency of production, but is more consistent with extensive methods of economic activity [2, 18-21]. For the raw material model of the economy, the main thing is the availability of natural raw materials, but not human resources, since their extraction and transportation abroad require significantly fewer people and with a lower educational level, even less than any of the least technologically developed branches of the processing industry [3]. In general, the raw material model of the economy is a reflection of

an economic phenomenon that in world economic science has received the name "resource curse" and which finds expression in the inverse relationship between the amount of natural resources in a certain country and the level of its socio-economic development. Accordingly, as evidenced by practice, the countries most rich in natural resources are, as a rule, poor or at least not distinguished by special wealth [2, 15-18].

Ukraine, as is known, is rich in natural resources, but among them land resources, soils used in agricultural production, and especially in such a field as crop production, are gaining more and more importance among them today. And this is objectively well-founded, because Ukraine owns a third of the best chernozems in the world. Thus, agricultural production in Ukraine actually became a leading industry that forms the main export potential, primarily in the form of agricultural plant raw materials, thereby bringing significant funds to the state budget, which are directed to support socio-economic development. And there is no solid reason to believe that anything will fundamentally change in the future. It seems that the above-mentioned processes will gain even greater momentum during the war.

However, when using natural resources as the main source of state income, market forces begin to operate in full force, which, not being introduced into certain institutional frameworks that take into account social and environmental needs, have the goal of their operation only to achieve the highest profit by any means and at any price. And therefore, in full agreement with the laws of action of unlimited market forces, almost parallel processes of concentration of capital and land resources took place in the Ukrainian agrarian sector. And thus, the main producers of agricultural raw materials have become large agricultural holdings, which displace small and medium-sized farms from the market of agricultural products.

Characteristic features of the activities of the mentioned large agricultural holdings are a predatory attitude towards the natural resources they exploit and, in a specific case, land resources. Thus, large agricultural producers, completely disregarding the rational rules of agricultural production, from year to year without any crop rotation, sow technical crops after technical crops, focusing only on the fact that they currently bring the greatest monetary profit. However, as a result of such predatory exploitation of soils, their depletion occurs, which agricultural holdings try to compensate by increasing the application of chemical fertilizers, which increasingly worsens both the general ecological situation and reduces the fertility of these soils, and therefore reduces the market value of the corresponding land plots.

This is obviously unfavorable for the economic situation of the country. And in general, the economic activity of large agrohodings makes the economy and the social sphere of the country dependent on the income from the sale of agricultural raw materials on the world market, the price of which (however, like any raw product) is characterized by sharp fluctuations, unlike the price of finished products with a high share of added value. Also, the focus on obtaining state income mainly through the sale of agricultural raw materials, which is obtained by predatory exploitation of natural land resources, causes the decline of the Ukrainian economy, and therefore the destruction of entire industries, in full compliance. with the mentioned economic regularity of the "resource curse".

Another negative consequence of the raw material model of the economy currently existing in Ukraine is the decrease in the number of people employed in its currently leading industry, namely: agriculture. This is especially clearly demonstrated by the situation regarding the number of farmers in Ukraine and neighboring Poland. After all, in our country, the agrarian sector dominates the national economy, which has already been formed as a branch of the raw material economy that operates only for the sake of financial income, despite environmental and social losses. On the other hand, agricultural production in Poland, along with economic, also performs important social and ecological functions for the whole society. And accordingly, despite the fact that there are 12 million hectares of agricultural land in Poland, and 42 million hectares in Ukraine,

according to pre-war data, the number of farmers is one hundred times greater – there are two and a half million farmers in Poland, and only 25 thousand in Ukraine [4]. This is evidence of a fundamental difference from Ukraine, both in the structure of Poland's agriculture, where there are no large agricultural holdings similar to Ukrainian ones, and in the Polish economy as a whole, in which industries function quite efficiently.

Therefore, the decrease in the number of the employed population is a specific, immanent feature of the modern raw economy in general and the version of its model that has developed in Ukraine in particular. And this must be taken into account when developing plans for the post-war recovery of our country, since the need to increase the number of people employed in the Ukrainian economy after the war seems to be indisputable today.

The indicated tendency to decrease the number of workers in the national economy built on the basis of the raw material model is significantly intensified in modern Ukraine under the influence of factors caused by the state of war, when people are forced to flee from constant enemy shelling by evacuating to other countries. And, as you know, there are several million such people who left Ukraine for other countries during the war.

Ensuring the return of these people to Ukraine after the war is currently one of the most priority tasks of the state socio-economic policy. But in connection with this, it is necessary to analyze to what extent the stated is implemented according to objective prerequisites. After all, the increase in the number of people employed in the national economy is determined by its development in the direction of mastering the latest technologies, which require highly educated and highly qualified personnel.

However, advanced technical and technological development, as evidenced by the world experience and especially the newly industrialized countries of East Asia, is primarily inherent in countries poor in natural resources, and therefore forced to achieve profitability precisely at the expense of high-tech structural changes in their economies. On the other hand, with regard to Ukraine, it should be taken into account that its subsoil is rich in rare earth elements, which today are of key importance for the development of modern high-tech products. In particular, these are rare earth metals such as titanium, germanium, lithium and graphite. At the same time, it is worth noting that Ukraine has 20% of the world's titanium ore reserves, 10% of the world's lithium reserves. Also, Ukraine ranks fifth in the world in terms of germanium mining and is among the top ten graphite producing countries. In general, the total reserves of rare earth metals, which today are recognized in the world as critical materials necessary for the production of semiconductors and high-tech products, in Ukraine can be estimated at 100 billion dollars. [5; 6].

That is, the demand for mineral raw materials, large deposits of which are in Ukraine, will grow in the world in the near future, and this actually ensures the preservation and even strengthening of those socio-economic conditions that determine the existence of the raw material model of the economy. First of all, it is the availability of guaranteed profits from the sale of raw materials, while the technological base of the industry is mostly outdated or in a state of destruction. Significant organizational efforts and investments are necessary for the renovation and technical-technological modernization of Ukrainian industry, so that it starts producing competitive products on the world market with a high share of added value. At the same time, the organization of extraction and sale of primary raw materials requires a much smaller amount of invested funds.

Along with that, a very unfavorable prerequisite for the development of the secondary sector of the economy in Ukraine, which creates final products ready for consumption, is the demographic crisis, that is, a significant decrease in the population. On the other hand, a significant number of workers is unnecessary for the primary, that is, the one that extracts raw materials, sector of the economy, as it was mentioned above.

Therefore, the preservation of the commodity model of the economy in post-war Ukraine seems quite real. Certain changes are possible only in terms of reducing, in relation to receiving income from natural rent, the importance of agricultural exploitation of land resources in favor of extraction of rare earth elements from the subsoil. But all this is expected to deepen the technological backwardness of the national economy and will not contribute to social development in the country.

At the same time, it should be borne in mind that the extraction of raw materials (and, above all, rare earth elements, which will obviously be the most promising) is extremely harmful to the environment and human health, as it leads to the destruction of the upper layer of the soil and its pollution, as well as to the pollution of groundwater. Moreover, the extraction of a whole range of rare earth metals requires a huge amount of water (for example, up to 2.27 million liters of water is used for one ton of extracted lithium) [6], which in the conditions of water scarcity in Ukraine seems extremely irrational and such that it significantly harms the environment.

However, it should be borne in mind that an economy in which the main source of income is natural rent does not represent a favorable environment for the proper functioning of the mechanisms of ecologically safe nature use, and also, which is particularly important from a socio-economic point of view, such an economic model is not able to ensure innovative socio-economic development, and on the contrary, will conserve technological backwardness. The latter threatens to lead to a decrease in the standard of living of the population as a result.

Thus, in order to achieve effective ecologically safe nature management in the post-war recovery period of Ukraine, it is necessary to overcome the raw material orientation of the functioning of the Ukrainian economy.

#### References:

1. Kinash, I.P., Kutsenko, V.I. & Anisimov, V.M. (2023). Rozvytok tsyvilizatsiyi ta protydiya henotsydu ukrayins'koho narodu: aspekt zdiysnyuvanoho RF ekotsydu [The development of civilization and countering the genocide of the Ukrainian people: an aspect of the ecocide carried out by the Russian Federation]. *Protydiya henotsydu ukrayins'koho narodu: zbirnyk materialiv Mizhnarodnoyi naukovo-praktychnoyi konferentsiyi molodykh vchenykh* (Kyiv, 08.05. 2023) [Anti-genocide of the Ukrainian people: collection of materials of the International Scientific and Practical Conference of Young Scientists (Kyiv, May 8, 2023)]. Kyiv: Scientist Support Office. Retrieved from <https://sso.org.ua/mozhlyvosti/> [in Ukrainian].
2. Edited by Macartan Humphreys, Jeffrey D. Sachs & Joseph E. Stiglitz. Foreword by George Soros. (2007). *Escaping the Resource Curse*. Revenue Watch Institute. [in Ukrainian].
3. Pekar, V. (2018). *Ekonomika bez hromadyan* [Economy without citizens]. *Site.ua – a club of top Ukrainian bloggers and exclusive materials*. March 20. Retrieved from <https://site.ua/valerii.pekar/ekonomika-bez-gromadyan-i0xrwog>
4. Medvid', S. (2023). *Ukrayintyam by taka vlada!* [Ukrainians would like such power!]. *Sil's'ki visti* [Rural news]. September 26. Retrieved from <http://www.silskivisti.kiev.ua/20031/index.php?n=53183> [in Ukrainian].
5. Amelin, A. (2024). *Shcho bude, yakshcho Ukrayina prohraye?* [What will happen if Ukraine loses?]. *LIGA.net*. February 20. Retrieved from <https://www.liga.net/ua/all/opinion/shcho-bude-iakshcho-ukraina-prohraie> [in Ukrainian].
6. Kush, O. (2024). *Chym nebezpechna propozytsiya Trampa dopomahaty Ukraini v kredyt* [How dangerous is Trump's proposal to help Ukraine with a loan]. *LIGA.net*. February 19. Retrieved from <https://www.liga.net/ua/all/opinion/chym-nebezpechna-propozytsiia-trampa-dopomahaty-ukraini-v-kredyt> [in Ukrainian].

# THE PRACTICAL IMPLICATION OF DISSERTATION RESEARCH FOR SCIENCE AND BUSINESS INTERACTIONS

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## Abstract

This paper analyzes dissertation researches in terms of practical contribution directly in the period of research activity. It is definite that the researched work is interesting to the public by its scientific novelty, which may still fill the gaps in the researched problems. However, the research work is more interesting when the results have the highest degree of applicability of the results of the research in practice, and its practical significance is increased by bringing practical results directly in the research being studied.

## Introduction

The practical implication of the research results in dissertation research papers is fundamental for further practical application of the solutions found through the research. However, according to Glebov (2021) there are frequent cases of incorrect wording and incomplete interpretation of results in dissertations, which could change the true meaning of this section in the dissertation. For example, in his opinion, this section often used language indicating the practicality of the results found, and often ignored the ways and possibilities of application of these results, it did not reveal their necessity and importance for solving specific problems in the field of activity, which contradicts the purpose of the rubric to which it is intended. This also contradicts the rules of this section. Glebov (2021) notes the mere mention of the fact that the results found may be suitable in this or that field is insufficient.

In this regard, it should be emphasized that one of the cardinal tasks of dissertation research is the contribution of the research itself to social development in the context of its specificity. The characteristic of methodological foundations is practical value, through which the dissertation research realizes its main function (Glebov, 2021). According to Polonskij (2016), the functions of describing the practical implication of the research results should include real shifts that have been achieved or can be achieved as a result of using the solutions found in the research in practical activities. In other words, the purpose of this rubric is not only to point out new results, but also to show their noticeable and positive impact on the development of the sphere of activity in which the research is conducted (Glebov, 2021).

In order to noticeably improve the practical implication of the results of the dissertation research, it is recommended to practically approve the results found. Noting the practical value of the obtained results, according to Ogursov (2008) it is necessary to add information about the degree of readiness for use or the scale of their use. It is also necessary to bring some information regarding the implementation of the research results with the indication of the type of activity of organizations in which the implementation was carried out, forms of implementation and details of relevant documents. In addition, the social and epistemic implications of the findings (Tennant

and Ross-Hellauer, 2020) should be considered and developed. Approbation of the results of dissertation research can also be carried out by means of consecrating the found results at scientific congresses, conferences, symposiums, meetings. Or in monographs, articles in scientific journals, collections of scientific papers, proceedings and abstracts of conferences, copyright certificates, where the results of the thesis are published (Ogursov, 2008), (Glebov, 2021).

Another problem is directly related to the practical implication of the results of the dissertation research - it is the problem of the relationship between science and the national economic community, science and business. In particular, Gordenko (2017) notes a problem in the interaction between science, business and the state from the point of view of economic development. He notes the need to create conditions for direct interaction between government bodies and research and business organizations (enterprises, corporations) in order to implement research knowledge that is effective for business, the state, and society as a whole. Gordenko (2017) touches on an important aspect of the relationship between producers and consumers of new knowledge and technologies, which according to Lundvall (1988) is possible to expand within a single country. Gordenko (2017), in particular, lists ways of solving such a development problem according to the model proposed by Freeman (1987), where scientific institutions directly as organizations responsible for conducting research, carry out activities that facilitate the transition of knowledge into practice through the organization of management of available resources at the enterprise level, and at the national level.

This indicates that a thorough elaboration of practical implication in the dissertation work is a necessary criterion that shows the real benefit of the application of research results in practical activities, their applied value. Research studies the sphere of human activity, where the function of research is the development and theoretical systematization of objective knowledge about reality. Consequently, theoretical description, reflection of reality, explanation and prediction of processes and phenomena of reality, and especially the results of practical approbation of the solution proposed in the study, are important components for solving the problem of the relationship between science and the national economic community, science and business.

However, the relevance of elaboration in terms of practical implication in the dissertation work is not exhausted only by the above-mentioned problems. Glebov (2021), Polonskij (2016) and others drew attention to the fact that dissertation studies often ignore the ways and possibilities of application of the results found, do not disclose their necessity and importance for solving specific problems, which obviously aggravates the relationship between science and the national economic community, science and business. This definitely indicates that there are some gaps for the development of the section of practical implication in dissertation research. It should also be noted that although there are many scientific materials in the literature about practical implication in dissertation research, such as: ways of formulation, importance of attention and description of types of approbation of the results obtained, but at the same time in the scientific literature found very few fully disclosed works that would give the opportunity to conduct some reviews and conclusions about the relationship between science and business and other community, which indicates some lack of research in this area. Therefore, in this paper an attempt is made to study the possibility of discovering the principles of solving such a problem as insufficient development of the problem of the relationship between science and the economic community, science and business through improving and increasing the weight of practical implication in dissertation researches.

## Methods

Theoretical arguments serve as a basis for any research, but without their application in real life, the results of scientific works lose their significance. The practical implication of the research emphasizes the applied nature of the results obtained in the dissertation research, as

well as what transformations of existing processes and phenomena can occur in the areas of their applicability. Properly organized outcome of the conducted experiments, exploration allows the development of scientific branches and implementation of developments in everyday life in various fields, strengthening the relationship between science and the economic community.

According to the classical theory, the practical implication of the research results is a mandatory section of the introduction to the dissertation, which reflects the application of the research results in practice; the results of practical use of the obtained results or recommendations for their use are given. It also describes the methods of use or recommendations for the practical use of the results of the study, indicating, if available, the form of use and details of documents confirming the use (Anisimov et al., 2014). The results of practical use can include new methods, solutions, techniques that are used or can be used in the relevant industry, indicating the degree of readiness for use or the scale of use. In addition, the practical use of research results can be formalized by an act of implementation, which specifies the specific results of the dissertation work used in the works of the organization to which the practical results are implemented.

Also, the practical use of the results can be confirmed by their inclusion in various programs, rules, development forecasts, normative documents, guidelines, regulations, instructions, methodologies, and in other ways. Documents confirming the practical use can be acts of implementation, conclusions and certificates of authorities, economic entities, as well as approved normative documents, recommendations, methodological guidelines, in which the results of the dissertation research are included. This can also be confirmed by their inclusion in educational and methodological literature, with confirmation by certificates from educational and scientific institutions (Anisimov et al., 2014).

In order to assess the practical value of the research conducted, it is important to distinguish between the term 'practical implications' itself. According to Collins' Dictionary (2023) it means the consequences of the proposed findings, which in practice may have different, both expected and unanticipated consequences. This is where lies its importance to the study. If the term is considered apart "implication" means the consequence of something is what may happen as a result. And the definition of "practical" means the practical aspects of something include real situations and events, not just ideas and theories. Thus, the practical consequences of applying the results proposed in the study are expected should lead to one or other expected consequences. However, not everything is unambiguous in practice as it turned out.

For example, Pompper (2014), when discussing the difference and usability of research findings based on both positivist and interpretive paradigms, suggests that despite clear and formal recommendations, the practical and theoretical implications of the proposed models may vary from organization to organization. This assertion according to his study is due to the multiple dimensions of social identity. Pompper (2014) emphasizes the importance of intersectionality approaches to specific paradigms and philosophies to address the problems inherent in social identity with respect to identity differences. Pompper (2014) here explicitly emphasizes that although various studies in large numbers can offer very practical solutions to problems, however, they have rarely been studied in terms of how to overcome the problems of implementations proposed by the models, which often, he argues, take place due to the difference between individuals and social groups in an organization.

According to Pompper (2014), in essence, such challenges can negatively impact the researcher's ability to expand their worldview to encompass different social identity constructs and question them as a legitimate area of research in the first place. Nevertheless, there are solutions through approbation of the research findings directly into the field that can partially alleviate such a problem.

Approbation literally means approval, validation, establishment of qualities. In other words, to check and officially approve (Ozhegov, 2020). In more detailed terms, the term "approbation" means a critical evaluation by the scientific community of the applicant's scientific research (Chudinov, 1910). Moreover, not only the final results of the work, but also the research methods and intermediate results of the work are evaluated then. Approbation stimulates the applicant to rethink their scientific research, more in-depth revision, helps the author to confirm or understand the need to revise the scientific provisions. That is why it is necessary to start approbation of the work from the very beginning of work on the dissertation research in order to obtain timely objective assessments of the stages of the research, conclusions and practical recommendations.

The most common ways to communicate to the scientific community the materials of dissertation study are the researcher's participation in scientific conferences, symposia, speeches at department meetings, participation in various types of events of the scientific community, preparation and sending to various bodies of proposals on the topic of research. Also, their publications in the form of books, theses of reports at conferences, depositing parts of scientific research are also approbation of research results (Anisimov et al., 2014).

For completeness of understanding of the studied problem, it is advisable to hold a discussion of the work with colleagues, with researchers and teaching staff at the place of preparation of the dissertation research (Anisimov et al., 2014). This can be various scientific forums, reports and speeches. Conducting a scientific discussion will allow the researcher to confidently conduct the research dissertation work. Thus, the practical application of the results of dissertation research can be used before the defense of the dissertation by application, implementation in various sectors of the national economy. Such use of the research results should be disclosed in full, detailed taking into account the type of industry, activity, where the results were successfully implemented, and how it in turn brought this organization economic, social, or other effect.

However, it should be noted that the effectiveness of implementation of the research findings in practice is determined by the development of theoretical and methodological provisions in the dissertation, which in the research are brought to specific recommendations that can be presented in the form of methods, instructions, standards and other documents. In fact, these can be both specific recommendations for improving the structure of production, time standards, instructions for the use of programs, and reports of approbation results. In other words, the transfer of research results to the consumer of scientific products should be carried out in a consumer-friendly form, providing an increase in the efficiency of the consumer's work, formalized by appropriate documents.

#### Results and Discussion

For full disclosure of the problem of practical implication of doctoral dissertations studied in this paper, 22 doctoral dissertation researches were explored. The main attention in the study of these researches was given to the study of the consequences of the models and solutions proposed in these works in practice on various national economic institutions.

The conducted review of the dissertation researches covered the period from 2014 to 2023, which made it possible to highlight and show the dynamics of improving the practical implication relevance in doctoral dissertation studies through approbation and other solutions of the proposed model directly in the field through the application in practice of the solutions found in the study. The analysis is noteworthy in that it significantly complements the existing research on this subject, at the same time offering new approaches to improve the results of dissertation research practical implications. In particular, the paper provides evidence of practical results after application in practice of practical implication recommendations, which positively affected the

work processes of the organizations where they were conducted, which once again proves and strengthens the weight of practical implication of the research work conducted by doctoral students.

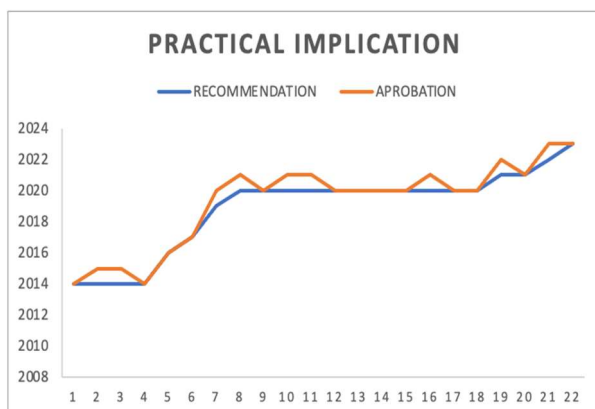


Figure 1. Dynamics of approbation of practical consequences onto recommendation.

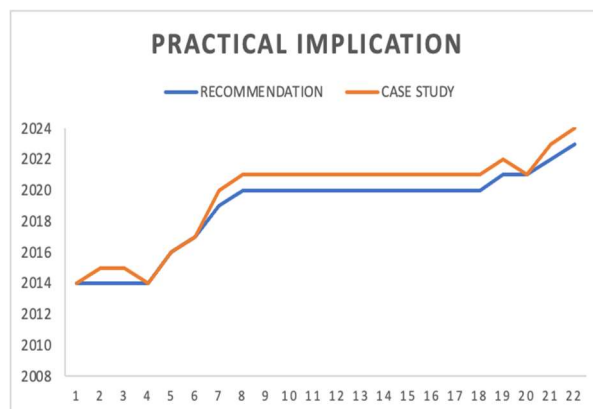


Figure 2. Approbation of practical consequences through case study research.

Above in the Figure 1 it can be observed the dynamics of implementation of approbation through recommendations of the proposed models in organizations, where the blue line indicates that in the studied dissertation researches recommendations were proposed as well as necessary steps for this purpose were described, and the orange color symbolizes how often in the dissertation researches there was a practical implementation of the proposed recommendations. It is also noteworthy that in the studied works the orange line was used for post-approbation survey, where according to the survey answers in 59% of cases it was necessary to correct and adjust the proposed models in practical meaning, and in 27% of cases to refuse use the proposed model at all and only in 14% of cases the model worked positively to organizations without any changes. It should be noted here that Pompper (2014), argued for ambiguous implications when using the findings of the study, where he noted a particular problem that is ignored by researchers in the process of creating practical implications. As Pompper (2014) argued, despite clear and formal recommendations of practical and theoretical implications, the proposed models their implications may have a variation from organization to organization, which he argued is caused by multiple dimensions of social identity. That is, not all individuals and social communities consist of the same individual characteristics of individuum, so that the models proposed by the study result not equally perfectly work in every organization and in all areas. Thus, according to the results of the post-approval survey, in 59% of cases adjustments to the proposed model were needed and in 27% of cases subsequently abandoned the idea of implementing such innovations after the initial attempt, a significant argument to support Pompper's (2014) assertion. He explicitly emphasized that although various studies in large numbers may have offered very practical solutions to problems, but they were rarely studied in terms of how to overcome the implementation problems of the proposed models, which often, in his opinion, take place due to differences between individuals and social groups in the organization. Nevertheless, the 14% cases of perfect utilization of the proposed model and 59% corrective solutions are encouraging and at the same time stimulating to look for improvements in the quality of practical implications. One such solution may be the use of validation through a case study research approach.

If look at Figure 2, it can be observed how the dynamics of the orange line - approbation through case study research behaves in relation to the blue line - recommendations were proposed as practical implication and the necessary steps for it were described. Case study research approach has a difference from the practical implementation given with Figure 1. Case

study research involves a preliminary study of any company before implementing the proposed in the dissertation research solutions. Preliminary preparation through Case study research studies the company starting from brochures, web site, reports, functional and other documentation and, most importantly, conducts interviews with decision makers and only by the results of Case study research develops the practical implication of the study (Merriam, 1998). Thus, according to the post-approval survey in case of implementation through Case Study Research the results of practical implications - in 58% of cases show a positive implementation without any changes in the proposed model, in 24% of cases there were minor adaptations of the program, but in 12% of cases there were significant adjustments to the proposed model, and 6% of cases soon after implementation returned to the previous mode due to reasons beyond the control of the proposed model. A total of 58% implementation with no change and 24% minor model adaptations is a significant event, positively influencing the practical implications of the dissertation research. Thus, based on the findings of this study it can be argued that improving the practical implication of the research through the Case Study Research approach significantly improves the practical implications of dissertation research. This also responds positively to the highlighted research challenges from Pompper (2014), Ogursov (2008), (Glebov, 2021) and others noted above.

According to researchers Simsek, Li and Jason (2021) in order for implications for practice to have a successful outcome and practical meaning to fulfill its intended purpose in the dissertation research it is necessary to clearly identify the target audience and potential users. In other words, practical implication should be adapted as much as possible for non-academic audiences so that they can consider, adopt or act on the thoughts, behaviors, work or life to the extent that academics have been able to articulate the problem and its noted significance or relevance to a particular audience, then its impact is likely to increase they believe. In this regard, the results of this study in this decision paper are particularly interesting for research attention since the dissertations studied covered many areas and varied in their subject matters, the area of study. The following Table 1 gives a list of dissertation topics used in this study.

Tables1. Overview table of doctoral dissertation research.

2014	The Corporate Governance of Mineral and Raw Sector Corporations of the Republic of Kazakhstan .
2014	Investments in Housing Construction in Kazakhstan: Prerequisites, Incentives and Risks.
2014	Strategic Management on ITC-Sector of Kazakhstan.
2014	Improving of Strategic Management in Higher Education Institutions of the Republic of Kazakhstan.
2016	Project Management of Precious Metals Mining.
2017	Treasury of Commercial Bank: Current Functions and Work in Crisis in the Republic of Kazakhstan.
2019	The Importance of Using Mediation in the Oil and Gas Sector.
2020	Formation of Corporate Culture and Its Influence on the Development of Enterprises in the Oil and Gas Sector of the Republic of Kazakhstan.
2020	Analysis of Regional Differences Among Affordable Housing in the Republic of Kazakhstan.
2020	Development of an Operational Management System for Construction Companies in the Republic of Kazakhstan.
2020	Building Competitiveness of Employees of Oil and Gas Companies of the Republic of Kazakhstan for Their Sustainable Development.

2020	Key Factors Influencing the Decision-Making Process on the Implementation of Voluntary Pension Contributions in Kazakhstan.
2020	Impact of State Support on The Development of Wind Energy in the Republic of Kazakhstan.
2020	Risk Management in Optimization of Management Decisions in an Insurance Company in RK.
2020	Digital Transformation of Construction Industry in the Republic of Kazakhstan.
2020	Strategic Management of Retail Trade of Low-Voltage Equipment in the Republic of Kazakhstan.
2020	The Impact of Financial Literacy on Investing Decisions in Securities.
2020	Customer Loyalty Management in a Microfinance Organization in the Republic of Kazakhstan.
2021	Agile supply chain management: Its role in the development of companies in the building materials industry in Kazakhstan.
2021	Development of the Interaction System for Entrepreneurial Structures of the Oil and Gas Industry in The Republic of Kazakhstan.
2022	Formation of Organizational Change Methods in the Innovative Projects Within Heavy Machinery Industry in the Republic of Kazakhstan.
2023	The Mechanism of Educational Capital Formation for Innovative Development of the Economy of the Republic of Kazakhstan.

As can be observed Case study research approach increase practical implication ability of the research findings. Nevertheless, when writing a dissertation, utmost attention should be paid to the formulation of practical implication for scientific and practical connection. According to Anuoluwapo (2018) the formulation and design of practical implication in the dissertation work should be as realistic as possible to what is expected in practice. It should also be noted that often recommendations for future researches can manifest from this section of the dissertation research. Practical relevance based on literature sources allows to identify future researches, and based on research empirical works allows to propose specific mechanisms to address the gaps highlighted in the study.

### Conclusion

Any research is designed to set and solve a specific problem. The course of development of the research object, science or industry, enterprise actually depends on the measures proposed by the researchers. Accordingly, each research work has its practical implication, that is, it should reflect the effectiveness of measures to solve the researched problems and give recommendations for their implementation in practice. According to Ogursov (2008) the results of basic scientific research (which should not be confused with inventions) do not have intellectual property rights because they belong to all mankind. Here he is guided by the principle of universality or openness of scientific achievements. According to his vision, neither the author nor anyone else can forbid the use of scientific results or claim any compensation for their use, except by reference to authorship. Accordingly, any scientist who has obtained new results should publish them, since new knowledge only becomes an integral element of the scientific picture of the world when it is verified and recognized by the scientific community emphasizes Ogursov (2008).

The main scientific position of the materials studied in this paper is determined by the answers to the research problems mentioned in the introduction: from Glebov (2021) - incorrect formulation and incomplete interpretation of the practical implications of the results in dissertation research; from Polonskij (2016) that to the functions of describing the practical implications it is necessary to refer the real shifts achieved as a result of practical use of the

solutions found in the research in the national economic activity; from Ogursov (2008), (Anisimov et al., 2014) approbation of the results of dissertation research through highlighting the findings at scientific congresses, conferences, symposia, meetings, monographs, articles in scientific journals, collections of scientific papers, conference proceedings and abstracts, or other author's certificates; from Tennant and Ross-Hellauer (2020) to consider and develop the social and epistemic implications of the findings; and from Pompper (2014) the problems of social variance in the use of research findings due to differences between individuals and social groups in an organizations, he also noted the need to expand the researcher's worldview in this regard every time to encompass different constructs of social identity. The saturation of the above-mentioned gaps in the research topic is expected to lead to the successful realization of the improvement of the practical implications of the doctoral research for the successful implementation and transfer of the obtained scientific product for use in the national economic activities, which will put in a better place the problems of the relationship between science and the economic community.

The scientific and practical implication of the study is an assessment of the need of proposed in the study model and suggestions of the researcher. This is what the dissertation research conducting for. Where the practical implications of scientific research is proved by concrete facts, numbers, analysis of the situation, supported by a sufficient amount of reliable, substantiated and qualitative information. To achieve an advanced result for the successful practical application, of the solutions proposed in the dissertation research, the materials used for the research should be based on accurate data and guided only by verified information (Anisimov et al., 2014). This will obviously require the researcher to scrutinize the selected information base, read a lot of literature, compare theories from different sources in order to use only those facts that do not contradict each other. This approach will prevent errors and omissions that could have undesirable practical consequences from the results obtained in the course of the dissertation research. To minimize such flaws, it is important to select the right theoretical material, accurate data for the experiment, and appropriate methodological and statistical tools to analyze the research data obtained. Then clearly describe the steps and ways to implement the findings obtained in the study to operationalize it, the proposed best solution that will lead to an improvement in the situation or mitigate the current problem.

However, it is expected that the following steps will contribute to improving the practical implications of dissertation research:

1. Competent formulation of the practical implication of the conducted research is addressed to the target audience and potential users. And it is applicability is maximally adapted for non-academic audience with the indication of specific mechanisms, supported by evidence base for the possibility of comparison in the implementation of the proposed in the study model and solutions at their place.

2. Testing the proposed model and solutions on one or more institutions, or in other ways. Thus, that the target audience, based on the approbation example could repeat the new approaches in practice. If the testing describes and shows the seal changes that have been achieved in the course of practical use of the solutions found in the research, then it is conditioned by the successful implementation of practical implications, which will have a positive impact on the development of the field of activity in which the research is conducted.

3. Approbation through Case study research. This approach significantly increases the practical implacability of the research findings as shown in this particular study. Case Study Research requires additional skills from researchers but it worse the time to deepen to reach the main task of the dissertation research aim.

As future research, it can be highlighted the problem that many experts have mentioned (Ogursov, 2008), (Polonskij, 2016) (Glebov, 2021) and others - it is the neglect of the practical

relevance section in dissertation research. In particular, while working on this study, it was encountered dissertation papers where recommendations on the practical implications of the solutions proposed in the study were absent or they were covered extremely sparingly. Since the objective of this study was different, this research did not cover these dissertation researches and parameters in the course of this study. However, they may serve as a research problem for future study.

Thus, the studied twenty-two doctoral dissertation researches allowed in this paper to formulate a basic assumption to improve the productivity of the practical implications of dissertation research, which is expected to be one of the bricks for improving the relationship between science and the national economic community, science and business. The scientific novelty can be noted is the Case Study Research approach. In improving the practical implications, the Case Study Research approach in dissertation research is one of the practical solutions, as shown in this study. However, with all the studied, the problem of practical implications in dissertation researches is still relevant and still needs to be improved onward.

#### References

Anisimov, E.G., Grushko, A.S., Bagmet, N.P., Gupanova, Y.E, Krasavina, E.V., Lipatova, N.G., Mikhailenko, T.D., Chernysh, A.Y. (2014). Organization and conduct of scientific research by graduate students. Publisher: Russian customs academy. ISBN: 978-5-9590-0827-7

Anuoluwapo, D.O. (2018) Understanding the Theoretical and Practical Implications of a Research Paper. Research Clue Journal. <https://nairaproject.com/blog/understanding-the-theoretical-and-practical-implications-of-a-research-paper.html>

Collins Dictionary. (2023). Авторские права © HarperCollins Publishers

Chudinov, A.N. (1910). Dictionary of foreign words included in the Russian language.

Freeman, C. (1987). Technology Policy and Economic Performance: Lessons from Japan. – L.: Pinter,

Glebov, A.A. (2021). Indicators of practical implication of the dissertation research results. <https://cyberleninka.ru/article/n/pokazateli-prakticheskoy-znachimosti-rezultatov-dissertatsionnogo-issledovaniya>

Gordenko, G.V. (2017). Problems of effective interaction between the state, science and business in the Russian innovative economy. Institute of Economics RAN. <https://www.collinsdictionary.com/dictionary/english/practical-implications>

Lundvall B.-A. Innovation as an Interactive Process: from User Producer Interaction to Nation System of Innovation // Technical Change and Economic Theory / Ed. by G. Dosi, C. Freeman and R. Nelson. – L.: Pinter, 1988.

Merriam, S. (1998). Qualitative research and case study application in education. Publishers: Jossey-Bass Inc.

Ogursov, A.N. (2008). Science Research Methodology. Harkov National Technological University Press.

Ozhegov, S.I. (2020). Explanatory dictionary of the Russian language. 100,000 words. Publisher: Peace and Education, ISBN: 978-5-94666-609-1

Polonskij V.M. Nauchnyj rezul'tat: struktura i sposoby opisaniya [Elektronnyj resurs] // Nauchnyj rezul'tat. Pedagogika i psihologiya obrazovaniya. 2016. T. 2. No 4. [http://rrpedagogy.ru/media/pedagogy/2016/4/Polonskij\\_VM.pdf](http://rrpedagogy.ru/media/pedagogy/2016/4/Polonskij_VM.pdf) (data obrashcheniya: 10.03.2021).

Pompper, D. (2014). Practical and Theoretical Implications of Successfully Doing Difference in Organizations (International Perspectives on Equality, Diversity and Inclusion, Vol. 1). Publisher:

Emerald Group Publishing Limited. ISBN: 978-1-78350-677-4, eISBN: 978-1-78350-678-1  
DOI:10.1108/S2051-2333(2014)000000102s

Simsek, Z., Li, N., Jason, L. (2021). Turbocharging Practical Implications in Management Studies. *Huang View*: Volume 48, Issue 5. DOI:10.1177/01492063211040562

Tennant, J.P., Ross-Hellauer, T. (2020). The limitations to our understanding of peer review. *Res Integr Peer Rev* 5, 6 <https://doi.org/10.1186/s41073-020-00092-1>

# Working capital management "Caspian Oil", "KazMunayGas"

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## "Caspian Oil"

"Caspian Oil" was established on January 22, 1997, and is currently engaged in comprehensive exploration, search, surveying, and extraction of hydrocarbon raw materials in the designated area. The main office located in the city of Atyrau. Since its inception, the company has been conducting exploration activities in accordance with a license and contract with the government of the Republic of Kazakhstan. On the premises of the deposit, there are several facilities, including an oil processing unit, a point for delivering refined oil products, a gas-driven power station, a diesel-driven power station. Over the years, Caspian Oil has successfully completed exploration work on the Ayrankol oil and gas field located in the Zhylyoi district of the Atyrau region and conducted trial exploitation. The company currently employs highly qualified specialists both in management and in engineering positions. They contain various petroleum products such as aviation fuel, bitumen, petroleum coke and etc. They also take into account the fact of the economic effect, creating jobs and supporting new professionals who are just starting their careers, and, more importantly, they do care well-being and safety of their employees in the workplace. The company is also interested in their technological field, in which they focus, using new advanced innovative technologies and improving their activities. Their main activities include exploration and production, shipping, where they use their own trucks, ships, railways or rent them for delivery. The company is also involved in sales, providing financial support to the marketing sector. And last but not least is safe, which includes their employees and the environment in which they are working.

## "KazMunayGas"

Company "KazMunayGas" On February 20, 2002, by the decree of the president of the Republic of Kazakhstan, they are interested supporting oil and gas in economic sector of the Republic of Kazakhstan. Main office in Astana. The 90% owner of the company is JSC "National Welfare Fund" Samruk-Kazyna and 10% owns National bank of Kazakhstan. Their main activities include exploration, transportation, and processing of oil and natural gas. Overall number of company employee more than 30.000. Christopher Walton serves as the Chairman of the Board of Directors, while Magzum Mirzagaliyev is the Chairman of the Management Board. The company is committed to social responsibility in its operations, with a key focus on ensuring the safety of production processes. KazMunayGas (KMG) is progressively introducing a Process Safety Management System, encompassing: Preserving the integrity of assets and technological equipment, establishing safe operational rules, standards, and procedures compliant with legislative requirements and leveraging international best practices, identifying technological risks, preventing losses related to employees' life and health. KMG acknowledges the significance of its environmental footprint and endeavors to mitigate it. As part of the Year of Ecology initiative,

various measures aimed at enhancing environmental safety were undertaken. These include efforts to dispose of historical oil waste and remediate oil-contaminated lands, intensifying environmental awareness among employees, participation in tree planting campaigns, devising action plans to minimize atmospheric emissions, implementing environmental protection programs, and other related activities. JSC NC KazMunaiGas has been annually disclosing its sustainable development activities for 14 years, and since 2012, it has been issuing reports aligned with the Global Reporting Initiative (GRI) standards. Moreover, the international agency Sustainalytics has lowered KMG's risk rating in sustainable development from 34.5 to 28.4 points. This indicates the company's effective management of significant ESG risks within the global oil and gas market. And now we will discuss about policy types that companies use, there are 3 of them

**Aggressive working capital policy:** The Company strives to minimize the level of its working capital in order to maximize the use of its resources. This may include a reduction in inventories, a reduction in the maturity of accounts receivable, and an increase in the period of accounts payable. This approach can lead to an increase in return on assets, but also increases the risk of insufficient provision for current needs.

**Conservative working capital policy:** The Company prefers to maintain a higher level of working capital in order to ensure financial stability and reduce the risk of insufficient liquidity. This may include maintaining large inventories, shorter terms of accounts receivable, and longer terms of accounts payable. While this reduces the risk of a shortage of working capital, it can also reduce the return on assets.

**Normal Working capital policy:** This is a balanced approach in which the company strives to maintain working capital at an optimal level in order to meet its operational needs, minimize the costs of storage and inventory management, as well as ensure financial stability and efficient use of resources.

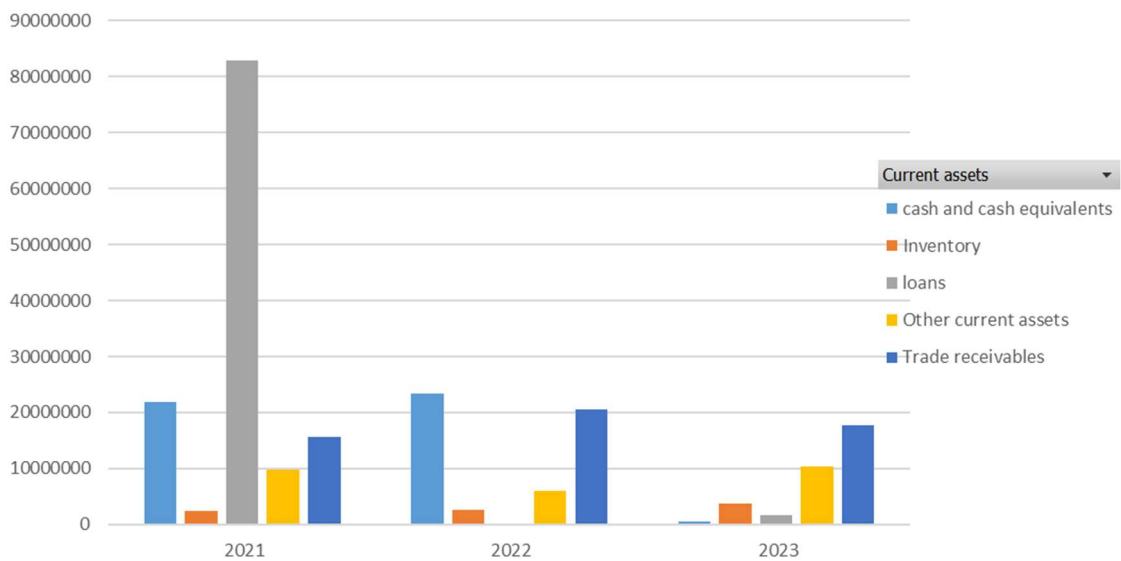
1. Table Policy types

Policy types	Formula
Aggressive policy	equity capital+fixed liabilities < Current liabilities
Normal policy	equity capital+fixed liabilities = Current liabilities
Conservative policy	equity capital+fixed liabilities >Current liabilities

2. Table total 3-year working capital of the “Caspian oil” company (thousand tg)

<b>Current assets</b>	2021	2022	2023
Inventory	2460023	2671927	3750718
Trade receivables	15670362	20477130	17662530
loans	82994979	68933	1704014
Other current assets	9870892	5942649	10372943
cash and cash equivalent	21950657	23358542	427762
<b>Total</b>	<b>132.946.913</b>	<b>52.519.181</b>	<b>33.917.967</b>

1.Bar chart total 3-year working capital of the “Caspian oil” company



3.Table “Caspian oil” company policy calculation (thousand tg)

Caspian oil		
2021	2022	2023
$92.603.296 + 25.126.372 = 117.729.668 > 56.855.056$	$38.572.124 + 16094720 = 54.666.844 > 42.317.570$	$37.620.626 + 5.856.841 = 43.477.467 > 34.867.164$

The given bar chart shows information on the difference in short-term assets of Caspian oil between 2021 and 2023. According to the information in the chart, among the short-term assets indicators of the company, 2021 shows the highest indicator of 132.946.413 tenge. The level of indicators fell to the middle level in 2022 and fell the following year. Overall we can see gradual decline from beginning to the end of the period between 2021-2022. The company's cash, accounts receivable figures are shown above the inventories, using this analysis it can be seen that the company followed a conservative policy and little bit similar to normal policy but in last year cash equivalents fell dramatically.

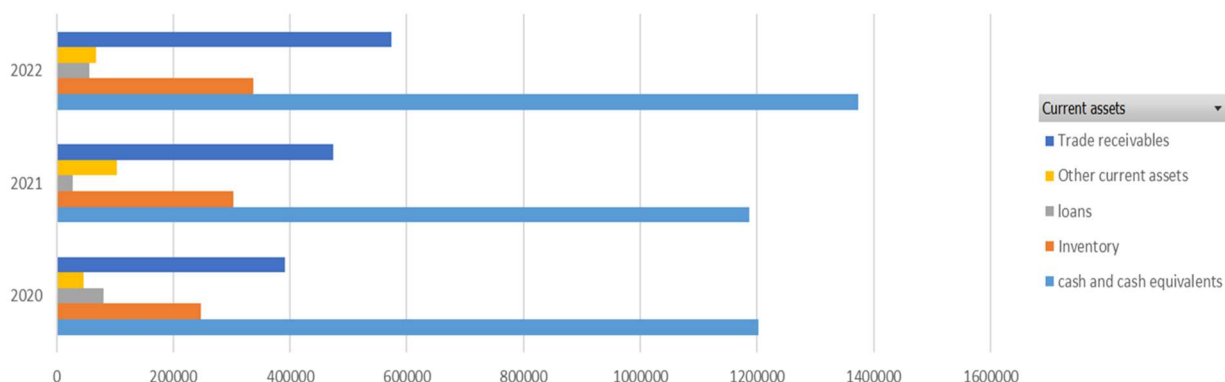
4.Table “Caspian oil” company

	Formula	2021	2022	2023
Indicator of the effectiveness of the use of working capital	Revenue /total current asset	0.9	3.0	3.5
Working capital spent on 1 tenge of sold product	Total current asset/ Revenue	1.1	0.3	0.2
1 period duration	Time ( 270 day) / Indicator of the effectiveness of the use of working capital	300	90	77

5. Table total 3-year working capital of "KazMunayGas" company (thousand tg)

Current assets	2020	2021	2022
Inventory	247448	302848	336401
Trade receivables	391725	474537	574023
loans	79963	27990	56096
Other current assets	46489	103795	66893
cash and cash equivalents	1203017	1186057	1373733
Total	1.968.642	2.095.227	2.407.146

2. Line chart total 3-year working capital of "KazMunayGas" company



6. Table "KazMunayGas" company policy calculation (thousand tg)

KazMunayGas		
2020	2021	2022
916541+4707839=5624380	916541+ 4630978=	916541+5286249=6.202.790
5.624.380 > 1.451.665	5.547.519 > 1.425.745	6.202.790 > 1.926.178

The given line chart shows changes in current assets of KazMunayGas between 2020 and 2022. Overall, it can be seen that there is stable growth and it is noticeable that cash and cash equivalents has the highest indicator. Where all indicators show gradual rise, loans and other current assets fluctuated over the period. Company does use conservative policy.

7. Table "KazMunayGas" company

	Formula	2020	2021	2022
Indicator of the effectiveness of the use of working capital	Revenue/total current asset	0.4	0.5	2.0
Working capital spent on 1 tenge of sold product	Total current asset/ Revenue	2.3	1.6	0.4
1 period duration	Time ( 270 day) / Indicator of the effectiveness of the use of working capital	675	540	135

## Conclusion

In conclusion, generally we give a information about overall company performance and covered some topics which related ESC analysis such us environmental corporative social responsibilities. Furthermore we discuss about company working capital and policy types that company can use. In addition we can find the effectiveness rate of company by using results of revenue and current assets also we would like to say that financial statements are one the most important indicators of company condition which at the time gives us opportunity control with all this processes. By monitoring the financial changes of this companies , we can determine what policy the company applied and this allows us identify the factors that affect its dependence and manage with it.

## Source list:

Финансовая отчетность как индикатор финансового менеджмента предприятия

Б Купешова, О Когут - Вестник КазНУ. Серия Экономическая, 2017

<https://www.kmg.kz/ru/sustainable-development/social-management/industrial-safety/>

<https://ar2021.kmg.kz/ru/strategic-report/sustainable-development/environmental-responsibility-and-safety>

<https://kase.kz/ru/issuers/KMGZ/>

<https://kase.kz/ru/issuers/KSNF/>

# Dynamique entre l'industrialisation et la croissance économique face au risque de crise politique à Madagascar

MANITRAVY Antoine Everal J'hon

## Résumé

Les nations prospères sont généralement caractérisées par leur industrialisation, considérant ce secteur comme un moteur essentiel de croissance économique. Cependant, à Madagascar, les crises politiques ont compromis la croissance, mettant en évidence l'impact défavorable de l'instabilité politique sur celle-ci. Cet article explore les dynamiques économiques de la croissance économique à Madagascar en mettant en lumière le rôle de l'industrialisation et en évaluant l'effet et l'impact des crises politiques, portant respectivement sur l'effet de la valeur ajoutée industrielle sur la croissance économique et sur la menace des crises politiques sur ce processus de croissance. Cette étude utilise une approche de modélisation autorégressive à retard échelonné (ARDL) pour examiner la relation entre la croissance industrielle et économique, en tenant compte des risques de crises politiques. L'analyse couvrant la période de 1996 à 2022 révèle une corrélation positive significative entre la croissance industrielle et économique à Madagascar.

La confirmation de la première hypothèse met en évidence l'influence positive de la croissance industrielle sur l'économie malagasy. La validation de la deuxième hypothèse souligne que le risque relatif aux crises politiques s'associe à une contraction du PIB à court terme. Ces résultats incitent à adopter des politiques économiques stables, propices à un environnement favorable à la croissance industrielle et économique durable à Madagascar.

Mots-clés : Madagascar, Crises politiques, Industrialisation, ARDL, Croissance économique.

## Abstract

Nations that thrive are typically characterized by industrialization, viewing this sector as an essential driver of economic growth. However, in Madagascar, political disruptions have compromised growth, highlighting the adverse impact of political instability on it. This article explores the economic dynamics of Madagascar by shedding light on the role of industrialization and assessing the impact of political crises. Two hypotheses structure the analysis, focusing respectively on the effect of industrial value added on economic growth and the threat of political crises to this growth process.

This study employs an autoregressive distributed lag (ARDL) modeling approach to examine the relationship between industrial and economic growth, taking into account political disruptions. The analysis covering the period from 1996 to 2022 reveals a significant positive correlation between industrial and economic growth in Madagascar.

Confirmation of the first hypothesis highlights the positive influence of industrial growth on the Malagasy economy. Validation of the second hypothesis underscores the inherent risk of political crises, associated with a short-term contraction of GDP. These findings encourage the adoption of stable economic policies conducive to an environment favorable for sustainable industrial and economic growth in Madagascar.

Keywords : Madagascar, political crises, Industrialization, ARDL, Economic Growth.

## INTRODUCTION

L'industrialisation, moteur incontestable de la croissance économique, a été le catalyseur de l'essor de nombreux pays développés. Toutefois, dans le contexte spécifique de Madagascar, la corrélation entre la croissance industrielle, la croissance économique, et les problèmes politiques reste complexe et mérite une analyse approfondie. Cette étude se propose d'examiner les dynamiques économiques de la grande île, en mettant en lumière le rôle de l'industrialisation dans le contexte malagasy et en évaluant la manière dont l'instabilité politique peut entraver ce processus.

Malgré l'importance potentielle de l'industrialisation comme moteur de croissance, Madagascar semble faire face à des défis persistants. Des crises politiques récurrentes ont entravé le développement économique, mettant en question la capacité du pays à tirer profit de son secteur industriel. Comment la croissance industrielle peut-elle contribuer à la croissance économique à Madagascar, et dans quelle mesure les crises politiques représentent-elles une menace pour ce processus de développement ? Ces interrogations constituent le cœur de notre réflexion.

Deux hypothèses structurent notre analyse. Premièrement, nous postulons que la valeur ajoutée industrielle (ou PIB industriel) exerce des impacts positifs sur la croissance économique de Madagascar. Deuxièmement, nous avançons l'idée que l'instabilité politique, manifestée à travers des crises, menace le processus de croissance économique de la grande île.

Pour explorer ces dynamiques complexes, notre approche repose sur la modélisation autorégressive à retard échelonné (ARDL). Cette méthodologie permettra d'analyser la relation temporelle entre la croissance industrielle et la croissance économique, en prenant en compte les risques associés aux crises politiques. Nous utiliserons des données provenant des indicateurs de développement dans le monde (World Development Indicators, ou WDI) de la Banque mondiale, focalisant notre attention sur la valeur ajoutée industrielle (PIB industriel) et le PIB réel.

## CADRAGE THEORIQUE ET REVUE DE LA LITTERATURE

A première vue, les pays riches sont tous industrialisés. Brasseul et Lavrard-Meyer ont constaté que les pays industrialisés arrivent toujours à produire deux fois plus de PIB industriel par rapport aux pays en développement (Brasseul & Lavrard-Meyer, 2016). Adam Smith a souligné que la spécialisation dans la production industrielle est très importante pour favoriser la création de richesse (Smith, 1843).

L'industrie est un moteur pour la croissance économique à Madagascar (Rasoarahona, 2019). Toutefois, cette croissance a été toujours entravée par les crises politiques, bloquant même tous ses processus (Razafindrakoto, Roubaud, & Wachsberger, 2014). L'instabilité politique figure parmi les facteurs principaux expliquant les mauvaises performances économiques de l'Afrique Subsaharienne, la grande île y comprise (Goujon, 2007). Razafindrakoto, Roubaud et Waschberger ont conclu que l'incapacité d'instaurer un consensus politique stable met la croissance économique sous des risques d'instabilité (Razafindrakoto, Roubaud, & Wachsberger, 2014).

Concernant particulièrement l'industrialisation, Madagascar n'est pas une exception par rapport à ses voisins d'Afrique. Toutefois, si certains pays ont pu renverser la tendance de croissance en mettant en avant l'industrialisation comme moteur de croissance, Madagascar n'a pas un bilan concluant, voire relâché (CREAM, 2014). Le Cercle de Réflexion des Economistes Malagasy a trouvé une explication dans le fait que « *les politiques (protection tarifaire élevée, politique commerciale non favorable au développement de l'industrie), les stratégies de développement et les actions de l'Etat pour asseoir le développement ne lui ont pas permis d'émerger et de faire de l'industrialisation un moteur de croissance économique* » (CREAM, 2014).

D'où leur conclusion que la contribution de l'industrie dans la croissance est élevée, mais elle demeure fortement insuffisante (CREAM, 2014). En parallèle avec cette insuffisance de la contribution de l'industrie dans la croissance économique, les risques de crise politique fragilisent aussi et menacent ce processus de croissance (Goujon, 2007).

## METHODOLOGIE

Notre choix méthodologique s'est orienté vers la modélisation autorégressive à retard échelonné (ARDL) afin d'analyser la relation dynamique entre la croissance industrielle et la croissance économique, tout en prenant en considération les risques liés aux crises politiques. Cette décision repose sur plusieurs considérations fondamentales. Tout d'abord, l'ARDL offre l'avantage d'explorer la dynamique temporelle des variables étudiées, même lorsque l'échantillon de données est relativement restreint (Berahab, 2017). En effet, cette approche permet une analyse robuste même en présence d'un petit ensemble de données, garantissant ainsi une évaluation précise des relations à travers le temps (Berahab, 2017).

Ensuite, l'ARDL se distingue par sa capacité à dévoiler les dynamiques à la fois à court et à long terme (Berahab, 2017). Cette dualité est essentielle pour comprendre l'évolution des variables au fil du temps. En examinant les interactions à court terme, nous sommes en mesure de saisir les ajustements immédiats entre la croissance industrielle et la croissance économique, tandis que l'analyse à long terme révèle les tendances structurelles et les effets persistants de ces deux variables. Cette approche méthodologique, comme le souligne Berahab (2017), offre une vision complète et nuancée des dynamiques entre la croissance industrielle et la croissance économique, en tenant compte des caractéristiques spécifiques du contexte malagasy (Berahab, 2017).

Les paramètres de notre analyse se fondent sur deux variables clés : la valeur ajoutée industrielle, également désignée comme le PIB industriel, et le PIB réel. L'ensemble des données associées à ces variables a été collecté à partir des Indicateurs de Développement dans le Monde (WDI), une base de données émanant de la Banque mondiale.

En complément de ces indicateurs, une variable supplémentaire, dénommée "crise", a été intégrée à notre modèle. Cette variable se présente sous forme de variable dummy, adoptant une nature binaire. Elle prend la valeur 1 lorsque l'année en question a été marquée par une crise politique, et 0 dans le cas contraire. Ainsi, la variable "crise" prend la valeur 1 pour les années 2002 et 2009 car dans ces mêmes années, la grande île a connu des crises politiques caractérisées par des mouvements populaires et des événements politiques tumultueux. Cette approche nous permet d'appréhender de manière spécifique les incidences des crises politiques sur la dynamique entre la croissance industrielle et la croissance économique au cours de ces périodes clés.

Le modèle à spécifier aura donc la forme :

$$\ln PIB_t = crise + \sum_{i=1}^p \ln PIB_{t-i} + \sum_{k=0}^q \ln PIBIND_{t-k} + e_t$$

Avec  $PIB_t$  et  $PIBIND_t$  indiquant respectivement le produit intérieur brut de l'année  $t$  et la valeur ajoutée industrielle pour la même période. Le résidu  $e_t$  n'est autre que les erreurs commises par le modèle lors de la régression.

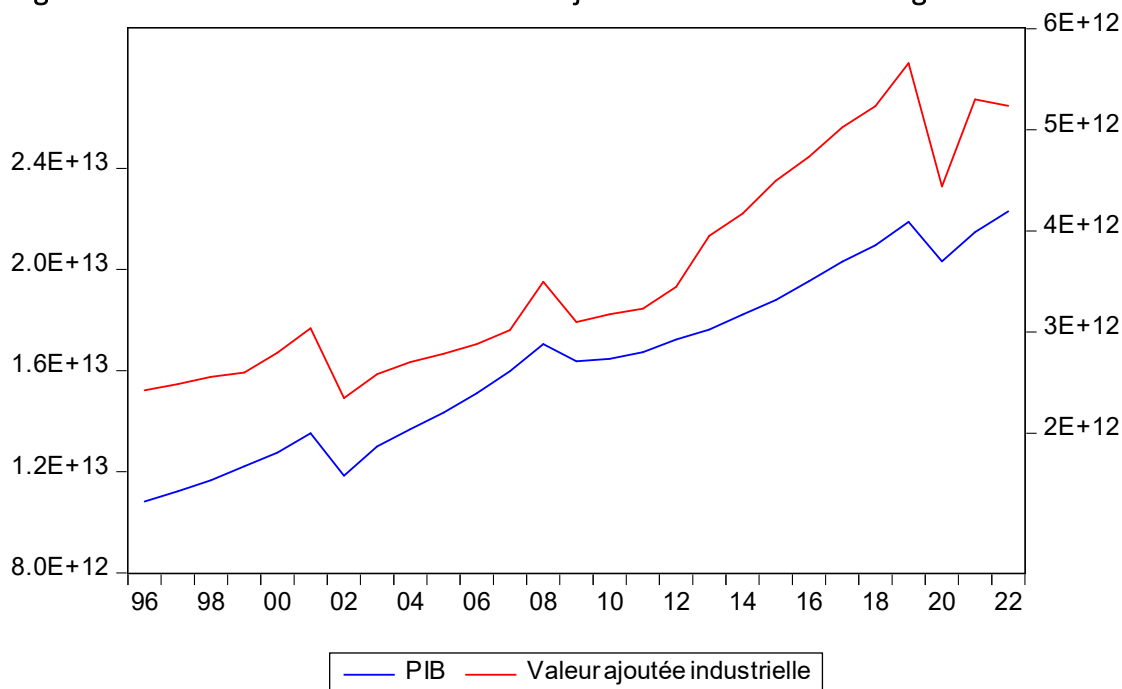
Pour évaluer la dynamique à long terme, nous avons entrepris un test de cointégration, impliquant le calcul de la statistique  $F$  seuil (Berahab, 2017). Cette statistique est ensuite confrontée à un intervalle de bande délimité par les valeurs  $I_{\min}$  et  $I_{\max}$  obtenues à travers le test de cointégration de Pesaran (Benyacoub, 2021). Si la statistique  $F$  calculée dépasse la borne supérieure  $I_{\max}$ , cela confirme la présence de la cointégration indiquant ainsi l'existence d'une relation de long terme entre le PIB et la valeur ajoutée industrielle (Benyacoub, 2021). En utilisant cette approche, nous cherchons à identifier et à quantifier les liens structurels qui perdurent au fil du temps entre ces deux variables cruciales (Berahab, 2017), fournissant ainsi des indications sur la persistance des relations de long terme dans le contexte économique malagasy.

## RESULTATS ET DISCUSSIONS

En analysant la trajectoire du PIB et la valeur ajoutée industrielle à Madagascar sur la période allant de 1996 à 2022, nous constatons une évolution pratiquement similaire. En effet, le calcul du coefficient de corrélation entre ces deux variables révèle une valeur positive de 0.95. Cette corrélation positive de forte amplitude indique que le PIB et la valeur ajoutée industrielle évoluent de manière concomitante. En d'autres termes, une augmentation de la valeur ajoutée industrielle, ou du PIB industriel, s'accompagne d'une élévation simultanée du PIB, et réciproquement. Cette corrélation robuste souligne l'interconnexion étroite entre la croissance industrielle et la croissance économique à Madagascar au cours de cette période d'analyse.

La visualisation graphique renforce notre observation, comme dépeint dans le graphique ci-dessous. La courbe en rouge reflète l'évolution de la valeur ajoutée industrielle, exprimée en termes de prix constants (échelle de droite). Parallèlement, la courbe en bleu trace la trajectoire du PIB, maintenu en Ariary constants (échelle de gauche). Cette représentation graphique offre une clarté visuelle quant à la corrélation synchronisée entre la valeur ajoutée industrielle et le PIB, mettant en lumière les fluctuations conjointes de ces deux indicateurs économiques clés au cours de la période analysée.

**Figure 1 : Evolutions du PIB et de la valeur ajoutée industrielle à Madagascar**

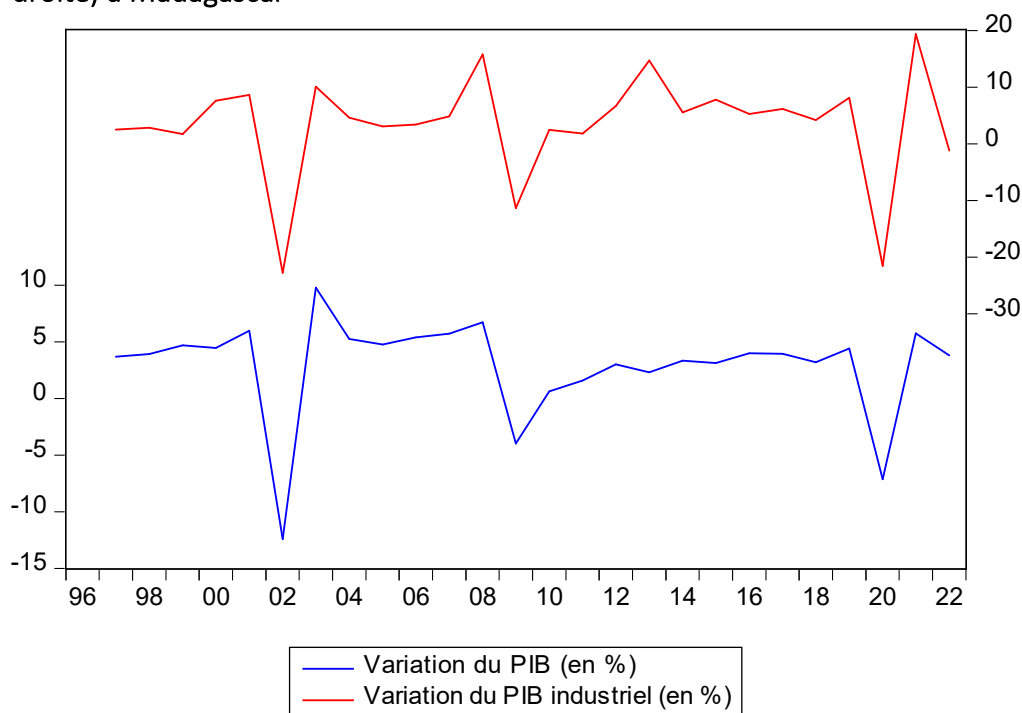


Source : mise en graphes par l'auteur des données recueillies dans le WDI, année 2024

En ce qui concerne les fluctuations observées dans les deux variables, il est remarquable que chaque année marquée par des crises politiques a été associée à des déclin significatifs. Par exemple, en 2002, le PIB a enregistré une chute de 12.4% (Figure 2), tandis que la valeur ajoutée industrielle a connu une baisse plus prononcée, atteignant -23% (Figure 2). Ces baisses brutales sont en effet provoquées par la crise politique de 2002 ayant opposé deux candidats à l'élection présidentielle de l'époque (Blanc-Pamard & Ramiarantsoa, 2003). De manière similaire, en 2009, une année marquée par des perturbations politiques, le PIB a diminué de 4%, accompagné d'une réduction de 11% pour la valeur ajoutée industrielle. Ces observations montrent historiquement l'effet négatif des crises politiques sur le secteur industriel qui compromet aussi le processus de la promotion de la croissance économique.

Le cas de 2020 revêt une particularité remarquable. Une décroissance a été survenue à cause d'une crise d'une nature spécifique, à savoir la crise sanitaire liée à la COVID-19. Cette nuance souligne la diversité des facteurs pouvant influencer les fluctuations économiques, où des crises d'origines différentes peuvent engendrer des dynamiques distinctes. La pandémie mondiale de la COVID-19 a ainsi exercé une pression sur l'économie, faisant baisser le PIB d'environ sept pourcent (Figure 2).

**Figure 2 : Variation du PIB (échelle de gauche) et de la valeur ajoutée industrielle (échelle de droite) à Madagascar**



Source : mise en graphe par l'auteur des données recueillies dans le WDI, année 2024

Les résultats obtenus à partir de l'analyse de la régression ARDL confirment de manière probante l'influence significative de la valeur ajoutée industrielle sur le PIB (Tableau 1). En effet, le résultat<sup>1</sup> (Tableau 1) montre que, à court terme, une augmentation de 1% au niveau de la valeur ajoutée industrielle apporte une croissance économique additionnelle de 0.21% pour l'économie malagasy<sup>2</sup>. Ces constatations confirment ainsi la première hypothèse avancée, démontrant que la croissance industrielle constitue une contribution positive essentielle à la croissance de l'économie nationale à Madagascar.

**Tableau 1 : Dynamique de court terme entre la valeur ajoutée industrielle et le PIB**

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PIB(-1))*	0.010514	0.037872	0.277609	0.7839
LOG(PIBIND(-1))	-0.010075	0.039860	-0.252757	0.8028
DLOG(PIBIND)	<b>0.218971</b>	0.085288	2.567432	0.0176

<sup>1</sup> LOG signifie logarithme népérien et DLOG c'est la différence du logarithme.

<sup>2</sup> Les valeurs en gras dans le tableau indiqué montrent les paramètres/coefficients évoqués.

CRISE -0.065231 0.025477 -2.560381 0.0178

\* p-value incompatible with t-Bounds distribution.

Source : calculs de l’auteur sous Eviews 10 à partir des données de la Banque mondiale, année 2024

L'application du test de cointégration de Pesaran par le biais du modèle confirme effectivement l'existence d'une relation de long terme entre le PIB et la valeur ajoutée industrielle. La statistique F calculée atteint la valeur de 9.69, surpassant la borne supérieure seuil<sup>3</sup> établie à 4.11 (Tableau 2) qui correspond à  $I_{max}$  suivant le test de cointégration de Pesaran effectué<sup>4</sup>. Ce résultat robuste indique qu’il existe une cointégration entre le PIB et la valeur ajoutée industrielle, révélant ainsi une liaison structurelle persistante entre ces deux variables économiques clés à Madagascar.

**Tableau 2 : Test de cointégration entre la valeur ajoutée industrielle et le PIB**

F-Bounds Test		NullHypothesis: levelsrelationship			No
Test Statistic	Value	Signif.	I(0)	I(1)	
			Asymptotic: n=1000		
F-statistic	<b>9.697967</b>	10%	2.44	3.28	
k	1	5%	3.15	<b>4.11</b>	
		2.5%	3.88	4.92	
		1%	4.81	6.02	

Source : calculs de l’auteur sous Eviews 10 à partir des données de la Banque mondiale, année 2024

Par conséquent, compte tenu de cette cointégration, il devient possible d'évaluer l'impact de la valeur ajoutée industrielle sur le PIB dans la longue durée. L'extraction de cette dynamique à long terme conduit aux résultats suivants<sup>5</sup> :

**Tableau 3 : Dynamique de long terme entre le PIB et la valeur ajoutée industrielle**

Levels Equation				
Case 1: No Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PIBIND)	<b>0.958259</b>	0.340015	2.818287	0.0100

EC = LOG(PIB) - (0.9583\*LOG(PIBIND) )

Source : calculs de l’auteur sous Eviews 10 à partir des données de la Banque mondiale, année 2024

<sup>3</sup> Les valeurs en gras dans le tableau indiqué montrent les paramètres/coefficients évoqués

<sup>4</sup> Avec une marge d’erreur de 5%.

<sup>5</sup> Les valeurs en gras dans le tableau indiqué montrent les paramètres/coefficients évoqués

Ce résultat indique que, à long terme, une augmentation de 1% de la valeur ajoutée industrielle se traduit par une croissance économique supplémentaire de 0.95% pour l'économie malagasy. Cette constatation vient renforcer l'affirmation initiale de la première hypothèse, soutenant que la croissance industrielle apporte effectivement une contribution positive à la croissance de l'économie nationale à Madagascar.

En ce qui concerne l'effet des crises, les résultats de la régression (présentés dans le Tableau 4) confirment la signification statistique de la crise avec un coefficient négatif de 0.06. En extrayant la dynamique à court terme, les résultats obtenus sont les suivants :

**Tableau 4 : Effet à court terme de la crise politique sur le PIB**

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PIB(-1))*	0.010514	0.037872	0.277609	0.7839
LOG(PIBIND(-1))	-0.010075	0.039860	-0.252757	0.8028
DLOG(PIBIND)	0.218971	0.085288	2.567432	0.0176
<b>CRISE</b>	<b>-0.065231</b>	0.025477	-2.560381	0.0178

\* p-value incompatible with t-Bounds distribution.

Source : calculs de l'auteur sous Eviews 10 à partir des données de la Banque mondiale, année 2024

Les résultats confirment un coefficient négatif et significatif (sa probabilité critique de significativité est de 0.0178) (Tableau 4). Cela indique qu'à court terme, une crise politique pourrait entraîner une chute du PIB atteignant jusqu'à 6.5% (Tableau 4)<sup>6</sup>. Cette constatation renforce la validité de la seconde hypothèse avancée, affirmant que la crise politique affecte négativement le PIB. Ce qui veut dire que, effectivement, la crise politique constitue un risque et une menace pour le processus de croissance économique à Madagascar.

<sup>6</sup> Les valeurs en gras dans le tableau indiqué montrent les paramètres/coefficients évoqués

## CONCLUSION

Cette étude s'est efforcée de démêler les complexités des dynamiques économiques à Madagascar, en regardant particulièrement la relation entre la croissance industrielle et la croissance économique face au risque des crises politiques. À travers un examen approfondi du cadre théorique, des revues de la littérature, et l'application d'une méthodologie rigoureuse basée sur la modélisation autorégressive à retard échelonné (ARDL), nous avons cherché à répondre à deux hypothèses cruciales.

La première hypothèse, selon laquelle la valeur ajoutée industrielle (PIB industriel) exerce des apports positifs sur la croissance économique de Madagascar, a été rigoureusement testée. Les résultats de la régression ARDL indiquent une influence significative à court terme, où une hausse de 1% de la valeur ajoutée industrielle entraîne une croissance économique supplémentaire de 0.21%. Dans le long terme, cette relation persiste avec une croissance économique supplémentaire de 0.95% pour chaque pourcent d'augmentation de la valeur ajoutée industrielle. Ces résultats, avec une probabilité critique de la valeur ajoutée industrielle à 0.0176, confirment de manière robuste notre première hypothèse.

La deuxième hypothèse, énonçant que l'instabilité politique, traduite par des crises, menace le processus de croissance économique de Madagascar, a également été vérifiée par notre analyse de la dynamique de court terme entre le PIB et la crise (Tableau 4). Les résultats de la régression révèlent que la crise politique a un impact négatif significatif à court terme, faisant décliner le PIB jusqu'à 6.5%. Ces conclusions soulignent le rôle déstabilisant des crises politiques dans le contexte malagasy.

Les pourcentages significatifs obtenus dans notre étude renforcent l'idée que la croissance industrielle peut être un levier essentiel pour stimuler la croissance économique à Madagascar. Cependant, cette dynamique est étroitement liée à la stabilité politique, et les résultats soulignent le risque que représentent les crises politiques pour le développement économique de la grande île.

En conclusion, pour exploiter pleinement le potentiel de l'industrialisation à Madagascar, des politiques économiques stables et des stratégies de développement appropriées s'imposent. Les résultats de cette étude fournissent des orientations cruciales pour le développement, soulignant la nécessité d'atténuer l'instabilité politique pour favoriser un environnement propice à la croissance industrielle et économique durable à Madagascar.

## BIBLIOGRAPHIE

- Benyacoub, B. (2021). *Modélisation ARDL, test de cointégration aux bornes*. Revue Internationale du Chercheur.
- Berahab, R. (2017). *Emissions de dioxyde de carbone et croissance économique au Maroc : une analyse de la courbe de Kuznets*. OCP Policy Center.
- Blanc-Pamard, C., & Ramiarantsoa, H. (2003). *Madagascar : sortie de crise ?* L'Espace géographique.
- Brasseul, J., & Lavrard-Meyer, c. (2016). *Economie de développement*. Economie du Développement.
- CREAM. (2014). *L'industrie comme moteur de croissance économique à Madagascar : Identification d'une relation de long terme et de causalité*. Cahier de recherche en Analyse Economique CREAM.
- Daron, A., Simon, J., James, R., & Yunyong, T. (2003). *Institutional causes, macroeconomic symptoms: volatility, crises and growth*. Journal of Monetary Economics.

- Goujon, M. (2007). *Démocratie et croissance : le cas de Madagascar 1972-2003*. Université de La Réunion.
- Rasoarahona, J. (2019). *L'industrialisation basée sur l'agriculture pour le développement de Madagascar*. FES Madagascar.
- Razafindrakoto, M., & Roubaud, F. (2002). *Madagascar à la croisée des chemins : la croissance durable est-elle possible ?* Afrique contemporaine.
- Razafindrakoto, M., Roubaud, F., & Wachsberger, J.-M. (2014). *Jalons pour une économie politique de la trajectoire malgache : une perspective de long terme*. Université Paris Dauphine DIAL IRD.
- Smith, A. (1843). *Recherches sur la nature et les causes de la richesse des nations*. Guillaumin.
- Subtil, C. (2021). *Madagascar : le retour de la stabilité politique permettra-t-il le décollage de l'économie malgache ?* MacroDev.

## ACRONYME

- ARDL : Autoregressive Distributed Lag
- COVID-19 : Coronavirus 2019
- CREAM : Cercle de Réflexion des Economistes Malagasy
- LOG ou LN : Logarithme naturel ou népérien
- MAN : Valeur ajoutée manufacturière
- ONUDI : Organisation des Nations Unies pour le Développement Industriel
- PIB : Produit Intérieur Brut

## Biological Sciences

# ӨСІМДІКТЕРДІҢ ТОПЫРАҚТҮЗІЛУ ҮРДІСІНДЕГІ РӨЛІ

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**Аннотация.** Жұмыста Жамбыл облысының өнеркәсіптің әсерінен техногенді бүлінген ландшафтарының далалық және зертханалық зерттеулерінің нәтижелері келтірілген. Техногенді бүлінген жерлердің фитоценозы анықталып, оларға сипаттама берілген. Бүлінген жерлердің қалпына келуінде өсімдіктердің рөлі анықталып, биологиялық рекультивация жүргізу үшін ұсыныстар берілген.

**Түйінді сөздер:** техногендік-бүлінген жерлер, фитоценоз, биологиялық рекультивация, ландшафт

### THE ROLE OF PLANTS IN THE PROCESS OF SOIL DEGRADATION

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**Abstract.** In work results of field and laboratory researches of the landscapes of Zhambyl area tehnogenno-broken by the industry are resulted. It is defined and described фитоценоз the tehnogenno-broken earths. The role of plants in restoration of the broken earths has been defined and actions for carrying out biological recultivation are given.

**Keywords:** man-made-degraded lands, phytocenosis, biological reclamation, landscape

**Өзектілігі.** Геологтар Орта Азияның республикаларында мақтаның, қант қызылшасының, жемістердің, көкөністердің және т. б. ауыл шаруашылық мәдени өсімдіктерінің өнімділігін арттыру (еселеу) мақсатында фосфатты кендерді табуға сенім артқан. Сөйтіп міне 1935-1937 жылдары геологтар Қаратаудағы кембрий жыныстарының арасынан фосфориттердің пластты түрлерінің бар екенін көрді. Бұл фосфориттермен өнімділігі, қоры, пластардың қалыңдығы жөнінен бүкіл әлемде ешқандай фосфоритті кендер теңесе алмайды. Қазіргі таңда Қаратаудағы фосфориттердің кен орындарының бассейні бүкіл әлемде ең ірі бассейн болып табылады.

1935 жылы геолог И. И. Машкара Тараз қаласынан 30 км-дей жерде орналасқан Қаратау жотасын картаға түсіруді жүргізді, соның нәтижесінде фосфориттердің кен орнын ашты. Олардың реңі әр түрлі болып келеді: ақшыл және қара сұр, қара, сары-құба және қызыл жыныстар. Қаратаудың фосфоритті қалыңдығы темірлі-марганецті карбонатты кендердің әлсіз қабатымен жабылып жатыр. Осы карбонатты жыныстардың құрамында 26% фосфорлы ангидрид және 22% марганец бар. Жыныстардың құрамында фосфор және марганецтің қатар болуы оларды микротыңайтқыш ретінде қолдануға мүмкіндік береді.

Қаратауда 45-тен аса фосфоритті кен орындар табылып отыр. Олардың ең ірілері: Жаңатас, Көкжон, Көксу, Ақжар, Үшбас, Шолақтау. Жамбыл облысының жеріндегі Қаратау бассейнінде 71,9% фосфориттердің қоры шоғырланған, сондықтан осында табиғи ландшафтардың ластануы мен жерлердің бұзылуы фосфориттерді өндірумен тікелей байланысты. Ондаған кен орындары бар бассейн ені 20-25 км болып келетін, солтүстік-батыс

бағытта 120 км-ге созылып жатқан жолақ болып табылады. Қаратау бассейнінің кен орындары жыныстардың құрамы бойынша бір-біріне ұқсас болып келеді. 400 м-ге дейінгі тереңдіктегі фосфориттердің жалпы қоры 1,5 млрд. тонна.

**Жұмыстың мақсаты:** Жанатас кен орнының өнеркәсіптік үйінділерінде топырақтүзілу үрдісіндегі өсімдік жамылғысының рөлін зерттеу.

**Зерттеу нысаны.** Қаратаудағы ірі кен орындарының бірі-Жаңатас кен орны. Зерттеу жұмыстары өнеркәсіптік үйінділерде жүргізілді. Үйіндінің жас мөлшері -50 жыл. Бұл үйінділер фосфориттерді өндіру барысында түзілді. Үйінділерде топырақ мүлдем жоқ. Топырақ түзілу үрдісі бұл үйінділерде өте баяу жүреді. Үйінділер ескі және жас болып бөлінеді. Олар карьердің айналасын қоршап жатыр. Біз ғылыми экспедицияға шығу барысында карьерді көруге мүмкіндік туды. Карьер бірнеше қабаттардан тұрады (1-сурет).



1-сурет. Жанатас кен орнының үйінділері



2-сурет. Жанатас кен орнындағы жер асты суларына толы карьер

**Зерттеу әдістері.** Фитоценоздарды зерттеген кезде геоботаникада қолданылатын әдістер қолданылды: 1м<sup>2</sup> немесе 100м<sup>2</sup> аудан бірлігінде өсетін өсімдік түрлерінің мөлшері; фитоценоздардағы түрлердің сандық ара қатынасын анықтау Друде шкаласы бойынша және көз мөлшермен бағалау әдісі (өсімдіктің топырақ бетін жауып жатқан ауданын анықтаумен) бойынша жүргізілді. Флораның түрлік құрамын есептеу өсімдік топтарын сипаттау процесінде өсімдік түрлерін тіркеу әдісімен жүзеге асырылды. Өсімдік жамылғысының сукцессия процесін зерттеу өсімдіктің алмасу барысын тікелей бақылау әдісімен, бұрынғы сипатталған өсімдіктерді қазіргі кезде өсіп тұрған өсімдіктермен салыстыра отырып сипаттау арқылы жүзеге асырылды. Өсімдіктің биомассасын анықтауда мынадай авторлардың әдістері қолданылды: Шалыт М.С., Красильников П.К., Байтулин И.О.

**Зерттеу жұмысының нәтижелері.** Өсімдік жабынын және оның биологиялық ерекшеліктерін, сондай-ақ рекультивацияланатын участоктың химиялық және су-химиялық қасиеттерін зерттей отырып фитоценоздың әсерінен лесс тәрізді жыныстардың бастапқы жағдайының өзгеру дәрежесін анықтауға болады.

Адам қызметі саласына түскен табиғи биоценоздар тез өзгереді немесе түбімен өзгеріске ұшырайды. Б.П.Колесников, Л.В.Моторинаның [1] көрсетуі бойынша олар инженерлік-техникалық құрылымдармен және кешендермен, мәдени егістіктермен, әр түрлі мақсаттағы өсімдік өсірумен, төменгі өнімді немесе өнімсіз тақыр жерлерге, «индустриялық шөлдерге» немесе басқа жаңа түзілімдерге алмасады.

Карьердің өңделген участкаларында табиғи өсімдіктердің пайда болуы жынысты игерудің бастапқы кезеңі болып табылады. А.П.Шенниковтың (1964) [2] айтуы бойынша өсімдік бірлестіктері экологиялық жағдайдың өзіндік бір индикаторы болып табылады, сондықтан да биологиялық рекультивацияның практикалық мәселелерін шешу үшін, әсіресе

жыныстардың орман, ауылшаруашылығы, табиғат қорғау және т.б. мақсаттар үшін пайдалануға жарамдылығын бағалаған кезде кең түрде қолдау табады.

Табиғи өсімдік жабынының құрамы мен биологиялық ерекшеліктері бойынша өнеркәсіптің әсерінен бүлінген жерлердің қайта қалпына келтірудегі жұмыс бағыты туралы айтуға болады. Топырақ түзілу процесі өсімдіктің алуан түрлілігі мен сол жерде өсу жылдамдығына тікелей байланысты болады. *В.В.Тарчевский* (1968) [3] зерттеулері өнеркәсіптің пайдаланған жерлерінде өсімдіктің өздігінен өсу процестерін есепке алмау өнеркәсіп отвалдарын, карьерлерін көгалдандырған кезде елеулі қателіктерге әкеліп, уақыт пен қаражаттың босқа шығындалуына әкелуі мүмкін екенін көрсетті.

Жоғары өнімді және мәдени биоценоздармен тығыз қоршалған техногендік ландшафтарда өнеркәсіптің қызметі нәтижесінде жойылған биогеоценоздардың қалпына келуі тез қарқынмен жүреді (*Гогатишвили, 1970; Махонина, 1976; Трофимов, 1977*) [4, 5, 6].

Қазіргі кезде өнеркәсіптік отвалдарда, карьерлерде адамның қатысуынсыз өсімдік жабынының қалыптасуы жайлы көптеген материалдар жиналған. (*Моторина, Ижевская, 1967; Тарчевский, 1968; Дзыбов, 1979, 1982; Қозыбаева және басқалары, 1988, және т.б.*) [7, 8, 3, 10, 11].

Биологиялық рекультивация бойынша ең алғашқы жұмыстар карьерлерде өсімдіктердің табиғи жолмен өсе бастау процестерін ескере отырып 1950-1951 жылдары Донбасста басталған болатын.

Табиғи жолмен өсімдіктердің карьерлерде өсе бастауының сипаты мен қарқыны өңделген жердің жасына, жер бедерінің ерекшелігіне, климатқа, қоршаған ортаның әсеріне тікелей байланысты.

*В.В.Тарчевскийдің* (1968) [3] басшылығымен жүргізілген жұмыстарда өнеркәсіп отвалдарында өсімдіктердің табиғи жолмен өсуі процесіне толық талдау берілген. Өндірістік кәсіпорындардың аймағындағы өсімдіктің морфогенез сипаты, фотосинтез, биохимиялық құрамы жағынан елеулі ауытқулары болатыны анықталған.

Өсімдіктің табиғи жолмен өсу қарқыны мен сипаты карьердің өңделу уақытына, жер бедерінің ерекшелігіне, климатқа, қоршаған ортаның әсеріне байланысты.

Техногендік ландшафтарда өсімдік жабынының пайда болуын *В.Н.Сукачев* (1942) [12] сингенез, ал өсімдік жабынының қалпына келуін денудация деп атады.

Техногендік ландшафтардың өсімдігінің табиғи жолмен өсуін зерттеушілердің (*Бондарь, Додатко, 1974; Кандрашин, 1979*) [13,14] көрсетуі бойынша, техногендік ландшафтарда өсімдіктердің дамуы сингенез бойынша, яғни бірнеше кезеңде: пионерлік, қарапайым, күрделі топтану, *Шенников* бойынша (1964) [2] диффуздық бірлестік түрінде жүреді.

Техногендік ландшафтарда өсе бастаған алғашқы өсімдіктерді, яғни пионерлік өсімдіктерді кең түрде таралған өсімдіктер анемохоралар яғни арам шөптер құрайды, оларда өсімді, яғни вегетативті көбею дамыған, олардың мал қорегі үшін құндылығы жоқ. Тек тез көбейеді, тез таралады.

Өсімдіктің өсімді жолмен таралуы техногендік ландшафтардың жылжымалы тұрақталмаған субстратында тұқыммен көбеюдің жеткілікті мөлшерде қамтамасыз етілмегенін көрсетеді. *Н.Т.Бекарьевич* (1973) [15] зерттеулері екінші және үшінші жылы техногендік ландшафтарда фитоценоздардың шұбарланып өскен кезеңі байқалады, онда дәрілік бақ-бақ сияқты рудералды түрлер басым болады, ценофобтардан аздаған мөлшерде өгейшөп кездеседі. Бұл кезең тұқымы жел арқылы таралатын түрлермен сипатталады, дегенмен де осы кезеңде фитоценоздың қалыптасуында өте үлкен рөл атқаратын фитоортаның қалыптасуы жүреді.

*Е.Р.Кандрашин (1979), А.Н.Куприянов (1982)* [14, 16] зерттеулерінің көрсетуі бойынша техногендік ландшафтарда пайда болатын өсімдік бірлестігінің өсуі мен құрамы климатқа, су режиміне, субстраттың минералды қоректік элементімен және азотпен қамтамасыз етуінің жеткіліксіздігіне байланыстылығы техногендік ландшафтарда өсімдік өсуіне, әсіресе алғашқы кезеңде өсімдік жабынының қалыптасуына қиындықтар туғызады.

Міне сонымен климаттық аймаққа, бүліну типіне, ашылған жыныстардың түрлеріне тәуелсіз техногендік ландшафтарда өсімдіктердің табиғи жолмен өсуі баяу қарқынмен жүреді және өсімдіктің табиғи жолмен өсуі техногендік ландшафтардың өсімдігінің толығымен қалпына келтірумен қамтамасыз ете алмайды.

Зерттеулердің көрсетуі бойынша үйінділерде өсімдіктердің өсуі бойынша 3 телімге бөлінеді: өсімдік мүлдем өспеген, нашар өскен және өсімдігі орташа өскен. Жас үйінділерде топырақ түзілу процесі өте баяу жүреді және өсімдіктер бұл үйінділерде өспейді немесе нашар өседі. Ал оңтүстік-шығыс бағытта ескі үйінділер орналасқан. Бұл үйінділерде өсімдік жамылғысының өздігінен қалпына келу және өсу құбылысы байқалады.

Техногендік-бүлінген ландшафтарда өсімдік жамылғысының табиғи (жасанды емес) жолмен қалпына келуі табиғат үшін өте маңызды процесс. Бұл ландшафтарда өсімдік жамылғысы мардымсыз болса да, ол табиғат жағдайының жақсаруына өзінің жағымды әсерін тигізеді.

Техногендік-бүлінген ландшафтар карбонаттық, доломиттік жыныстардан тұрады. Ландшафтардың үстіңгі қабатында шым кездеседі. Шым дегеніміз- топырақтың жоғарғы қабатында өсімдіктің тірі және өлі тамырларының тұтаса шоғырлануы. Кейбір өсімдіктер шымды өте жақсы береді. Соның нәтижесінде техногендік-бұзылған ландшафтарда гумус (қара шірінді) түзіледі. Шымды көбінесе дәнділер тұқымдастары береді. Дәнділер тұқымдастары жақсы органиканы береді. Сондай-ақ кәдімгі бетеге өсімдігі жақсы шым түзеді. Бұл өз кезегінде техногендік-бұзылған ландшафтарда топырақ түзілу процесіне жағымды әсерін тигізеді.

Техногендік-бүлінген ландшафтар доломитті жыныстардан тұрады. Осындай құнарсыз, тіршілік үшін қолайсыз жерде өсімдіктің өздігінен және жасанды жолмен өсуі мүмкін емес деген ой туады. Бірақ осындай жерлерде де өсімдіктің өздігінен, табиғи жолмен өсуі байқалады. Үйінділердің бетінде табиғи фитоценоздардың орналасуы байқалады.

Техногендік-бүлінген ландшафтардың айналасындағы аймақтардан жел арқылы бұл ландшафтарға өсімдіктердің тұқымдары таралады. Бұл тұқымдар қолайлы жағдайға тап болып, өсіп -өне бастайды. Сөйтіп, бұл ландшафтарда өсімдік өседі.

Өсімдік біртұтас жүйе ретінде белгілі түрдің әр түрлілігімен, биомассасымен және бірлестіктің өнімділігімен сипатталады, өсімдіктер бірлестігінің табиғи экожүйелерінің үлкен құбылымдығы кезінде олардың әрқайсысында түрлер жиынтығы болады, олар фитоценоздардың өзгешелігін анықтайды; соңғысы климаттық және эдафикалық жағдайларға тәуелді болады; бірлестіктің құрамы сукцессияның ерте кезеңдерінде кездейсоқ факторлардың үлкен әсерінде болады, бірлестіктің өмірін бақылап отырушы негізгі фактороның ішкі қасиеттері болып табылады: өсімдіктер сукцессиясы биогеоценоздың толықтығы, оның рельефтегі орны және антропогендік күштің түрі бойынша әр түрлі болып келеді; олар біріншілік және екіншілік болып бөлінеді; биогеоценоздың нөлдік жағдайдан бастап дамуы, босаған бетінде топырақ грунттарының өсімдік бірлестігінің қалыптасуы біріншілік сукцессия деп аталады; бір немесе бірнеше компоненттердің бұзылуы, биогеоценоздың алғашқы қалпына келіп оралуы немесе оның дамуы қандай болса да жаңа бағытта жылжуы екіншілік сукцессия деп аталады. Біріншілік сукцессия кезінде өсімдіктердің дамуы сингенез типі бойынша жүреді, яғни аумақты өсімдіктер басады. Бұл процесс кезінде өсімдіктердің арасында белгілі бір аумақ үшін күрес жүреді және олардың арасында белгілі

бір қатынастар қалыптасады. Техногендік сукцессияны сипаттау үшін көптеген мамандар Л. Г: Шеннинковтың ұсынған схемасын қолданады. Ол өсімдіктердің техногендік топырақ грунттарында қалыптасуының үш негізгі кезеңін бөліп алады. 1) өсімдіктердің арасында өзара байланыстар болмайтын пионерлік топтар; 2) өсімдіктердің арасында белгілі бір қатынастар пайда болатын, бірақ бірлестіктердің таралу кейпі фрагменттік болатын топтасып өсу бірлестігі; 3) өсімдіктер арасындағы қатынастардың кейпі аралас болып келетін және жеке түрлер арасындағы бөліну бірлестіктің арасындағы элементтер бәсекелестігінің деңгейіне сәйкес келетін диффузиялық бірлестік. Біздің зерттеу жұмыстарымыздың көрсетуі бойынша үйінділерде өсімдіктің өздігінен қалыптасу процесінде қалыптасудың екі кезеңін айтуға болады: пионерлік топтасу және топтасып өсу бірлестігі.

Шөптесін өсімдіктердің жер бетіндегі фитомассасының биоөнімділігі пішенді алаңдар әдісімен есепке алынды (1x1 м<sup>2</sup>, 4 қайталанымда). Тамыр жүйесі монолиттік әдіспен 4 қайталанымда алынып, әрі қарай 1 мм диаметрдегі елеуіш арқылы жуылды.

Фитоценоздардың жер үстіндегі және жер астындағы өнімділігін анықтаудың көрсетуі бойынша жас топырақтарда өсетін өсімдіктердің тамыр массасының негізгі бөлігі 0-10 см тереңдікте орналасады. Статистикалық талдау жер астындағы және жер үстіндегі өсімдіктердің алуан түрлілігін анықтауға көмектесті, өсімдік жамылғысы біркелкі таралмаған. Тамырлар биомассасының вариациялық коэффициенті 36-71% шамасында, 6-қазба шұңқырда вариациялық коэффициент ең жоғарғы мәнге жетеді (71%). 9-қазба шұңқыр пішенінің вариациялық коэффициенті 79,8%-ды құрайды. 7-қазан шұңқыр түсімінің вариациялық коэффициенті 95,5%-ды құрайды. Аймақтық топырақтағы тамырлар биомассасының вариациялық коэффициенті 38,2-66,1% шамасында.

## 1-кесте. Жанатас кен орнының үйіндісінде өсетін өсімдіктер

Рет саны	Бұршақ тұқымдастар ( <i>Leguminosae</i> )
1.	Ақ шеңгел ( <i>Halimodendron halodendron (Pall) Voss</i> )
2.	Есек мия ( <i>Goebelia pachycarpa (schrenk) Bge.</i> )
3.	Тісті түйежоңышқа ( <i>Melilotus dentatus (w. et. K.) Pers.</i> )
Күрделігүлділер тұқымдасы ( <i>Compositae</i> )	
1.	Күмән зиягүл ( <i>Senecio dubius Lebed.</i> )
2.	Шағыр жусан ( <i>Artemisia scoparia wold st. et Kit</i> )
3.	Түкті мақсыр ( <i>Carthamus lanatus L.</i> )
4.	Аңдыз ( <i>Verbascum thapsus L.</i> )
5.	Сиверс жусаны ( <i>Artemisia sieversiana wild</i> )
6.	Жусан ( <i>Artemisia sublessingiana (Kell.) Krasch.</i> )
7.	Ной зиягүлі ( <i>Senecio noeamis Rupr.</i> )
Ерінгүлділер тұқымдасы ( <i>Labiatae</i> )	
1.	Бунге киікоты ( <i>Ziziphora bungeana Jus.</i> )
Дәнділер тұқымдасы ( <i>Gramineae</i> )	
1.	Қылқан ( <i>Taeniatherum crinitum (Schreb.) Desf (Hordeum crinitum) (Schreb.) Desf</i> )
2.	Бетеге ( <i>Festuca Sulcata Hack</i> )
Шаршыгүлділер тұқымдасы ( <i>Cruciferae</i> )	
1.	София сармаласы (ұлы шөп) ( <i>Descurainia Sophia (L) Schur.</i> )
Қылшалар тұқымдасы ( <i>Ephedraceae</i> )	
1.	Қызыл тамыр қылша ( <i>Ephedra intermedia Echrenfc.</i> )
Қорғасыншөптер тұқымдасы ( <i>Plumbaginaceae</i> )	
1.	Мыңжылғы кемпіршөп ( <i>Acantholimon minshelkense Pavl.</i> )
Тарандар тұқымдасы ( <i>Polygonaceae</i> )	
1.	Қаратау түйесіңірі ( <i>Atraphaxis karataviensis Lip sch. Et. Pavl.</i> )
Қалампырлар тұқымдасы ( <i>Caryophyllaceae</i> )	
1.	Сылдыршөп ( <i>Silene longicalycina Kom.</i> )
Алабұталар тұқымдасы ( <i>Chenopodiaceae</i> )	
1.	Коровин балқаңбағы ( <i>Corispermum Korovinii Zljn.</i> )

Біздің зерттеу жұмыстарымыздың нәтижесінде өсімдіктердің тұқымдастары анықталды. Соның ішінде бұршақ тұқымдас өсімдіктерден 3 өсімдік анықталды. Олар: жыңғыл, есек мия, түйе жоңышқа. Күрделігүлділер тұқымдасынан 7 өсімдік анықталды. Олар: зиягүл, шағыр жусан, мақсыр, аңдыз, сиверская жусаны, жусан, зиягүл. Дәнділер тұқымдасынан 2 өсімдік анықталды. Олар: бетеге, қылқан. Шаршыгүлділер тұқымдасынан 1 өсімдік (сармала), ерінгүлділер тұқымдасынан 1 өсімдік (көкемарал), қылшалар тұқымдасынан 1 өсімдік (қызылша), қалампыргүлділер тұқымдасынан 1 өсімдік (кемпір шөп), қарақұмықтұқымдастар тұқымдасынан 1 өсімдік (қаратау түйесіңірі), қалампыргүлділер тұқымдасынан 1 өсімдік (ешкімия), алаботалар тұқымдасынан 1 өсімдік (Коровин түйеқаңбағы) анықталды

**Қорытынды.** Техногендік ландшафтың табиғи жолмен қайтадан қалпына келуі ұзақ процесс, сондықтан да техногендік ландшафтарды биологиялық рекультивация кезінде түрлі игеруші дақылдарды пайдалана отырып, тез арада қалпына келтіруге, яғни мәдени агроценоздарға айналдыруға болады.

Техногендік-бүлінген ландшафтардағы өсімдік жамылғысының өздігінен, табиғи жолмен қалпына келіп өсуі табиғат және ауыл шаруашылығы үшін пайдалы болып келеді. Уақыт өте келе біз бұл ландшафтарды мал жайылымы ретінде пайдалана аламыз.

Техногендік-бүлінген ландшафтарда биологиялық рекультивация жүргізу арқылы бұл ландшафтардың құрылымын өзгертуге болады. Біз ғылыми экспедиция барысында бұл ландшафтарда жиде өсімдігін отырғызған болатынбыз. Жиде - қолайсыз жағдайларда өсіп-өне беретін, көп күтімді қажет етпейтін өсімдік.

Техногендік-бүлінген ландшафтарда өсімдік жамылғысының өздігінен, табиғи жолмен қалпына келуі экология үшін өте маңызды процесс. Бұршақ тұқымдас өсімдіктер ауадағы азотты тамырына жинақтайды. Соның нәтижесінде бұл өсімдіктердің тамырында бактериялар жинақталады. Нәтижесінде ландшафтар азотпен байытылады.

Жаңатас кен орнында фосфориттерді өндіру нәтижесінде қоршаған ортаның ластануы болып тұрады. Бұл өз кезегінде адамдардың денсаулығына кері әсерін тигізеді. Ал өсімдік жамылғысының қалпына келуі бұл проблеманы шешуге жәрдемін тигізеді. Өсімдіктер ауаның құрамындағы улы газдарды (көміртегі қосылыстары) сіңіріп, оттегіні қоршаған ортаға бөліп шығарады.

Қазіргі таңда ауаның құрамында көміртегінің көбейіп бара жатқаны байқалуда. Көміртегінің көбеюі өз кезегінде озон қабатының жұқаруына алып келеді. Бұл үлкен экологиялық апат болып табылады. Ал өсімдіктер көміртегіні сіңіріп қалады. Соның нәтижесінде озон қабатының жұқаруына жол берілмейді.

Зерттеу нәтижесінде Жанатас кен орнының үйіндісінде өсетін өсімдіктердің бірнеше тұқымдасы анықталды. бұршақ тұқымдас өсімдіктерден 3 өсімдік анықталды. Олар: жыңғыл, есек мия, түйе жоңышқа. Күрделігүлділер тұқымдасынан 7 өсімдік анықталды. Олар: зиягүл, шағыр жусан, мақсыр, аңдыз, сиверская жусаны, жусан, зиягүл. Дәнділер тұқымдасынан 2 өсімдік анықталды. Олар: бетеге, қылқан. Шаршыгүлділер тұқымдасынан 1 өсімдік (сармала), ерінгүлділер тұқымдасынан 1 өсімдік (көкемарал), қылшалар тұқымдасынан 1 өсімдік (қызылша), қалампыргүлділер тұқымдасынан 1 өсімдік (кемпір шөп), қарақұмықтұқымдастар тұқымдасынан 1 өсімдік (қаратау түйесіңірі), қалампыргүлділер тұқымдасынан 1 өсімдік (ешкімия), алаботалар тұқымдасынан 1 өсімдік (Коровин түйеқаңбағы) анықталды.

### **Ұсыныстар**

1. Жанатас кен орнының үйінділерінің құнарлылығын қалпына келтіру үшін, осы үйінділерде аймақтық өсімдіктерді пайдалана отырып, биологиялық рекультивация жүргізілуге тиіс. Қоршаған ортаны қорғау туралы заңында нақты көрсетілгендей, әр түрлі пайдалы қазбаларды қазбалағаннан кейін, қандай да болмасын өнеркәсіп орындары, өздері техногенді бүлдірген жерлерге биологиялық рекультивация жұмысын жүргізіп, бүлінген жерлерді қалпына келтіріп, ауыл шаруашылығына қайтаруға міндетті.

2. Биологиялық рекультивация жұмысын жүргізу үшін сол аймақтың климаттық жағдайына бейім, құрғақшылыққа төзімді өсімдіктердің тұқымы пайдаланылуға тиіс. Мысалы, үйіндіде жыңғыл өсімдігі өте жақсы өседі, сондықтан осы өсімдікті үйіндіде биологиялық рекультивация жүргізген кезде пайдалануға кеңес береміз.

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### Пайдаланылган әдебиеттер

1. Шенников А.П. Введение в геоботанику. Л., ЛГУ, 1964, 442 с.
2. Тарчевский В.В. Изучение естественной растительности как необходимый этап биологической рекультивации отвалов при открытой добычи бурых и каменных углей. В сб.: Растения и промышленная среда. 1968, с.19-27.
3. Гогатишвили А.Д. Особенности методики рекультивации земель в горных условиях. В кн.: Программа и методика изучения техногенных биогеоценозов. М., Наука, 1978, с.148-159.
4. Махонина Г.И. Первичные стадии почвообразования на промышленных отвалах Урала. В сб.: Освоение нарушенных земель. М.Наука, 1976, с.44-45.
5. Трофимов С.С. и др. Гумусообразование в техногенных экосистемах. Новосибирск, Наука, 1986, 168 с.
6. Моторина Л.В. Естественное зарастание отвалов открытых разработок. В сб.: Растительность и промышленное загрязнение, Свердловск, 1970.
7. Ижевская Т.И. Особенности развития корневых систем растений на отвалах бурогольных разработок. В сб: Проблемы рекультивации земель в СССР. Новосибирск, 1974, с. 183.
8. Дзыбов Д.С. О самозарастании и ускорении. В сб.: Растительность и промышленная среда. Свердловск, 1979, с.60-67.
9. Козыбаева Ф.Е., Бейсеева Г.Б., Лапшина М.С. Естественные фитоценозы техногенных лессовых пород. Проблемы рекультивации нарушенных земель. Свердловск, 1988, с.39-40.
10. Сукачев В.Н. Идея развития фитоценологии. Советская ботаника. М-Л. АН СССР, №1—3, 1942, с.5-14.
11. Бондарь Г.А., Додатко Э.Л. Сингенетические сукцессии растительного покрова на породах надугольной толщи Александрийского месторождения. В сб.: Рекультивация земель.
12. Кандрашин Е.Р. Сингенез и продуктивность естественной растительности и полукультурфитоценозов на отвалах угольных разрезов Кузбасса. В сб.: Почвообразование в техногенных ландшафтах. Новосибирск, Наука, 1979, с.163-172.
13. Бекаревич Н.Т. Основные результаты исследований по биологической рекультивации земель, нарушенных горнодобывающей промышленностью. В сб.: Экологобиологические и социально-экономические основы с/х рекультивации в степной черноземной зоне УССР. Днепропетровск, 1984, т.49, с.12-33.
14. Куприянов А.Н. Естественное зарастание отвалов Карагандинского угольного бассейна и их фитомелиорация. Дисс. К.б.н. Алма-Ата, 1982, 221 с.
15. Етеревская Л.В. Рекультивация земель. Киев. 1977, 122 с.
16. Бурькин А.М. Темпы почвообразования в техногенных ландшафтах в связи с рекультивацией. Почвоведение, 1985 а, №2 с.81-93.

# Accumulation of proline in plants under oxidative stress

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Oxidative stress caused by environmental factors such as drought, high salinity, and extreme temperatures trigger complex biochemical and physiological changes in plant cells. Proline is one of the key amino acids present in plant cells and plays structural and functional roles in biochemical processes. However, despite its importance, proline is also becoming the focus of attention in the context of oxidative stress, which is one of the main factors affecting plant organisms under adverse external influences. This article is devoted to the study of proline accumulation in plants under oxidative stress caused by a combination of biotic and abiotic factors.

**Introduction.** The accumulation of proline under stressful conditions affects the plant's ability to survive by performing many functions. Proline acts as an osmoprotector, maintaining osmotic balance and cell turgor, which helps plants tolerate abiotic stress [1][2][3]. It also acts as a signaling molecule, triggering the stress response of plants [4]. In addition, proline acts as an antioxidant defense molecule, reducing the level of reactive oxygen species and preventing oxidative damage [5]. The accumulation of proline helps to stabilize membranes, maintain electrolyte balance, and protect the photosynthetic apparatus. In addition, proline can interact with other osmoprotectors and signaling molecules, enhancing plant defense mechanisms under stressful conditions. In general, the accumulation of proline plays a crucial role in increasing stress resistance and improving the ability of plants to survive in adverse environmental conditions.

Note that scientific research in the field of proline accumulation under oxidative stress is important not only for plant biology, but also for practical aspects of agriculture, biotechnology and ecology. Understanding the mechanisms of plant adaptation to stressful conditions

contributes to the development of new approaches to improve plant resistance to adverse factors, which is important in changing climate and environmental conditions.

### **Materials and methods**

In this experiment, *Nicotiana benthamiana* plants were used as the object of research. The wild type of TBSV virus and its mutant RMJ1 were used as the source of infectious material. The RMJ1 mutation involves replacing the gene encoding the capsid protein (CP) with the GFP gene [6]. This modification does not affect the ability to infect, but the absence of CP is accompanied by a decrease in the effectiveness of systemic infection [7].

We used 2.5 mM solutions of molybdenum and tungsten, as well as a combination of these metals in a 1:1 ratio, as abiotic factors in our experiment. We treated plants that were 30 days old by watering them with fresh metal solutions daily for 7 days. Then, we inoculated the plants with viruses by mechanically rubbing the leaf surfaces.

### **Obtaining viral DNA**

*Escherichia coli* (*E. coli*) bacteria were transformed with pUC19 plasmids containing a viral genome using the heat shock method. The resulting culture was cultivated and reproduced to accumulate plasmids. Isolation of plasmids was performed using the Thermo Scientific GeneJET Plasmid Miniprep Kit. Linearization of the plasmid was achieved by SmaI restriction enzyme at the CCC↓GGG restriction site.

DNA purification was carried out using the phenol-chloroform method. 450 microliters of distilled water and 500 microliters of a phenol:chloroform mixture were added to 50 microliters of DNA. The mixture was gently stirred for 30 seconds by turning the tube upside down. After centrifuging at 10,000 RPM and 4°C for 15 minutes, 400 microliters of the supernatant from the upper layer was carefully removed. Then, 40 microliters of 3 M sodium acetate and 560 microliters of cold 96% ethanol were added. The sample was incubated at -20°C for 40 minutes in an upright position. After centrifugation, the supernatant was discarded, and the pellet was washed twice with 500 microliters of 70% ethanol. The pellet was then dried at 37°C and resuspended in 10 microliters of water.

### **In vitro transcription**

6 µl of Tango buffer, 6 µl of each type of nucleoside triphosphate (ATP, GTP, CTP, UTP), 6 µl of purified restricts, 6 µl of T7 DNA-dependent RNA polymerase and 21 µl of sterile water were added to sterile tubes. Incubated for three hours in a water bath at a temperature of 37°C. The presence of transcripts was checked using agarose gel.

### **Infection of *N.benthamiana* plants**

The solution containing the virus RNA was brought to a volume of 350 µl with a 10 mM phosphate buffer. After a week of metal treatment, two leaves were infected on each plant with the addition of saltpeter and 25 µl of RNA virus and then the leaf was lightly rubbed to penetrate the RNA into the cells.

A week after infection, samples were isolated with a TE buffer to confirm the presence of infection, and sulfosalicylic acid to determine proline.

### **Western blotting**

Western blotting was performed using primary antibodies specific to the P19 protein of the virus. Secondary antibodies were used by anti-rabbit labeled with alkaline phosphatase. NBT/5-bromo-4-chloro-3-indolyl phosphate substrate was used to visualize the results.

### **Determination of proline accumulation**

The proline content was determined using the Bates method. The method is based on the interaction of free proline with a ninhydrin reagent, which forms a pink-red color. A leaf suspension weighing 0.1 g was homogenized in 2 ml of a 3% solution of sulfosalicylic acid. The homogenate was centrifuged at 10000 rpm for 10 minutes. 2 ml of glacial acetic acid and 2 ml of freshly prepared ninhydrin reagent containing ninhydrin, acetic acid and 6M orthophosphate acid were

added to 2 ml of the supernatant in a reaction tube. The tubes were kept for 1 hour in a boiling water bath. The samples were then cooled to room temperature, and the concentration of proline was measured using a SPEKOL 1300 spectrophotometer at a wavelength of 520 nm in 3 ml cuvettes.

### Results

The detection of viral infection was carried out by the RNA interference suppressor protein P19. Immunoblotting in TBSV infected plants revealed accumulation of P19 protein in the leaves, which indicates the presence of a viral infection. (Fig. 1)

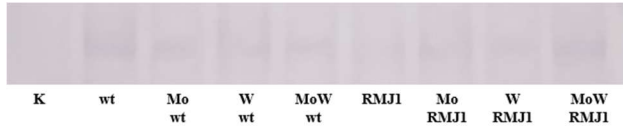


Figure 1.

During the treatment of plants with metal solutions with a concentration of 2.5 mM, an increase in the level of proline was noted compared to the control specimen, which was watered only with distilled water (Fig. 2). Under conditions of combined exposure to heavy metals and wild-type TBSV virus, the concentration of proline remained at the control level. However, when infected with a virus alone, there was a decrease in the concentration of proline (Fig. 3). A study conducted using a mutant showed similar results, but the concentration of proline in the leaves was lower than that in the control plant (Fig. 4).

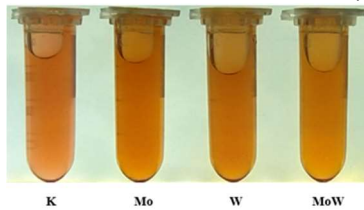


Figure 2.

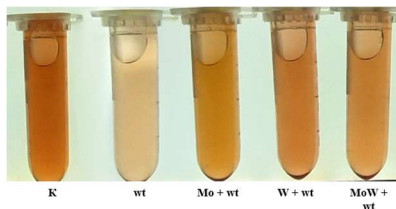


Figure 3.

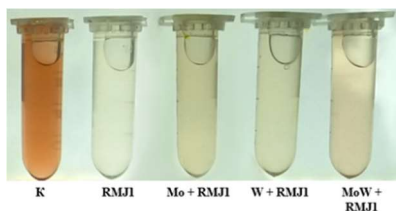


Figure 4.

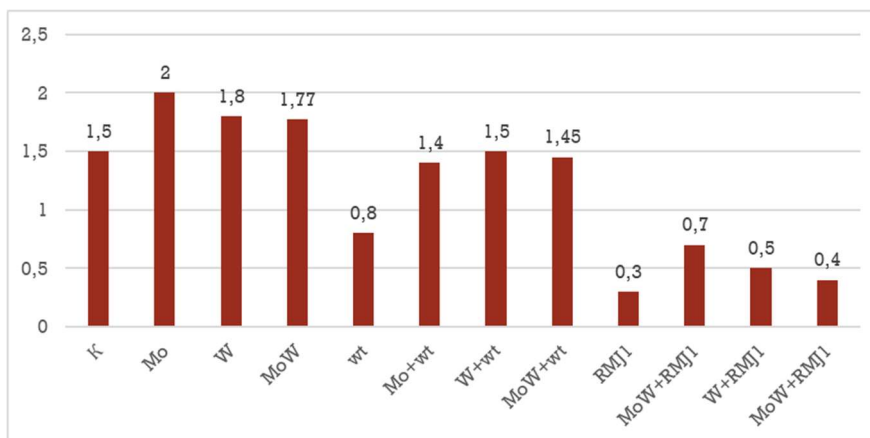


Figure 5. Proline accumulation

**Conclusion.** In conclusion, it can be noted that the results confirm the important role of proline in plants in response to various stressful conditions. Under the influence of metals, an increase in the content of proline is observed, which may indicate its role as a component of the protection system against oxidative stress in this context. However, when infected with viruses, there is a decrease in proline levels, which may indicate a violation of the mechanisms of antioxidant protection and/or a reorganization of amino acid metabolism in plant cells.

It is interesting to note that in the case of combined exposure to viruses and metals, an intermediate value of the proline content is observed, which may indicate a complex relationship between various stress factors and their effect on proline metabolism in plants (Fig. 5). This result highlights the need for a deeper study of the molecular mechanisms of the interaction of various stress factors and their effect on plant metabolism.

In general, the results of this study may be of great practical importance for the development of methods for managing plant stress resistance in agriculture and biotechnology. Understanding changes in proline metabolism in response to various stressful conditions will allow us to develop effective strategies to increase plant resistance to adverse environmental factors, which in turn contributes to sustainable and productive agriculture and the conservation of plant biodiversity.

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## References

1. Spormann, S., Nadais, P., Sousa, F., Pinto, M., Martins, M., Sousa, B., Fidalgo, F., & Soares, C. (2023). Accumulation of proline in plants under contaminated soils—are we on the same page? *Antioxidants*, 12(3), 666. <https://doi.org/10.3390/antiox12030666>
2. Raza, A., Charagh, S., Abbas, S., Hassan, M. U., Saeed, F., Haider, S., Sharif, R., Anand, A., Corpas, F. J., Jin, W., & Varshney, R. K. (2023). Assessment of proline function in higher plants under extreme temperatures. *Plant Biology*, 25(3), 379–395. <https://doi.org/10.1111/plb.13510>
3. Mohammadi Alagoz, S., Asgari Lajayer, B., & Ghorbanpour, M. (2023). Proline and soluble carbohydrates biosynthesis and their roles in plants under abiotic stresses. *Plant Stress Mitigators*, 169–185. <https://doi.org/10.1016/b978-0-323-89871-3.00027-6>
4. Brini, F., & Saibi, W. (2023). Role of proline in regulating physiological and molecular aspects of plants under abiotic stress. *The Role of Growth Regulators and Phytohormones in Overcoming Environmental Stress*, 317–326. <https://doi.org/10.1016/b978-0-323-98332-7.00007-x>

5. Jiang, J., Guo, Z., Sun, X., Jiang, Y., Xie, F., & Chen, Y. (2023). Role of proline in regulating turfgrass tolerance to abiotic stress. *Grass Research*, 3(1), 1–7. <https://doi.org/10.48130/gr-2023-0002>
6. Shamekova, M., Mendoza, M. R., Hsieh, Y.-C., Lindbo, J., Omarov, R. T., & Scholthof, H. B. (2014). Tombusvirus-based vector systems to permit over-expression of genes or that serve as sensors of antiviral RNA silencing in plants. *Virology*, 452–453, 159–165. <https://doi.org/10.1016/j.virol.2013.12.031>
7. Yamamura, Y., & Scholthof, H. B. (2005). Tomato bushy stunt virus: a resilient model system to study virus-plant interactions. *Molecular plant pathology*, 6(5), 491–502. <https://doi.org/10.1111/j.1364-3703.2005.00301.x>

## Legal Sciences

# Ақпараттандыру және байланыс саласындағы заңнамасын бұзғаны үшін әкімшілік-құқықтық жауапкершілікті жүзеге асырудағы салыстырмалы-құқықтық талдау: шетелдік үздік тәжірибе

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### Аннотация

Ақпараттық технологиялар мен цифрлық дәуірде ақпараттандыру және байланыс күнделікті өміріміздің, қоғам мен мемлекеттің ажырамас бөлігіне айналды. Қазіргі таңда ақпараттық технологиялар мен жүйелердің дамуы қоғам мен азамат үшін пайдалы тұстары болғанымен, ақпараттандыру және байланыс саласындағы құқық бұзушылықтар үшін заңды жауапкершілік шараларын күшейту мен аталған саладағы заңнаманың сақталуын қамтамасыз етуде өзекті болып табылады. Мақалада Қазақстан Республикасының ақпараттандыру және байланыс саласындағы әкімшілік құқық бұзушылықтары үшін әкімшілік-құқықтық жауапкершілік шараларын жетілдіру тұсында, әлемнің үздік мемлекеттерінің тәжірибелеріне назар аудара отырып, ақпараттандыру және байланыс саласындағы заңнаманы бұзғаны үшін әкімшілік-құқықтық жауапкершілікке тарту бойынша салыстырмалы-құқықтық талдау жүргізілген. Зерттеудің негізгі мақсаты Қазақстанның ұлттық заңнамасында енгізілуі немесе жетілдірілуі мүмкін құқықтық реттеудің негізгі аспектілері мен тиімді әдістерін анықтау болып табылады.

*Кілт сөздер:* ақпарат, ақпараттық технология, ақпараттандыру, байланыс, әкімшілік құқық бұзушылықтар, әкімшілік-құқықтық жауапкершілік.

### Кіріспе

Қазіргі сандық дәуірдегі қоғамда ақпараттандыру және байланыс саласы қоғамның барлық салаларында маңызды рөл атқарады. Ақпараттық технологияларды мемлекеттік органдар, денсаулық сақтау, білім беру, ғылым, көлік және логистика, экология салалары қызметі барысында қолданады. Дегенмен, қазіргі күні дербес деректерді өңдеу және қорғау қағидаларын бұзу, авторлық құқық пен интеллектуалдық меншік құқығын, ақпараттық жүйелердің қауіпсіздігін бұзу сияқты қоғамға кері әсерін тигізетін құқық бұзушылықтардың саны артып келеді. Осыған бірқатар факторлар өз әсерін тигізіп жатыр. Біріншіден, ақпаратты қорғаудағы кемшіліктер мен техникалық осалдықтардың салдарынан ақпараттық жүйелердегі кибершабуылдардың артуы мен дербес деректердің желіге ағып кетуі.

Екіншіден, отандық заңнамадағы кемшіліктердің салдарынан құқық бұзушылықтар мен қылмыстар үшін жазаның қатаң болмауы. Үшіншіден, ақпараттық технологиялар саласындағы қызметкерлердің ақпараттық қауіпсіздік бойынша жеткілікті дәрежеде білімінің болмауы. Төртіншіден, ақпараттық және сандық технологиялардың күрт дамуы мен оны тиісті дәрежеде құқықтық реттеудің мүмкін болмауы. Бесіншіден, ақпараттық технологиялар мен цифрлық құрылғылардың көмегімен алаяқтық, банктік шоттарды тонау, интеллектуалдық меншік объектілерін ұрлау сияқты құқық бұзушылықтар мен қылмыстардың артуы. Алтыншыдан, құқық бұзушылықтар мен қылмыстар үшін құқықтық ықпал ететін шаралардың бірі заңды жауапкершіліктің әлсіз болуы сияқты факторлар ақпараттандыру және байланыс саласындағы құқық бұзушылықтардың артуына негіз болып отыр.

Жоғарыда аталған құқық бұзушылықтың факторларымен күресуде заңды жауапкершілік ақпараттандыру және байланыс саласындағы заңдылықты, қауіпсіздікті және құқықтық тұрғыдан тиімді жұмыс істеуі мен құқық бұзушылық үшін әділдікті қамтамасыз етуде маңызы зор. Ақпараттандыру және байланыс саласындағы заңды жауапкершілік шаралары қоғамдық тәртіп пен қауіпсіздікті қамтамасыз ете отырып, жеке және заңды тұлғалардың құқықтары мен бостандықтарын, заңды мүдделерін құқыққа қайшы әрекет немесе әрекетсіздіктен қорғайды. Құқықтық нормалардың сақталуы мен құқық бұзушылық үшін құқықтық мәжбүрлеу шараларын белгілейді. Заңды жауапкершілік заң мен сот алдындағы теңдік қағидатының жұмыс істеуі мен азаматтардың сот жүйесіне деген сенімін қалыптастырады. Сонымен қатар еркін ақпараттық қоғамның қалыптасуы мен экономиканың дамуының алғышарты ретінде әрекет етеді. Қазақстан Республикасында (бұдан әрі-ҚР) мемлекеттік қызметтердің цифрландырылуы, электрондық үкіметтің (e-Government) жұмыс істеуі, интернетке қолжетімділік арқылы елдің цифрлық инфрақұрылымының дамуы, жаңа стартаптарға қолдау көрсетілуі, ақпараттық технологиялардың көмегімен цифрлық сабақ беру мен онлайн білім алу мүмкіндігі және онлайн-төлем жүйелері мен банк қызметтерінің цифрландырылуы арқылы финтех саласы қарқынды даму үстінде. Қазақстан дамушы мемлекет ретінде ақпараттандыру және байланыс саласын дамытуда жұмыс жасап жатқанымен, құқықтық реттеу мен әкімшілік-құқықтық жауапкершілік шараларын жетілдіруді қажет етеді. Әлемнің дамыған мемлекеттерінің аталған саладағы заңнамаларына салыстырмалы-құқықтық талдау жүргізу арқылы, үздік тәжірибелерін ұлттық заңнамаға негіздеу мен әкімшілік-құқықтық жауапкершілікке тартудың тиімді құқықтық механизмдерін жетілдіру бойынша тәжірибені ескеруді қажет етеді.

### **Ақпараттандыру және байланыс саласындағы әкімшілік-құқықтық жауапкершілікке шолу**

Қазіргі ақпараттық технология дәуіріндегі әлемде ақпаратқа қол жеткізу құқығы азаматтардың құқықтары мен мүмкіндіктерін кеңейтетін демократиялық мемлекеттің негізі болып табылады. Ақпаратқа қол жеткізу құқығының қалыптасуына адам құқықтары жөніндегі халықаралық құжаттар мен халықаралық конвенциялар, сондай-ақ халықаралық ұйымдар әсерін тигізді. Ақпарат алу құқығын дүниежүзілік деңгейде бекіткен - 1948 жылғы 10 желтоқсандағы БҰҰ Бас Ассамблеясының 217 А (III) қарарымен қабылданған “Адам құқықтарының жалпыға бірдей декларациясы”. Аталған Декларацияның 19-бабы “әр адамның сенім бостандығына және оларды еркін білдіруге, бұл құқыққа өз нанымдарын еркін ұстану еркіндігі және ақпарат пен идеяларды кез-келген тәсілмен және мемлекеттік шекараларға қарамастан іздеу, алу және тарату еркіндігі” [1] кіретіндігі бекітілген. 1966 жылғы 16 желтоқсандағы Бас Ассамблеяның 2200 а (XXI) қарарымен қабылданған “Азаматтық және саяси құқықтар” туралы халықаралық пактінің 19-бабының 2 тармағында

айтылған барлық ақпарат пен идеяларды іздеу, алу және тарату еркіндігі ақпарат бостандығына кепілдік берілді [2]. Жоғарыда аталған халықаралық деңгейде қабылданған құжаттардың барлығында адам құқықтары демократиялық принциптерді ілгерілетудің маңызды рөлі ретінде көрсетілген. Сонымен қатар, цифрлық әлемде қорғалуы керек негізгі құқықтар мен бостандықтарды анықтап, сөз бостандығы мен ақпаратты іздеу және алу құқығының маңыздылығы айқын көрсетілген.

Ақпараттық құқық - ақпарат айналымы және ақпараттық технологияларды қолдану процесінде (ақпаратты іздеу, алу, беру, өндіру және тарату құқығын жүзеге асыру кезінде), сондай-ақ ақпаратты қорғауды қамтамасыз ету кезінде (ақпараттық қауіпсіздікті құқықтық қамтамасыз ету және ақпараттық тәртіпті құқықтық қорғау процесінде) ақпараттық салада туындайтын қоғамдық қатынастарды реттейтін құқықтық нормалардың жиынтығы [3, 17 б], - деген анықтаманы М.А. Федотова ұсынған. Қазақстандық автор А.Е.Жатқанбаева ақпараттық құқық дегеніміз-ақпаратты және одан туындайтын өнімдерді іздеумен, алумен, берумен, таратумен байланысты қоғамдық қатынастар саласын кешенді негізде реттейтін құқықтық нормалардың жиынтығы, - деген [4,21]. Ковалева Н. Н “ақпараттық құқық пәніне” келесідей түйіндеме жасаған. Ақпараттық ресурстарды құрумен, ресімдеумен, сақтаумен және өңдеумен, таратумен, пайдаланумен байланысты қоғамдық қатынастардың бөлігі, ақпараттық ресурстарды қалыптастыру және басқару саласындағы дамумен, коммуникациялар жүйелері мен желілерінде ақпаратпен және оны беру технологияларымен жаңа технологиялық жұмыстарды дамытумен және пайдаланумен, қамтамасыз ету жөніндегі шараларды белгілеумен байланысты ақпараттық салалардағы қауіпсіздік және аталған салалардағы заңды жауапкершілікті қамтиды [5, 21 б].

Осы тұста ақпараттық құқық саласының басқа құқық салаларынан өзінің пәнімен ерекшеленетінін атап өту маңызды. Қазақстандық автор А.И.Алдабергенова келесідей тұжырымдама жасаған:

- 1) ақпаратта оның көріну нысандарының алуан түрлілігі және осы негізде қалыптастырылатын ақпараттық ресурстар кезінде;
- 2) ақпаратпен жұмыс істеу құралдары мен технологиялары (ақпараттық технологиясы);
- 3) байланыс желілері бойынша ақпарат беру құралдары мен технологиялары [6,16].

Жалпы алғанда ақпараттық құқықтың пәні ақпараттандыру процесін, яғни ақпараттық ресурстарды қалыптастыру мен пайдалану негізінде, сонымен қатар ақпараттық қажеттіліктерді қанағаттандыру және субъектілердің құқықтарын іске асыру үшін әлеуметтік-экономикалық және құқықтық-техникалық жағдайды қалыптастыруды ұсынады.

Қазақстан Республикасында ақпараттандыру және байланыс саласындағы құқық бұзушылықтар үшін: әкімшілік-құқықтық және қылмыстық-құқықтық жауапкершілік белгіленген. ҚР ақпараттандыру және байланыс саласындағы құқық бұзушылықтардың ішінде жиі қолданылатыны әкімшілік-құқықтық жауапкершілік болып табылады.

Елімізде ақпараттық құқық пен ақпаратқа қол сұғушылықтан қорғайтын бірқатар нормативтік-құқықтық актілер бар: Қазақстан Республикасының 1995 жылы 30 тамызда республикалық референдумда қабылданған Конституциясы, Қазақстан Республикасының 2014 жылғы 3 шілдедегі Қылмыстық кодексі, Қазақстан Республикасының 2014 жылғы 5 шілдедегі Әкімшілік құқық бұзушылық туралы Кодексі, Қазақстан Республикасының 2004 жылғы 5 шілдедегі № 567 Байланыс туралы заңы, Қазақстан Республикасының 2013 жылғы 21 мамырдағы Дербес деректер және оларды қорғау туралы заңы, Қазақстан Республикасының 1999 жылғы 15 наурыздағы Мемлекеттік құпиялар туралы заңы, Қазақстан Республикасының 2003 жылғы 7 қаңтардағы Электрондық құжат және электрондық цифрлық қолтаңба туралы заңы, Қазақстан Республикасының 2015 жылғы 24 қарашадағы Ақпараттандыру туралы заңы.

Қазақстандық ғалым Р.А.Подопригора әкімшілік жауапкершілік - Қазақстан Республикасының Әкімшілік құқық бұзушылық туралы Кодексінде (бұдан әрі-ӘҚБТК) көзделген әрекеттерді жасағаны үшін соттар мен оған уәкілетті мемлекеттік әкімшілік органдары (лауазымды адамдар) жеке және заңды тұлғаларға қолданатын заңды жауаптылықтың түрі,-деген анықтама ұсынған [7, 288 б].

Ақпараттандыру және байланыс саласындағы әкімшілік құқық бұзушылықтар Қазақстан Республикасының 2014 жылғы 5 шілдедегі Әкімшілік құқық бұзушылық туралы Кодексінің 636-641 баптары аралығын қамтитын 31 тарауымен реттеледі.

Жоғарыдағы заңдар шеңберінде ақпараттандыру және байланыс саласындағы әкімшілік құқық бұзушылықтарды айқындайтын келесідей баптардан тұрады және әкімшілік-құқықтық жауапкершілікті көздейді:

- Электр байланысы желілеріне шеткі құрылғыларды (жабдықты) заңсыз қосу (636-бап);
- Қазақстан Республикасының байланыс саласындағы заңнамасын бұзу (637-бап);
- Сәйкестігі міндетті расталуға жататын, бірақ одан өтпеген байланыс құралдарын пайдалану (638-бап);
- Электрондық ақпараттық ресурстарды қорғау құралдарын пайдалану жөніндегі талаптарды бұзу (639-бап);
- Қазақстан Республикасының электрондық құжат және электрондық цифрлық қолтаңба туралы заңнамасын бұзу (640-бап);
- Қазақстан Республикасының ақпараттандыру туралы заңнамасын бұзу (641-бап).

Ақпараттандыру және байланыс саласындағы құқық бұзушылықтар үшін жауапкершілік істердің ведомстволығы арқылы Соттар мен осы саладағы негізгі уәкілетті орган Ақпараттандыру және байланыс саласындағы және Ақпараттық қауіпсіздікті қамтамасыз ету саласындағы уәкілетті органдар арқылы қаралады. Цифрлық даму, инновациялар және аэроғарыш өнеркәсібі министрлігі Қазақстандағы ақпараттық-коммуникациялық технологияларды дамыту мен реттеуде маңызды рөл атқарады. Министрлік елдегі цифрлық экономиканы дамыту стратегияларын әзірлеп, мемлекеттік бағдарламалардың іске асырылуын қамтамасыз етеді және саланың қызметін ұйымдастырады. Өз кезегінде министрліктің құрылымдық бөлімшелері ретінде жоғарыдағы екі уәкілетті орган осы саладағы құқық бұзушылықтарды қарайды.

Әкімшілік-құқықтық жауапкершіліктің бір ерекшелігі жауаптылыққа соттар мен бірге уәкілетті органдардың тарта алатындығы болып табылады. Соттар ҚР ӘҚБТК 637 бабының (8,9,10,13) бөліктерін және 638 баптың 2 бөлігін қарастырса, Ақпараттандыру және байланыс саласындағы уәкілетті орган: 637 баптың (1, 2, 3, 4, 5, 6, 7, 11, 12, 14, 15) бөліктерін және 638 баптың 1 бөлігін қарастырады. Ал Ақпараттық қауіпсіздікті қамтамасыз ету саласындағы уәкілетті орган 639, 640, 641 баптар бойынша істерді қарап, солар бойынша әкімшілік жаза қолданады. Жалпы жоғарыда аталған баптар өз кезегінде әкімшілік жазаның келесі түрлерін қолданады: айыппұл салу, лицензияны тоқтату тұру (638 баптың 8 бөлігінде), рұқсаттан айыру (638 баптың 9 бөлігінде) және баптардың бір-екі бөлігінде ескерту немесе айыппұл түріндегі әкімшілік жазаны, аталған саладағы құқық бұзушылықтар қамтылған баптардың барлығы дерлік айыппұлды қолданады.

### **Шет елдердегі ақпараттандыру және байланыс саласындағы заңнама мен үздік тәжірибені салыстырмалы-құқықтық талдау**

Америка Құрама Штаттары (бұдан әрі-АҚШ), Германия сияқты дамыған елдерде ақпараттандыру және байланыс саласын реттейтін кешенді заңдар мен ережелер бар. АҚШ-та ақпараттандыру және байланыс саласын реттейтін Жеке деректерді қорғау туралы заң (Data Protection Act), Электрондық коммерция туралы заң (Electronic Commerce Act) және ең негізгі заңнамалардың бірі - 1934 жылғы Байланыс туралы Заң (Communications Act) бар. АҚШ-тың 1934 жылғы “Байланыс” туралы заңы (Communications Act) телефон, телеграф және радио байланыстарын реттейді. Осы саланы қадағалау мен реттеу үшін (FCC) федералды байланыс комиссиясы жұмыс істейді. Заң 1934 жылдан бері қолданыста болғандықтан, өзгерістер мен толықтырулар енгізіле отырып, оған хабар тарату, кабельдік және спутниктік теледидар сияқты жаңа байланыс технологияларын реттейтін ережелер қосылған. Аталған заң АҚШ-тағы телефон, телеграф, теледидар және радио байланыстарын реттей отырып, жиілікті бөлу, тарифтер мен алымдарды, стандарттарды, бәсекелестікті, абоненттік қол жеткізу шарттарын, жарнаманы, мемлекеттің байланыс жүйелерін пайдалануын реттейді [8]. АҚШ-тың “Байланыс” туралы заңын ҚР 2004 жылғы 5 шілдедегі Байланыс туралы заңымен салыстырғанда, екі заң да байланыс қызметтерінің қолжетімділігі мен жоғары сапасын қамтамасыз етуге бағытталғанын және байланыстың тиімді жұмыс істеуін қамтамасыз ету үшін нормалар мен стандарттарды белгілейтінін көруге болады. Заңның біраз ұқсастықтары бар, атап айтқанда АҚШ және ҚР заңдарында да байланыс операторларының заңды қызметі мен сәйкестігін қамтамасыз ету үшін лицензиялау тәртібін белгілейді. Бұған спектрлік ресурстарды бөлу, жиілік спектрін басқару және байланыс инфрақұрылымын реттеудің басқа аспектілерін реттеу кіреді. Екі заңның ұқсастықтары болғанымен, ҚР Байланыс туралы заңына енгізуге және толықтыруға болатын тәжірибе де бар. Мысалы, екі елдің Байланыс туралы заңдары байланыс саласындағы тұтынушылардың құқықтарын қорғауға бағытталған нормаларды қамтығанымен, АҚШ заңында байланыс операторларының абоненттер және байланыс қызметтерін пайдаланушылар туралы қызметтік ақпараттар мен дербес деректерінің құпиялылығын қамтамасыз ету міндеттемелері туралы норма бар. Бұдан бөлек, мүмкіндігі шектеулі пайдаланушылардың байланысқа қол жетімділігі туралы, байланыс операторларының пайдаланушылардың белгілі бір санатына немесе жергілікті жеріне қатысты тарифтерінде немесе қызмет көрсетуінде кемсітушілікке тыйым салу туралы нормаларды қамтиды. Осы тұста ҚР Байланыс туралы заңына деректер құпиялылығы, тарифтер мен қызметтердің ашықтығы жөніндегі міндеттемелерді қоса алғанда, байланыс саласындағы тұтынушылардың құқықтарын қорғау жөніндегі шараларды, сондай-ақ барлық пайдаланушылар, оның ішінде мүмкіндігі шектеулі пайдаланушылар үшін қызметтердің қолжетімділігін қамтамасыз етуді енгізе отырып күшейтуге болады.

ҚР үшін шетелдік тәжірибені Байланыс туралы заңға толықтыру ретінде қарастыруға болады. Себебі, АҚШ тәжірибесі отандық заңнамада қарастырылғанымен, норманың мазмұнын толықтай қамтымайды деуге болады. Мысалы, отандық заңнамада тұтынушылардың құқықтарын қорғау туралы норма бар болғанымен, олардың пайдаланушы ретіндегі қызметтік ақпараттар мен дербес деректерінің құпиялылығын қамтамасыз ету туралы норма қамтылмаған. Сонымен қатар ҚР 2015 жылғы 24 қарашадағы Ақпараттандыру туралы заңының 38 бабы 2 тармағының 9 тармақшасында, мүмкіндігі шектеулі пайдаланушылардың мемлекеттік органның ақпараттық жүйесіне қол жеткізуін қамтамасыз ете отырып құрылады. Мүмкіндігі шектеулі пайдаланушылардың мемлекеттік органның ақпараттық жүйесіне қол жетімділігі ҚР “Ақпараттандыру” туралы заңына сәйкес бар болса, осындай норманы Байланыс туралы заңға енгізу арқылы, тұтынушылардың құқықтарын қамтамасыз етуге болады.

АҚШ заңының тағы бір ерекшелігі аталған заңда құқық бұзушылықтар үшін әкімшілік және қылмыстық санкциялар көзделген. Әкімшілік санкция ретінде Communications Act 47 U.S.C. 312 бабында комиссия кез келген станция лицензиясын немесе құрылыс рұқсатын қайтарып ала алатыны көрсетілген. Осыған келесі негіздер әсер етеді: лицензиат саналы түрде жалған мәлімдемелер жасаған болса, комиссияға лицензия беруден бас тартуды негіздейтін фактілер туралы белгілі болса, лицензия шарттары сақталмаса, байланыс туралы заңды немесе Комиссия ережелерін бұзса, қызметті тоқтату туралы түпкілікті бұйрықты сақтамса, АҚШ-тың "Қылмыстар мен жазалар туралы" заңын бұзу орын алса, лицензия немесе рұқсатты қайтара алады [8]. Аталған санкция түрі ҚР ӘҚБТК 31-тарауындағы ақпараттандыру және байланыс саласындағы құқық бұзушылықтарға қолданылатын арнайы құқықтан айыру, рұқсаттан айыру немесе оның қолданылуын тоқтата тұру, сондай-ақ тізілімнен алып тастау, қызметті тоқтата тұру немесе оған тыйым салу түріндегі санкцияларға ұқсас. Дегенмен, егер хабар тарату станциясы кез-келген 12 айлық кезең ішінде эфирлік сигналдарды таратпаса, онда лицензияның қандай-да бір шарттарына қарамастан, осы хабар тарату станциясының жұмыс істеу лицензиясы осы кезеңнің соңында аяқталатыны да көрсетілген.

АҚШ-тың Communications Act яғни Байланыс туралы заңының V тарауының (501 – 511) баптары әкімшілік айыппұлдан бөлек, байланыс саласындағы құқық бұзушылықтар үшін қылмыстық санкцияларды қарастырады. Қылмыстық санкция ретінде айыппұл (500-10 000) доллар көлемінде, тәркілеу, 1 жылға дейінгі мерзімге бас бостандығынан айыру, белгілі бір төлемдер алу қолданылады. Аталған заңға сәйкес, байланыс саласындағы кейбір қызмет түрлері лицензиялауды қажет ететін болғандықтан, осы талаптарды орындамау әкімшілік жаза түрлерін қолдануға алып келеді. Ал киберқылмыс, хакерлік шабуылдар, құпия деректерді ұрлау немесе ақпараттық қауіпсіздікке қатысты құқық бұзушылықтар орын алғанда, көп жағдайда қылмыстық санкциялар қолданылады. АҚШ-тағы байланыс заңнамасының субъектілері ретінде байланыс операторлары, жеке тұлғалар және саладағы телекоммуникацияны реттеуге және заңдарды орындауға қатысуы мүмкін федералды органдар болып табылады. Ал Федералдық байланыс комиссиясы (FCC) 1934 жылғы Байланыс туралы заңын орындауға және реттеуге жауапты негізгі реттеуші орган. FCC осы саладағы ережелерді әзірлейді, байланыс операторларына лицензия береді, шағымдарды қарайды және телекоммуникация бойынша тергеулер жүргізумен айналысады.

Байланыс саласындағы құқық бұзушылықтар маңызды әрі қазіргі қоғамда көп кездесіп жатқанымен, ақпараттандыру саласындағы қоғамдық қатынастар бүгінгі күннің ең өзекті аспектісі деп айтуға болады. Еліміздің Ақпараттандыру саласын реттейтін Ақпараттандыру туралы заңы Қазақстан Республикасының аумағында, ақпараттандыру объектілерін құру, дамыту және пайдалану кезінде, сондай-ақ ақпараттық-коммуникациялық технологиялар саласын дамытуды мемлекеттік қолдау кезінде мемлекеттік органдар, жеке және заңды тұлғалар арасында туындайтын ақпараттандыру саласындағы қоғамдық қатынастарды реттейді [9]. Осы саладағы құқық бұзушылықтар үшін ҚР заңдарына сәйкес, әкімшілік және қылмыстық жауапкершілік көзделген. Жоғарыдағы АҚШ тәжірибесіне сәйкес байланыс саласына шолу жасалып өткендіктен, ақпараттандыру саласындағы үздік тәжірибе ретінде Еуропалық Одақтағы Германияның тәжірибесіне салыстырмалы-құқықтық талдау жасау маңызды.

Алдыңғы қатарлы Еуропалық Одақтағы озық мемлекеттердің бірі Германияда ақпараттандыру саласындағы құқық бұзушылықтарды Германияның Федералдық ақпараттық қауіпсіздік департаменті (Федералдық агенттік BSI) қарайды. Федералдық агенттік федералды ішкі істер, құрылыс және қоғам министрлігінің құрамындағы ең жоғары федералды орган болып табылады.

Ақпараттық технологиялар қауіпсіздігі жөніндегі Федералды департамент ақпараттың қолжетімділігін, тұтастығын және құпиялылығын қамтамасыз ете отырып, заңның 3 тарауына (§ 3 Aufgaben des Bundesamtes) сәйкес, келесідей міндеттерді орындайды: Федералдық ақпараттық технологияларды қауіпсіздік қатерлерінен қорғайды; Қауіпсіздік тәуекелдері туралы ақпаратты басқа органдарға және үшінші тұлғаларға олардың қауіпсіздік мүдделерін қорғау үшін беру арқылы жинайды және бағалайды; Қауіпсіздік тәуекелдерін зерттейді және федералды үкіметтің міндеттерін орындау үшін қауіпсіздік шараларын әзірлейді; Ақпараттық технологиялардың қауіпсіздігін сынау және бағалау үшін критерийлер, процедуралар мен құралдарды әзірлейді; Ақпараттық технологиялар жүйелерінің немесе компоненттерінің қауіпсіздігін тексереді және бағалайды және қауіпсіздік сертификаттарын береді; Еуропалық Одақтың заңнамасына сәйкес киберқауіпсіздікті сертификаттау жөніндегі Ұлттық органның міндеттерін орындайды; Федералды сектордағы ресми құпия ақпаратты өңдеу үшін ақпараттық технологиялардың жүйелерін немесе компоненттерін бекітеді; Мемлекеттік құпияны қорғау үшін негізгі деректерді шығарады және шифрлау жүйелерін пайдаланады; Ресми құпия ақпараттың қауіпсіздігіне қолдау мен кеңес береді; Федералды ақпараттық технологияларға қауіпсіздік талаптарын әзірлейді және қауіпсіздік өнімдерін ұсынады; Ақпараттық технологиялар қауіпсіздігі жөніндегі федералды органдарға, соның ішінде деректерді қорғау жөніндегі федералды комиссарға қолдау көрсетеді [10].

Еліміздің Ақпараттандыру туралы заңның 4 бабына сәйкес, Қазақстан Республикасының аумағында, ақпараттандыру объектілерін құру, дамыту, қолдап отыру, пайдалану кезінде, сондай-ақ ақпараттық-коммуникациялық технологиялар саласын дамытуды мемлекеттік қолдау кезінде мемлекеттік органдар, жеке және заңды тұлғалар арасында туындайтын ақпараттандыру саласындағы қоғамдық қатынастарға қолданылатынын көрсетеді [9]. Аталған заң ақпараттық-коммуникациялық инфрақұрылымға, атап айтқанда электрондық үкімет, электрондық ақпараттық ресурстарға және ақпараттық жүйелер мен ақпараттандыру объектілерін қорғауға аса мән беріле отырып қарастырылған.

Ақпараттық қауіпсіздік жөніндегі федералды ведомство туралы (BSI - BSI Заңы) заңның 2 тарауы (§ 2 Begriffsbestimmungen) ақпараттық технологияларға ақпаратты өңдеудің барлық техникалық құралдары жататынын түсіндіреді [10]. Ал еліміздің заңнамасында ақпараттандыру объектілері – электрондық ақпараттық ресурстар, бағдарламалық қамтылым, интернет-ресурс және ақпараттық-коммуникациялық инфрақұрылым ретінде түсіндіреді [9]. Осыдан шығатын қорытынды, ақпараттандыру саласы дамып келе жатқандықтан, екі түрлі анықтама ұсынылуы орынды құбылыс. Екі елдің ақпараттандыру саласындағы заңнамасындағы нормаларда келесідей ұқсастықтар байқалды: заңда қолданылатын негізгі ұғымдардың анықтамалары, ақпараттық технологиялар мен ақпараттандыруға қатысты терминдерді, екі елдің уәкілетті органдарының құзыреті, кәсіптік және қауіпсіздік стандарттары туралы ережелер ұқсас келеді. Германия заңнамасындағы бір ерекшелік ақпараттық-коммуникациялық инфрақұрылымның аса маңызды объектілеріне мән берілген. Еліміздің заңнамасында да ақпараттық-коммуникациялық инфрақұрылымның аса маңызды объектілері құқықтық тұрғыдан реттелгенімен, неміс заңнамасындағы сияқты әкімшілік жауапкершілік ҚР ӘҚБТК енгізілмеген. Осы тұста ақпараттық-коммуникациялық инфрақұрылымның аса маңызды объектілерін қорғау мен құқық бұзушылық объектісі болған жағдайда заңды жауапкершілік шарасының қатаң болуының, маңызды екенін келесі негіздер бойынша атап айтуға болады. Ақпараттық-коммуникациялық инфрақұрылымның аса маңызды объектілер: энергетика, көлік, қаржы және денсаулық сақтау сияқты экономиканың маңызды секторларының жұмысын қамтамасыз ететін болғандықтан, жүйеге жасалған шабуыл қаржылық шығынға алып келеді. Осы жүйеге шабуыл жасау азаматтар мен ұлттың қауіпсіздігіне, қоғамның инфрақұрылымға деген сенімінің бұзылуына алып келеді.

Сол себепті неміс тәжірибесіне сүйене отырып, елімізде ақпараттық-коммуникациялық инфрақұрылымның аса маңызды объектілеріне қатысты құқық бұзушылықтар үшін ҚР ӘҚБТК әкімшілік-құқықтық жауапкершілікті қарастыруға болады.

Заңдағы ерекшелік ретінде Германия заңнамасында ақпараттандыру саласындағы құқық бұзушылықтар үшін әкімшілік айыппұлдардың көзделгенін атап өту маңызды. Еліміздің Ақпараттандыру туралы заңында ақпараттандыру саласындағы қоғамдық қатынастар реттелгенімен, заңды жауапкершілік ҚР Әкімшілік, Қылмыстық кодекстеріне сәйкес тағайындалады. Ал Германияның BSI Заңының § 14 айыппұл ережелері (Bußgeldvorschriften) туралы тарауына сәйкес, ақпараттандыру саласындағы заңнамаға сәйкес дұрыс немесе толық құжаттарды ұсынудан бас тартқаны үшін - екі миллион еуроға дейін айыппұл; ақпараттық технологиялар саласындағы қауіпсіздікті қамтамасыз ету жөніндегі нұсқамаларды орындамаған жағдайда - бір миллион еуроға дейін айыппұл; ақпараттық технологиялардың қауіпсіздігін қамтамасыз ету және деректерді қорғау жөніндегі әртүрлі талаптарды сақталмаған жағдайда - бес жүз мың еуроға дейін айыппұл; құжаттамамен дұрыс жұмыс істемеуге, ақпарат беруден бас тартуға немесе заң талаптарына сәйкес қолдау көрсетпеуге байланысты құқық бұзушылық үшін - жүз мың еуроға дейін айыппұл қарастырылған [10]. Еліміздің ҚР ӘҚБТК 641 бабындағы субъектілердің түрлеріне қарай салынатын 10-200 айлық есептік көрсеткіш мөлшеріндегі айыппұл, Германия тәжірибесіне сәйкес құқықтық ықпал ету дәрежесінің төмен екенін көрсетеді.

#### **Қорытындылар мен ұсыныстар**

Ақпараттандыру және байланыс саласындағы заңнамасын бұзғаны үшін әкімшілік-құқықтық жауапкершілікті жүзеге асырудағы шетел заңнамаларына сәйкес салыстырмалы-құқықтық талдау, еліміздің ақпараттандыру және байланыс саласын дамыту мен құқық бұзушылықтар үшін тиімді жауапкершілік шараларын жетілдіруге мүмкіндік береді. Салыстырмалы-құқықтық талдау ҚР ақпараттандыру және байланыс саласындағы әкімшілік құқық бұзушылықтарды, әлемнің озық АҚШ пен Германия сияқты мемлекеттерінің тәжірибесімен салыстыра отырып, бірқатар тәжірибелерді енгізуге болатынын көрсетті. АҚШ пен Германияның ақпараттандыру және байланыс саласындағы тәжірибелерін еліміздің 2015 жылғы 24 қарашадағы “Ақпараттандыру” туралы заңы мен 2004 жылғы 5 шілдедегі “Байланыс” туралы заңына және аталған заңдарды бұзған жағдайда әкімшілік-құқықтық жауапкершілікті қарастыратын 2014 жылғы 5 шілдедегі Әкімшілік құқық бұзушылықтар туралы заңының аталған құқық бұзушылықтар бөлігінде өзгерістер мен толықтырулар ретінде енгізуге төмендегідей негізінде қорытындылар жасалды.

1. Еліміздің Байланыс туралы заңына АҚШ заңындағы байланыс операторларының абоненттер және байланыс қызметтерін пайдаланушылар туралы қызметтік ақпараттар мен дербес деректерінің құпиялылығын қамтамасыз ету міндеттемелері, мүмкіндігі шектеулі пайдаланушылардың байланысқа қол жетімділігі туралы, байланыс операторларының пайдаланушылардың белгілі бір санатына немесе жергілікті жеріне қатысты тарифтерінде немесе қызмет көрсетуінде кемсітушілікке тыйым салу туралы нормаларын отандық Байланыс туралы заңнамаға енгізуге болады. Себебі, отандық заңнамада тұтынушылардың құқықтарын қорғау туралы норма бар болғанымен, олардың пайдаланушы ретіндегі қызметтік ақпараттар мен дербес деректерінің құпиялылығын қамтамасыз ету туралы норма қамтылмаған. Бұл өз кезегінде тұтынушылардың құқықтарын қорғау туралы норманы кеңірек ашуға және мүмкіндігі шектеулі пайдаланушылардың байланысқа қол жетімділігін қамтамасыз ете отырып, ҚР Байланыс туралы заңының 5 бабындағы субъектілердің құқықтары мен заңды мүдделерін қорғау қағидатының жұмыс істеуіне мүмкіндік береді. Ал байланыс қызметтеріне арналған тарифтер негізінде кемсітушілікке тыйым

салу арқылы, құқықтарды қорғау және адал бәсеке қағидаттарының жұмыс істеуіне жағдай жасауға болады.

2. Ақпараттандыру саласындағы Германияның айыппұл салу бойынша тәжірибесін еліміздің Ақпараттандыру саласындағы әкімшілік құқық бұзушылықтар үшін әкімшілік-құқықтық жауапкершілік шараларын жетілдіру мен қатаңдату тұрғысынан енгізуге болады. Германия заңнамасында ақпараттық-коммуникациялық инфрақұрылымның аса маңызды объектілеріне мән берілгендіктен, еліміздің ҚР ӘҚБТК ақпараттық-коммуникациялық инфрақұрылымның аса маңызды объектілері туралы норманы қарастыру қажет. Бұл өз кезегінде маңызды объектілердің құқық бұзушылық объектісі болуын алдын алады және тиісті заңды жауапкершілік шараларын қамтамасыз етеді.
3. Үшіншіден Германияның ақпараттандыру саласындағы заң кең аспектілі және жауапкершілік тұрғысынан қатаң екенін көрсетті. Бұл Сол еліміздің ҚР ӘҚБТК-нің 641 бабындағы құқық бұзушылықтар құрамының шектеулі екенін және жаңа нормалармен қамтамасыз етілуі керек екенін көрсетіп отыр. 641 бапқа зиянды бағдарламалық жасақтамадан және федералды байланыс технологияларына қауіп-қатерден қорғау талаптарын орындамағаны үшін және маңызды инфрақұрылымдардың ақпараттық технологияларындағы қауіпсіздік талаптарын қамтамасыз етілмеген кездегі әрекет немесе әрекетсіздіктер үшін құқық бұзушылық құрамдарын қарастыру қажет.

Жалпы қорытындылай келе, ақпараттандыру және байланыс саласындағы нормалар шетел тәжірибелеріне сәйкес дамығанын және жауапкершілік шаралары қатаң екенін көрсетті. Еліміздің ақпараттандыру және байланыс саласындағы қауіпсіздікті қамтамасыз ету мен құқық бұзушылықтардың артуының алдын алу үшін шетелдік тәжірибені отандық заңнамаға енгізу мен толықтырулар жүргізу, заңнаманың тиімді жұмыс істеуі мен азаматтық қоғамның сенімінің қалыптасуына зор әсерін тигізетіні анық.

### Әдебиеттер тізімі

1. Всеобщая декларация прав человека Принята резолюцией 217 А (III) Генеральной Ассамблеи ООН от 10 декабря 1948 года [Электрондық ресурс] URL: [https://www.un.org/ru/documents/decl\\_conv/declarations/declhr.shtml](https://www.un.org/ru/documents/decl_conv/declarations/declhr.shtml)
2. Международный пакт о гражданских и политических правах Принят резолюцией 2200 А (XXI) Генеральной Ассамблеи от 16 декабря 1966 года. [Электрондық ресурс] URL: [https://www.un.org/ru/documents/decl\\_conv/conventions/pactpol.shtml](https://www.un.org/ru/documents/decl_conv/conventions/pactpol.shtml)
3. Информационное право : учебник для бакалавриата, специалитета и магистратуры / под редакцией М. А. Федотова. — Москва : Издательство Юрайт, 2019. — 497 с. — (Бакалавр. Специалист. Магистр). — Текст : непосредственный.
4. Жатканбаева А.Е. Информационное право: учебное пособие / А.Е.Жатканбаева.- Алматы: Қазақ университеті, 2015.-150.
5. Ковалева Н. Н. Информационное право России: Учебное пособие. — М.: Издательско-торговая корпорация «Дашков и К», 2007. — 360 с.
6. Алдабергенова А.И. А 40 Информационное и цифровое право. Учебно-методическое пособие. Костанай: КРУ им.А.Байтурсынова, 2022. - 90 с.
7. Административное право: учебный курс / под ред. Р.А.Подопригоры. –Алматы: Налоговый эксперт, 2010. – 368 с.
8. The Communications Act of 1934 // <https://transition.fcc.gov/Reports/1934new.pdf>
9. Қазақстан Республикасының 2015 жылғы 24 қарашадағы № 418-V Ақпараттандыру туралы заңы // <https://adilet.zan.kz/kaz/docs/Z1500000418>

10. Gesetz über das Bundesamt für Sicherheit in der Informationstechnik // [https://www.gesetze-im-internet.de/bsig\\_2009/index.html#BJNR282110009BJNE000206125](https://www.gesetze-im-internet.de/bsig_2009/index.html#BJNR282110009BJNE000206125)

# Азаматтық құқықтағы кінәсіз жауапкершілік феномені

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**Аңдатпа.** Бұл мақалада авторлар азаматтық құқықтағы кінәсіз жауапкершіліктің құқықтық болмысын қарастырады. Зерттеудің мақсаты - азаматтық құқықтағы кінәсіз жауапкершіліктің құқықтық табиғатын, мәнін ашу, кінәлі және кінәсіз жауапкершілік шегін анықтау. Кінәсіз жауапкершілік мәселесі бірнеше уақыттан бері заңгерлер қауымдастығының қызығушылығын тудыруда, себебі бұл мәселе теориялық және практикалық маңызға ие. Жүргізілген зерттеу нәтижесінде Қазақстан Республикасының қолданыстағы азаматтық заңнамасының кейбір нормаларында зиянды өтеу құқық бұзушының кінәсіне қарамастан жүзеге асырылуы тиіс ұйғарымдар бар екені анықталды. Десек те екінші жағынан, бұл мәселе әлі де зерттеуді қажет етеді. Зерттеудің теориялық маңыздылығы авторлардың азаматтық құқықтағы кінәсіз жауапкершіліктің құқықтық болмысын ашып, кінәні азаматтық-құқықтық жауапкершілік шарттары жүйесінде бірінші кезектегі мәселе ретінде белгілеп, соңғы кездері азаматтық құқық ғылымында кеңінен орын алып жатқан "кінәсіз жауапкершілік" тенденциясының кеңеюін сынға алумен анықталады. Зерттеудің практикалық маңыздылығы оның нәтижелерін заңнамалық және сот практикасында қолдану мүмкіндігімен анықталады. Зерттеу барысында диалектикалық, жүйелік және логикалық әдістер қолданылды.

**Кілт сөздер:** Кінә, кінәсіз жауапкершілік, оқиға

## 1. Кіріспе

Кінәсіз жауапкершілік мәселесі көптен бері заңгерлер қауымының қызығушылығына ие. Себебі бұл мәселесінің теориялық-тәжірибелік маңызы зор. Бір жағынан қарағанда, қолданыстағы заңнаманың кейбір нормаларына сәйкес зардап зиян келтірушінің кінәлі не кінәсіз екендігіне қарамастан өтелуге тиіс. Басқа жағынан, бұл феноменнің болмысы мен табиғатына қатысты сауалдар әлгі күнге дейін зерттеуді қажет етеді.

## 2. Әдіснама.

**Мақаладағы зерттеудің әдіснамалық негізін** танымның ғылыми диалектикалық әдістерінің ережелері құрайды. Ғылыми зерттеулерді жүргізу кезінде диалектикалық, салыстырмалы-құқықтық, логикалық әдістер қолданылды.

**Мақаладағы зерттеудің теориялық маңыздылығы** жүргізілген зерттеулер нәтижесінде Қазақстан Республикасының қолданыстағы азаматтық заңнамасының кейбір нормаларында келтірілген зиянның құқықбұзушының кінәсіне қарамастан өтелуге жататындығы анықталуы себепті, мақаланың нәтижесі осы мәселені тереңірек зерттеу мен қарастыруды қажет ететіндігін көрсетіп отыр.

**Зерттеудің тәжірибелік маңыздылығы** мақалада зерттеліп отырған түсініктің құқықтық табиғатына, болмысына қатысты мәселелер әлі де толық ашылмағандықтан, оны тереңірек зерттеуде және тәжірибеде қолдану кезінде кездеетін мәселелерді қарастыру жағынан маңызды болып табылады.

### 3. Пікірталастар.

Түрлі тарихи кезеңдердегі мемлекеттердің азаматтық құқық нормалары тұлға қандай шарттар негізінде мүліктік жауапкершілікке тартылуы тиіс деген мәселеде бірнеше әдісті басшылыққа алды. Кейбір жағдайларда жауапкершіліктен босатылу негізі ретінде тұлғаның кінәсіздігі қарастырылды, сондықтан да жауапкершілік тек тұлға кінәлі болған кезде ғана туындауы мүмкін еді. Енді бірде жауапкершіліктен босатылу негізі ретінде шарттық міндеттемелердің орындалмауы кезіндегі, сондай-ақ зиян келтіруден туындаған міндеттемелердегі дүлей күш қарастырылды. Сонымен азаматтық құқықта бір-біріне қарама-қайшы, шартты түрде айтқанда, «кінә үшін жауапкершілік» пен «кінәсіз жауапкершіліктің» орын алуы түсіндіруді қажет ететін мәселе болып табылады.

Ұзақ уақыт бойы континенталды құқықтық жүйедегі елдерде тұлғаны азаматтық-құқықтық жауапкершілікке тартуда кінәлілік қағидасы басшылыққа алынды. Қазіргі кездегі көптеген зерттеуші-ғалымдар ежелгі Рим заңгерлерімен келісе келе, «кінә болмаса, онда жауапкершілік те болмайды» деген тұжырымды қолдайды, сондықтан да олар «кінәсіз жауапкершілік» бұл шындығында жауапкершілік емес, зардап шегушінің мүліктік жағдайын қалпына келтірудің ерекше әдісі деп есептейді [1]. Өзге авторлар, керісінше, кінәсіз құқықбұзушының келтірілген зиянды өтеуі немесе айыппұл төлеуі – бұл өзге құқықтық құбылыс емес, нақты жауапкершілік деген ұстанымды басшылыққа алады [2].

Кінәсіз жауапкершілік концепциясы белгілі бір дәрежеде «кінә заңи жауапкершілікке тартудың қажетті шарты болып табылады» деген ұстанымға қол сұғады. Сондай-ақ аталған концепция цивилистика ғылымында ғана кездеседі. Дәстүрлі түрде кінә құқық бұзушылық құрамының қажетті элементі және сәйкесінше тұлғаны азаматтық-құқықтық жауапкершілікке тартудың шарты болып табылады. Юриспруденцияда кінә құқық бұзушылық жасаған тұлғаның өзінің құқыққа қайшы әрекетіне және оның зиянды салдарына ішкі (психикалық) қатынасы ретінде қарастырылады. Қылмыстық құқықта «кінәні қылмыстық жауапкершілік пен жазалаудың қажетті субъективті алғышарты» деген орынды болса, жеке қатынастарда көбіне тұлға еркінің білдірілуі туралы айтқан жөн. Айта кететін жайт, кінәсіз жауапкершілік қылмыстық заңнамамен қарастырылған қылмыстар үшін мүлдем қолданылмайды. Барлық заңгерлер бірауыздан заңға сәйкес әділеттілік және ізгілік қағидаларына сүйене отырып, объективті (кінәсіз) қылмыстық жауапкершіліктен бас тартады. Қиындық азаматтық құқық бұзушылықтар туралы сөз қозғалғанда ғана туындайды, себебі азаматтық құқықтық заңнама кінәсіз жауапкершіліктің орын алуына жол береді.

Кінәсіз жауапкершілік мәселесі жан-жақты және сатылы зерттелуін азаматтық-құқықтық доктрина шеңберінде тапты. Бұл мәселемен әсіресе М.М.Агарков, С.Н.Братусь, Г.К.Матвеев, О.А.Красавчиков, О.С.Иоффе, И.Б.Новицкий, Л.А.Лунц, В.А.Ойгензихт, О.В.Дмитриева айналысқан. Г.К.Матвеев азаматтық-құқықтық жауапкершіліктің (заңи жауапкершіліктің бір түрі ретінде) жалпы негізі ретінде азаматтық құқық бұзушылықты қарастырады. Бұл құқық бұзушылықтың құрамын классикалық төрт элемент құрады. Яғни азаматтық-құқықтық жауапкершілік тікелей мағынада оның құрамының төрт шарты орын алған жағдайда ғана туындайды. Сонымен азаматтық заңнама бойынша тұлға кейбір жағдайларда құқық бұзушылықтың келте (шектелген) құрамы орын алған жағдайда да жауапкершілікке тартылады. Басқаша айтқанда, мұндай жағдайларда жауапкершілік туралы

емес, міндеттеме жайлы айтқан орынды болар. «Жауапкершілік» терминін қолдану қалыптасқан заңи-техникалық тәжірибемен байланысты.

Кінәсіз жауапкершілік мәселесін зерттей келе, бұл феноменді кейбір ғалымдар тікелей мағынада заңи жауапкершілік емес, құқықтық міндет ретінде қарастыратынына көз жеткізуге болады. О.А.Красавчиковтың пікірінше, кінә орын алмаса, бірақ келтірілген зиянды өтеу қажеттілігі туындаса, онда жауапкершілік туралы емес, тұлға міндеттемесі туралы сөз қозғаған дұрыс. Бір тұлға өзге тұлғаға келтірілген зиянның орнын толтыруға міндетті, бірақ оның алдында жауапты емес. Жауапкершілік әрдайым кінәмен қатар жүреді. Оның ойынша, кінәсіз жауапкершілік бұзылған құқықтарды қалпына келтірудің, зиянды өтеудің айрықша нысаны болып табылады [3]. Мұндай пікірге С.Н.Братусь келесідей сын айтады: «Біздің ойымызша, О.А.Красавчиковтың ойлары оны қате тұжырымға әкеп соқтырады. Себебі тек кінәсіз келтірілген зиян ғана өтелмейді. Зиян келтіруші кінәлі болған жағдайда да мұндай міндет туындайды. Міндеттеменің құрамында ешқандай айырмашылық жоқ, өйткені аталған екі жағдайда да зардап шегушінің бұзылған мүліктік жағдайын қалпына келтіру міндеті туралы сөз қозғалып отыр. Бірақ егер екі жағдайда да міндеттеме ерікті түрде жүзеге асырылмаса, онда ол мемлекеттік мәжбүрлеу шараларымен жүзеге асырылады [4].

Жоғарыда аталған ұстанымдардан бөлек кінәсіз жауапкершілік мәселесіне қатысты тағы да бірқатар зерттеушілердің көзқарастарын келтіруге болады. Олар кінәсіз жауапкершілікті еріктілік, мақсаттылық, превенция, борышқордың кінәлілік презумпциясы сияқты факторлармен негіздейді. Осылайша, О.С.Иоффе көрсеткендей, кінәсіз жауапкершілікке тарту нәтижесінде зиянды өтеу міндеті «...зиян келтірушінің санасы мен еркіне әсер етумен байланысты» және сәйкесінше, тек жауапкершіліктің өзі болып табылады [5]. Бұған қарсы зиян келтірушінің санасы мен еркіне кез-келген әсер етуді, тіпті заң кеңістігінде болсын, жауапкершілік ретінде қарастыруға болмайды.

Көптеген авторлар кінәсіз жауапкершілікті жеке құқықта қолданылатын борышқордың кінәлілік презумпциясымен байланыстырады. Л.А.Лунцтың айтуынша, «егер міндеттеме орындалмаса, онда борышқордың кінәлілік презумпциясының орын алғандығы анық» [6]. Д.Е.Богданов өз кезегінде «...азаматтық-құқықтық жауапкершілік құқықбұзған борышқорлар мен деликвенттердің кінәсінен туындайды... Осылайша, заңшығарушы міндеттеменің кез-келген орындалмаушылығын, кез-келген зиян келтіру фактілерін, басқаша дәлелдемелер болмаса, құқықбұзушының кінәлі әрекеттерімен байланыстырады». Мұндай жағдайларда кінәсіз тұлғаны заңи жауапкершілікке тарту тараптарға тиісті дәлелдемелерді ұсыну мәселесіне тіреледі. Борышқордың кінәлілік презумпциясы кінәсіз жауапкершілікке тарту идеясын емес, «әр тарап өз талаптары мен (немесе) қарсылықтарын белгілі бір фактілерге сүйену арқылы дәлелдеуі тиіс» деген тезисті білдіреді. Тұлғаның өз кінәсіздігін дәлелдей алмауы заңнаманың не себепті оны кінәсіз жауапкершілікке тартатындығын түсіндірмейді.

Осылайша, кінәсіз жауапкершілік мәселесіне қатысты бірнеше ұстаным қалыптасқан. Көптеген зерттеушілер кінәсіз жауапкершілікті ерекше аномалия, жалпы ережеден ауытқушылық деп қарастырады. Сондай-ақ, заңшығарушы бұл мәселеге қатысты осы ауытқушылықтарды заң нормаларында бекітуі тиіс деген де пікірлер айтылды. Мұндай жауапкершілік өз кезегінде сақтандырудың бір түрі ретінде талқыланады. Өзге зерттеушілер кінәсіз жауапкершілікті кінә үшін жауапкершілікпен бір деңгейде қарастырады, олардың ойынша, азаматтық-құқықтық жауапкершіліктің бұл екі түрі теңдей дәрежеде тұрады. Үшінші топтағы ғалымдар кінәсіз жауапкершілік – бұл түп мәнінде кінә үшін жауапкершілік болып табылатындығын айтады. Төртіншілері объективті жауапкершіліктің негізі ретінде өз әрекеттерінің салдары үшін тұлғаның тәуекелге беу бууын қарастырады.

Кінәсіз жауапкершілік мәселесіне зерттеу жүргізгенде С.Н.Братусьтің ұстанымына ерекше назар аудару қажет сияқты. Ғалым кінәсіз жауапкершіліктің субъективті негізі ретінде

тәуекел қарастырылатынын мойындаған. Мұндай жағдайда мүдделі тұлға жағымсыз әлеуметтік салдарға әкеп соғушы мән-жайларға жол береді. Жоғары қауіптілік көздерін қолдану салдары заңнамада көрсетілген. Заңды білу тиістілігі презумпциясының негізінде жоғары қауіптілік көзінің иесі мойнымен тәуекел жүгін көтереді. Сондықтан да жоғары қауіптілік көзінің иесі кінәлі не кінәсіз болса да жауапкершілікке тартылады. Осылайша, С.Н.Братусьтің пікірінше, жауапкершіліктің субъективті негізі болып әрдайым кінә болып табыла бермейді. Кейбір жағдайларда тәуекелдің де жауапкершіліктің субъективті негізі болып қарастырылады. Мұнда тәуекелдің құқыққа қайшы әрекетпен (әрекетсіздікпен) қандай қатынаста болатындығы жөнінде мәселе туындайды. Зерттеушінің ойынша, тәуекел – бұл заңмен тыйым салынбаған, бірақ өзге тұлғалардың заңды мүдделеріне қол сұғуға заңмен рұқсат етілмеген әрекет. Бұл - қоршағандарға қауіптілік туғызуы мүмкін, бірақ кінәсіз және құқыққа қайшы келмейтін қызмет. Азаматтық айналымның қалыпты дамуы құқықтық құралдармен қамтамасыз етіледі. Сондықтан да қазіргі уақытта мүліктік айналымның түрлі қатынастарына оның өзге де қатысушыларымен түсетін тұлғалардың жағымсыз салдарды алдын ала пайымдамауы мүмкін емес [4;191 б.].

Мүліктік зиянның орын алуына орай, зерттеуші-ғалымдар не себепті заңнаманың кейбір жағдайларда тұлғаны жауапкершілікке тартуда кінәнің болуын міндетті шарт ретінде талап ететінін, ал енді басқа жағдайларда оған мүлдем бей-жай қарайтынын, яғни кінәсіз жауапкершілікке жол беретіндігін негіздеуге тырысты. Соған сәйкес кінәсіз жауапкершілікті негіздеу екі бағытқа топтастырылды. Бірінші бағыт кінәсіз жауапкершіліктің объективті себептерін анықтаса, екіншісі жауапкершіліктің бұл түрінің субъективті шарттарын зерттеуге бағытталды.

Кінәсіз жауапкершілікті негіздеудің бірінші бағыты шеңберінде әділеттілік, заңдық сақтандыру, кәсіби тәуекел (қазіргі кездегі объективті тәуекел теориясы), зардап шегуші үшін процессуалды басымдықтар сияқты теориялар ұсынылды.

Кінәсіз жауапкершіліктің субъективті шарттарын іздеуге бағытталған пікірталастар шеңберінде субъективті тәуекел, жоғары ұқыптылық және құқықбұзушы кінәсін «жоққа шығаруға келмейтін» презумпциясы теориялары қалыптасты. Субъективті тәуекел теориясы В.А.Ойгензихт, С.Н.Братусь, Ю.Г.Басин еңбектерінде көрініс тапты. Бұл теория кінәсіз жауапкершілікте субъективті шарт ретінде құқықбұзушының тәуекелі қарастырылады. Тәуекел – кінә және кінәсіздік секілді субъектінің өз мінез-құлқына психикалық қатынасы болып табылады, дегенмен, оның кінә мен кінәсіздіктен айырмашылығы бар. Тәуекелдің кінәсіздіктен айырмашылығы, кінәсіздікте субъекті өзінің мінез-құлқының салдарын алдынала болжай алмайды және болжай алу мүмкіндігіне ие емес. Осылайша, бұл теорияға сәйкес, кінәсіз жауапкершіліктің субъективті шарты ретінде субъектінің өзінің әрекеттері мен олардың зиянды салдарына психикалық қатынасы қарастырылады, бұл өз кезегінде, субъектінің «кінә» деп аталатын өз мінез-құлқына психикалық қатынасымен ұқсас келеді. Десек те, кінә мен тәуекелдің айтарлықтай айырмашылықтары бар. Кінәда субъекті өз мінез-құлқының жағымсыз салдарының нұсқасын таңдай алады. Ал, тәуекелде мәселе басқаша. «Егер таңдау болмаса, онда тәуекел де болмайды» дегендей, кінә орын алғанда құқықбұзушының алдында таңдау болады және ол өз еркіне сай шешім қабылдайды, ал тәуекелде таңдау болмауы да мүмкін, тәуекел қажеттіліктен де туындауы әбден ықтимал. Мысалы, көлік шығаратын кәсіпорындардың қызметін қажеттілік ретінде қарастыруға болады. Себебі аталмыш ұйымдар қоғамның экономикалық дамуын ынталандырады. Осылайша, азаматтардың меншігінде көлік құралдары мен өзге де жоғары қауіптілік көздерінің көбеюі қалыпты тенденция болып шығады. Ал егер мұндай қажеттілік туындаса, онда ол міндетті түрде бір тұлғамен саналы түрде жүзеге асырылады. Сондықтан да мұндай жағдайда тұлғаның болжауға және алдын алуға келмейтін, белгілі бір дәрежеде жағымсыз салдарға саналы түрде жол беретін тәуекелін жоққа шығаруға болмайды.

Экономикалық тұрғыдан өзінен анағұрлым күшті субъектімен құқықтық қатынастарға түсетін немесе жоғары қауіптілік көзі иесінің қызметінен жоғары дәрежедегі қауіпке шалдығатын тұлғалар азаматтық-құқықтық қатынастардың өзге де субъектілері секілді заң қорғауында болады. Олар өмір сүру, меншікке ие болу, жеке басқа қол сұқпаушылық сияқты субъективті құқықтарды иеленеді. Бұл құқықтар абсолютті, сондықтан да өзге тұлғалар оларға қол сұқпауы тиіс. Дегенмен, әлеуетті зардап шегушінің жоғары қауіптілік көзі иесімен немесе экономикалық жағынан өзінен анағұрлым күшті контрагент-кәсіпкермен (кәсіпкерлер мен тұтынушылар қатынастары аясында) өзара қоғамдық қатынастарға түсерде белгілі бір мінез-құлықты орындауды талап ету құқығын жүзеге асыруы қиынға соғады, себебі кәсіпкерлер мен жоғары қауіптілік көзі иелері өз қызметтерін заңмен рұқсат етілген негізде орындайды. Бұл қиындық ҚР АҚ 918-бабының 1-бөлігінде болашақта зиян келтіру қаупі мұндай қауіпті тудыратын іс-әрекеттерге тыйым салу туралы талап қоюға негіз бола алады деген норма қарастырылса да туындайды. Өзге тұлғалардан белгілі бір мінез-құлықты орындауын талап ету құқығын жүзеге асырудағы қиындықтар аталған норманың болуымен өз шешімін таппайды. Осы нормаға сүйене отырып, болашақта зиян келтіруі мүмкін деген қауіппен автокөліктерді пайдалануға тыйым салуға болады ма? Әрине, жоқ, себебі мұндай жағдайда заң ғылыми прогресті ынталандырудың орнына, оны кері шегіндірер еді. Сот әлеуетті зардап шегушінің мұндай талап арызын қанағаттандырудан бас тартады, себебі өзге шешім мұндай қызметпен айналысуға заңмен жалпы рұқсат етілген ережеге қайшы келеді.

Сонда қандай жағдайда ҚР АҚ 918-бабының 1-бөлігін пайдалануға болады? Біздің ойымызша, егер әлеуетті зардап шегуші сотта өзіне болашақта өзге тұлғаның нақты әрекеттері салдарынан нақты қауіп төндіретіндігін дәлелдей алса, бұл норманы қолдана алады. Мысалы, балалар ойнайтын аулада белгілі бір кәсіпкерге тиесілі автокөліктің жүйелі түрде өтуі сол балалардың өмірі мен денсаулығына болашақта нақты қауіп төндіруі мүмкін. Мұндай жағдайда абстрактылы қауіп төндіруі мүмкін жоғары қауіптілік көзін пайдалану қызметіне жай ғана тыйым салу емес, нақты автокөліктің нақты жердегі нақты тұлғамен атқарылған қызметіне тыйым салу туралы айтқан орынды. Заңшығарушы да осындай жағдайды меңзегенге ұқсайды.

Аталған жағдайларда кінәсіз жауапкершілік тек келтірілген зиянды мүліктік өтеу әдісі ретінде ғана емес, сонымен қатар зардап шегушіге өзінің субъективті құқықтарын толығымен жүзеге асыруға қиындық тудыратын немесе мүмкіндік бермейтін «заңи өтемақы» әдісі болып табылады. Мұндай түсіндіру зардап шегушінің процессуалдық басымдықтарын да көрсетеді, сондықтан да процессуалды басымдықтар теориясы объективті тәуекел теориясының жалғасы ретінде де қарастырылуы мүмкін. Заңшығарушы зардап шегушіге өзіне келтірілген мүліктік зиянды өтеттіру үшін құқықбұзушының алдында процессуалды басымдық берген, яғни зардап шегуші оның кінәсін дәлелдеуге міндетті емес, ал құқықбұзушы тек өз кінәсіздігін дәлелдеген жағдайда ғана жауапкершіліктен босатылады.

#### 4. Нәтижелер

Жоғары ұқыптылық және құқықбұзушы кінәсін «жоққа шығаруға келмейтін» презумпциясы теорияларының екеуі де кінәсіз жауапкершіліктің субъективті шарты ретінде құқықбұзушының кінәсін таниды, айырмашылығы тек құқықбұзушы кінәсін «жоққа шығаруға келмейтін» презумпциясы теориясы бойынша кінәсіз жауапкершіліктің субъективті шарты болып болжамды кінә қарастырылса, ал жоғары ұқыптылық теориясы кінәсіз жауапкершіліктің субъективті шарты етіп шынайы кінәні мойындайды, себебі заң немесе шарт бойынша мұндай жауапкершілік артылатын тұлғаларға ұқыптылық пен абайлампаздықтың жоғары талаптары қойылады.

## 5. Қорытынды

Заңмен немесе шарт талаптарымен қарастырылған кейбір жағдайларға сәйкес құқықбұзушы әрекеттерінде қасақаналық немесе абайсыздықтың болмауы оған келтірілген залалдың орнын өтеу не айып төлеу үшін міндетті шарт болып табылмайды. Сәйкесінше, егер құқықбұзушы өз міндеттерін орындау барысында жеңіл дәрежедегі абайсыздыққа да жол бермесе, яғни ол жағымсыз мүліктік салдардың орын алуына кінәлі болмаса да, одан келтірілген зиянның орнын толтыруды және айып төлеуді талап етуге болады. Себебі азаматтық-құқықтық жауапкершіліктің мақсаты келтірілген нақты нұқсанның орнын толтыру және айыптың төленуін қамтамасыз ету, ал құқықбұзушының кез-келген нысандағы кінәсі мұнда белгілі бір кетегориялардағы жағдайлар үшін тұлғаны жауапкершілікке тарту шарты және азаматтық құқықбұзушылықтарды саралаушы белгі болып табылады. Осыған орай, біз кінәсіз жауапкершілікті – келтірілген нұқсанның орнын толтыру немесе айып төлеу арқылы жүзеге асырылатын кінәсіз құқықбұзушы үшін қосымша мүліктік-мәжбүрлеу түріндегі міндеттерді орындауда көрініс табатын азаматтық-құқықтық жауапкершілік түрі деп қарастыра аламыз.

### Пайдаланылған әдебиеттер тізімі.

1. Гражданское право / под ред. проф. М.М. Агаркова и проф. Д.М. Генкина. Т. 1. - С.337.
2. Яичков К.К. Система обязательств из причинения вреда в советском гражданском праве // Вопросы гражданского права. - М., 1957. – С.170.
3. Красавчиков О. А. Возмещение вреда, причиненного источником повышенной опасности. - М., 1966. - С. 31.
4. Братусь С. Н. Юридическая ответственность и законность. – С.174.
5. Советское гражданское право. - Л., 1971. Т. 1. – С. 439-441.
6. Новицкий И.Б., Лунц Л.А. Обязательственное право. - М., 1950. – С. 319.

## Geographic Sciences

# Soviet toponymy according to old cartographical sources

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**Introduction.** Studing of toponyms is very important from many points of view. First of all, some of the toponyms are quite stable, which allows to find out the elements that existed in ancient languages and are no longer used. In some geographical names, the old words or its old grammatical forms are preserved. In addition, through toponyms, it's possible to determine the level of existence elements other languages on different areas. Toponymy helps the linguist to determine the existence of the linguistic substrate of different peoples. For example, the presence of a Georgian substratum in the geographical names of the North Caucasus, Eastern and Minor Asia. Common names are often preserved in toponyms, which are no longer preserved in the modern lexical fund. The toponym often contains a historical fact, indicating the old area of settlement of a certain part of the population. Accordingly, it is possible to determine the settlement area of different peoples, the directions of migration flows. Toponyms often indicate the distribution of certain types of flora and fauna, the population's agricultural activities, etc.

Because toponyms belong to different geographical environments, historical periods, and civilizations, they reflect geographical environments, historical moments, ethnographic, and lexical features at the same time. That is why the study of toponyms is especially important for such disciplines as linguistics, history, ethnography and geography.

The process of naming geographical names is regular and they are primarily due to historical reasons, the necessity of the origin of names [Kharadze, 1980]. Therefore, toponyms preserve the "pictures" of the past, often they also provide the opportunity to restore a retrospective picture of the past.

During the Soviet period, many old Georgian toponyms changed their names and many of them were forgotten. Since the 1990s, some Georgian toponyms have been restored in Georgia, while some Soviet-era toponyms have survived to this day. It should be noted that the natural process of naming was neglected under the conditions of ideologizing in the Soviet period. Obviously, they no longer used names related to Christianity, kings, princes or nobles. Such names were replaced by ideological names. as G. Khoranauli notes that the process of dechristianization of people's names began in the Soviet period [Khoranauli, 2003. 296]. This article serves to research this issue and determine its territorial scope.

**The aim of the research** is to determine the peculiarities of the territorial distribution of Soviet toponyms based on the analysis of old cartographic sources.

**Initial data.** Old (XX century) and modern cartographic sources are used as the main research source. All the oikonyms reflected on them, which were named during the Soviet period, were

analyzed. For this purpose, the following maps published in the Soviet period were used: Javakhishvili Iv., 1922; 1923; Javakhishvili al., 1931-1932; Map of Adjara-Kobuleti, 1922; Map of the Republic of Georgia, 1925; Socialist Soviet of Georgia; Georgian SSR, 1952; Georgian SSR, 1965, 1966, 1982, etc.], also, soviet topographic maps of different scales [scale 1:100,000; 1:50,000].

For the purpose of identification of toponyms and clarification-verification of their names, beside of maps, sources that contain information about settlements, such as population census data [1989; 2002; 2014], collections of administrative-territorial division [1949; 1961; 1966; 1987; Abkhazskaya ACCP..., 1953], in the Soviet period [Постановление..., 1936; 1948; Protocol..., 1944; Указ Президима] and later [Decrees of the President of Georgia, 2006-2013] adopted resolutions regarding the renaming of geographical names. In order to specify and verify the names of other geographical objects (orographic, hydrographic, etc.), the orthographic dictionaries of Georgia were used [1987; 1989],

The research was also based on various scientific works [Songhulashvili, 2009; Tskhadaya, Chilashvili, 1975; Kharadze, 1985; 2018; 2019; Khoranauli, 2005, etc.].

### Main results

After the establishment of the Soviet government in Georgia, many geographical objects, mainly populated areas, were renamed. Therefore, the history of Soviet toponyms begins in 1921. This process began particularly intensively in the 1930s.

During the Soviet period, many populated area throughout the Union were renamed. This process affected Georgia as well. The name of toponyms began to be changed, which actually had nothing same with the peculiarities of environmental conditions, historical fact, population migration, social existence and culture. This entire period can be considered a process of de-Christianization and "Sovietization" of geographical names. as G. Khoranauli notes that the process of dechristianization of people's names began in the Soviet period [Khoranauli, 2003, 296]. The same can be said about geographical names.

In that period, the process of naming toponyms can be divided into several groups:

- replacing the names of administrative units and settlements;
- Ideologicalized names of toponyms;
- Translation of toponyms and addition of a kind of "Soviet words" - epithets to the names of toponyms.

One of the most widespread was the replacement of names of administrative units and settlements with memoratives. They changed the name of administrative units and settlements: district (now municipality), city, township and village, and changed the names of Bolshevik leaders, heads of state and Communist Party, Soviet military figures. The names of Georgian figures were mainly given to large settlements and also to the districts subordinated to them. Thus appeared on the map of Georgia: Gegechkor (currently Martvili), Stalinir (currently Tskhinvali), Makharadze (currently Ozurgeti), Orjonikidze (currently Kharagauli), Tskhakaia (currently Senaki), Tsulukidze (currently Khoni). That is why we got such a situation that the same settlement changed its name several times. This happened both in the case of villages and cities (Table 1).

**Tab 1. Change of names of cities**

1	Akhalgori → Leningori (1934) → Akhalgori (1991)
2	Akhali Senaki → Mikha Tskhakaia (1933) → Tskhakaia (1976) → Senaki (1989)
3	Baghdati → Maiakovski (1940) → Baghdati (1990)
4	Dedoplistskaro → Tseltskaro → Dedoplistskaro (1991)
5	Martvili → Gegechkori (1936) → Martvili (1990)
6	Ozurgeti → Makharadze (1934) → Ozurgeti (1990)
7	Kharagauli → Ordjonikidze (1949) → Kharagauli (1990)
8	khashuri → Mikhailovo (1872) → Khashuri (1918) → Stalinisi (1928) → Khashuri (1934)

Villages were also named with memoratives, but mainly with the names of foreign revolutionaries, heroes of the Soviet Union, and party-military figures. These are the villages: Atharbegovka, Budionovka, Voroshilovka, Kalinino, Kirov, Kirovisi, Kirovka, Molotovo, Zhdanovka, Shaumian, Chapaevka, etc.

Many settlements name was connected with Lenin. e. Murzaev wrote that toponyms related to Lenin were connected not only with his pseudonym (Lenin), but also with his surname (Ulianov) and even his father's name (Ilya) [Murzaev, 1982: 134]. For example, Leningori was named St. Akhalgori and the district under it, as well as the villages: Zeda Ulyanovka (earlier name of Sachino village of Kobuleti district), Leninis (earlier name of Kvishiani village of Gardabni district), Lenino (earlier names of Ifnari village of Dmanisi district and Satavi village of Sukhumi district), Leninovka (Dedoflistskaro district) it is the old name of Choeti village), Ulyanovka (village of Marneuli district), Ulianovka (earlier name of Iliatsminda village of Dedoflistskaro district), etc. [Sartania, Nikolashvili, Ujmajurizde, ].

There were much more cases when geographic objects were given names reflecting party-revolutionary content and Soviet ideals. This is what happened in the case of the following villages: Komsomolskoe (translated as "belonging to Komsomol", Krasnogorsk ("red hill"), Krasnoe ("redness"), Oktiabrskoe, October, Pirveli Maisi ("First of May"), Tselvarskvlavi ("red star"), Tselvopeli ("red village"), Tseltskaro ("red spring"), Tselkhevi ("red ravin"), etc.

There was also an attempt to reflect in the toponyms general words reflecting Soviet reconstruction and glory, such as akhalgazrdobis Kheivani ("Youth Alley"), Ganakhleba ("Renewal"), Gantiadi ("Dawn"), Ganatlebis Kari ("Door of Education"), Vesiolovka ("cheerfulness"), Tavisupleba ("Freedom"), Kavshiri ("Union"), Mziseuli ("Sunshine"), Mnatobi (Brigtness), Sabchota Chai ("Soviet Tea"), Salkhino ("Joy"), Shroma ("Labor"), Sromsiubani ("Labor District"), Chais Ubani ("Tea Suban"), Citrusovani ("Citrusy"), Tsodnis Kari ("Door of Knowledge"), Tsinsvla ("advance"), etc. These names were given even for the reason of creating a feeling of bringing universal happiness and giving faith in the future. In general, it seems that the assignment of these last names cannot be negatively evaluated, although the main thing here is that these names are part of the Soviet, communist ideology, which replaced the old Georgian names. Such is, for example, village Vachnadziani (the village of Vachnadze itself) was renamed as Shroma ("labour"), Little Trinity as Little Gantiadi, village Michael Gabriel as Shroma ("Labour") and many others.

In the same context, we can consider the appearance of the word "red" in the geographical names of Georgia: Tselvarskvlavi ("red star"), Tselubani ("red district"), Tseltskaro ("red spring"), Tselkhevi ("red ravin"), etc. It is known that the word "red" was Soviet symbol, and it was for this reason that many geographical objects were given this name. There were cases when this word was added to an old toponym, and this is how the so-called "Red" toponyms: Red Besleti (instead of Besleti), Red Sabatlo (instead of Sabatlo).

Because the Bolshevik Party seized power in Russia on October 25, 1917 (BC style) and later founded the Soviet Union, this date (the October Revolution) was celebrated as an anniversary throughout the Soviet era. At the same time, this historical fact became the provoking factor for giving names to toponyms. Villages in Gudauti, Gulrifshi, Zugdidi, Terjoli, Samtredia, Sukhumi, Kedi, Kvareli, Tsalenjikha, Khulo districts bore the name of October. Some villages still have these names.

During the Soviet period, the translation of toponyms was accepted. For example, Salkhino became Vesiolovka ("cheerfulness"), Tavisupleba as Svoboda ("Freedom"), Kultuban as Kultuchastok ("Cultivated place"), Kakliani as Orekhovo ("place with nuts"), Georgian Gorge as Gruzinskoe Ushelie ("Georgian gorge"), Verkhliani as Serebriano ("place with silver"), Sikharuli as Otradnoe ("Joy"), Tsvitskaro as Kholodnaya Rechka ("cold river"), etc. The largest part of such toponyms is in one of the regions of Georgia - the territory of Abkhazeti.

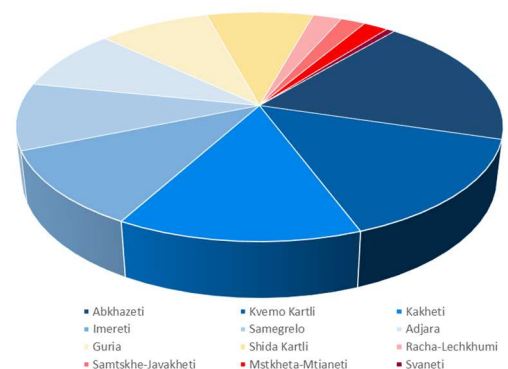
Separately, we can talk about such toponyms, which were named after water reservoirs, hydroelectric power stations, melioration systems, new industrial facilities, new workers' settlements, etc. As a rule, such objects were given "Soviet" or names expressive of Soviet reconstruction. This is how the workers' settlements appeared: Alaznis Tskalsakachi - "water pump" (Dedoflistskaro district), Bakurianis Andeziti - "Andesite of Bakuriani" (Borjomi district), Gumathesi - "Gumat HES" (Tskaltubo district), Zahesi (Tbilisi) and others. In official documents, administrative-territorial division and population census publications, these objects were named as workers' settlements, which later became villages, although the names related to the infrastructure have survived to this day.

The research showed that Coronim, which "were baptized" with "Soviet" names, occupied about 15% of the total area of Georgia (Pic. 1). This should be quite a high rate. Spatially, "Soviet" toponyms are unevenly distributed on the territory of Georgia.

Abkhazeti, Kvemo Kartli and Kakheti were especially leading in replacing them with "Soviet" toponyms (pic. 2). In Abkhazeti, "Soviet toponymization" took place intensively in 1948-1951. During this time, the names of 1 village council, 24 village councils and 122 populated points were changed [Sartania, Nikolaishvili, Ujmajuridze, 2017].

One thing that stands out very clearly is that such names were rare on high hypsometric levels, and the soviet toponyms mostly affected settlements located in the intermountain bar of Georgia. Accordingly, a large part of the settlements located in the highlands have preserved the old Georgian names - the original toponymy.

There were exceptions. Such are the high plateaus of Samtskhe-Javakheti, which are It located at an altitude of 1500 m. Because of the flat surfaces here, where there are quite dense settlements, the "Soviet" influence was much more visible. For example, there are the following villages: Kirovakan, Miasnikian (Akhalkalaki municipality), Zhdanovakan (Ninotsminda municipality), Gantiadi (Tsalka municipality) and others. One more thing will be noticed here. In Javakheti, where Russian and tsarist toponyms (Bogdanovka, Gorelovka, Efremovka, Rodionovka, Tambovka, etc.) were established since the 19th century, toponym "Sovietization" did not occur. It seems that Russian was better associated with Soviet than Georgian indigenous toponymy. The same can be said about Abkhazeti, where Russian toponyms have at least partially changed their name. Here, Russian names were replaced more often if the toponyms reflected the names of the Romanovs, members of the royal family, and generals of the Russian army.



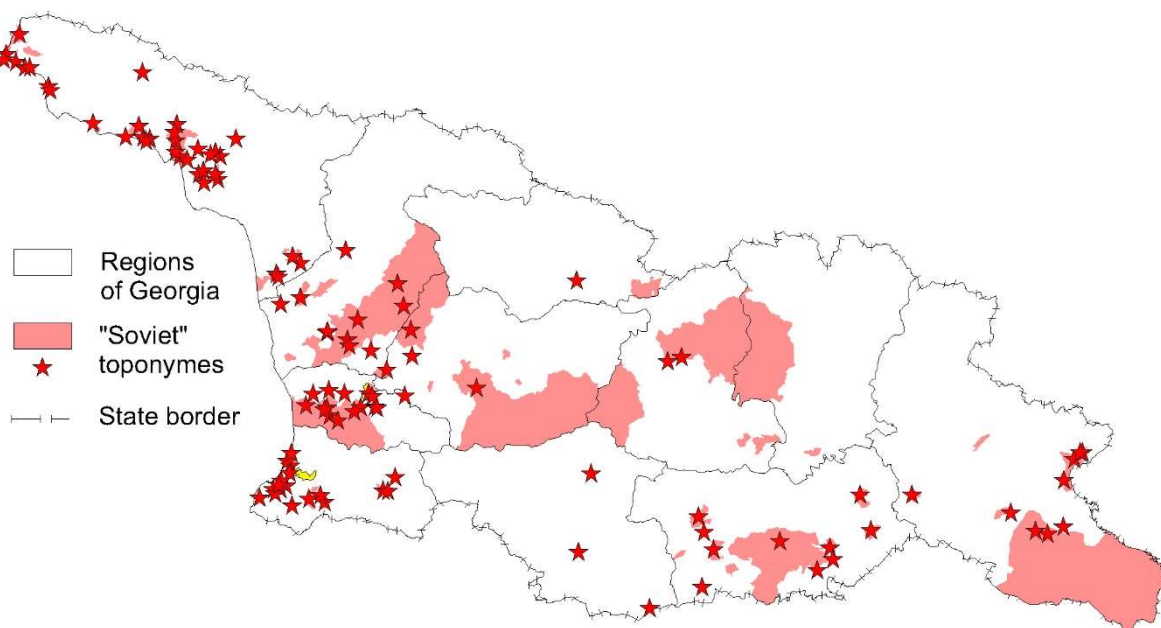
**Pic.2. Distribution of "Soviet" toponyms according to the parts of Georgia**

Thus, we got a logical picture - toponyms were replaced where there was dense settlement. There is a logical explanation for this: revolutionary activity was manifested on a larger scale where there were large settlements, proximity to cities, and economically developed regions.

The period of the names of "Soviet" toponyms can be divided into several stages:

Stage I (1921-1941) is the period after the October Revolution. During this period, given names was related to revolutionaries and Bolsheviks, as well as Soviet ideals. The transformations especially affected toponyms related to the feudal period and tsarism.

The II stage (1941-1956) is related to the ongoing political processes during and after World War II. During this period, happened the "Sovietization" of toponyms and the following villages appeared on the map of Georgia: Akhalsofeli, Akhalshen, Akhalubani, Gamarjveba, Gantiyadi,



**Pic 1. "Soviet toponymy"**

Chaisubani and other similar names depicting Soviet glory.

The III stage (1957-1988) is related to the development of new political processes in the former Soviet Union, namely, the condemnation of the Stalinist regime and the establishment of collective governance. This is how a new wave of toponym transformation began. This process began with the issuance of the Decree of the Presidium of the Supreme Council of the USSR [Указ Президима, 1957]. It is also interesting that during this period there was a restoration of some of the historical Georgian toponyms. For example, name of village Budionovka-Voroshilovka was transformed into Algeti (Tetri Tskharo municipality), Budionovka village into Ninigora (Lagodekhi municipality), Molotovo village into Trialeti (Tsalka municipality), Staliniri and the district of the same name under his control, into Tskhinvali and others [Sartania, Nikolaishvili, Ujmajuridze, 2017].

IV stage (1989-present) is the stage of restoration of indigenous Georgian toponyms. Since 2006, the process of restoration of Georgian toponyms has started, for example, the villages of Svobodnoe in Lagodekhi municipality became Davitian and Ulyanovka became Chiara, and the villages of Sagarejo municipality became Bogdanovka and Krasnogorski became Satafle. Similar transformations affected almost all parts of Georgia. The State Language Department is working on the development of a unified strategy for the state language. This process continues today. The State Language Department is working on the development of a unified strategy for the state language.

## Conclusion

During the Soviet period, the process of "Sovietization" of toponyms was intensively carried out, as a result of which many old Georgian toponyms were replaced by artificially invented names. This was replaced by memoratives and names reflecting Soviet glory. Mainly, the names related to Christianity, kings, princes or nobles were changed. In the same period, public names were transformed into their own names, to be clear, the names of geographical objects.

Since the 1990s, the opposite process began: many "Soviet" toponyms were replaced by old Georgian ones. It is true that many toponyms have restored their old Georgian names, but in this topic, there is still a lot to be done.

## Acknowledgements

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## References

1. Map of Adjara-Kobuleti Autonomous Republic, 1922.VII.05, scale 5 verst (1:210,000), drawn topon. by Baramidze, Ministry of Internal Affairs due to com. Lithography / printing house, lithographed in the cartographic department of the headquarters of O.K.A. In Georgian.
2. Map of the Republic of Georgia, 1925, ed.: E. Baramidze, scale: 1:42,000. In Georgian.
3. Map of the Socialist Soviet Republic of Georgia, compiled by: V.A. Tugulov, lithography: USSR BCHX, 1929.
4. Map of the Socialist Soviet Republic of Georgia, 1928; Published by Prof. al. under the leadership of Javakhishvili; Developed at the Cartographic Institute of Georgia, State Publishing House of Georgia, lithography: T.S.M.U.S.P.T. Lithograph, scale scale: 1:200,000. In Georgian.
5. Georgian SSR, 1952, chief editor: N.A. Suzdaltseva, scale: 1 : 600,000. In Georgian.
6. Georgian SSR, 1965, chief editor(s): S. d. Steinberg, S. S. Rudenko, scale scale: 1 : 400,000. In Georgian.
7. Georgian SSR: [administrative division], chief editor(s): A. Aslanikashvili, USSR Ministry of Geology, Geodesy and Cartography Mt. Division, 1966, scale: 1 : 600,000. In Georgian.
8. Georgian SSR: Physical school. map, 1982, scale: 1:600,000, chief editor(s): A. F. Aslanikashvili, I. A. Gogoberishvili R. i. Chekurishvili, Russia, Moscow. In Russian.
9. Soviet topographic maps [scale 1:100,000; 1:50,000].
10. Orthographic dictionary of geographical names of Georgia. Tbilisi, 1987; 1989.
11. General census of the population of Georgia. Tbilisi. 1989; 2002.
12. Decrees of the President of Georgia: January 9, 2006, # 14; 2006
13. February 1, # 91; December 27, 2007, # 4173; March 27, 2008, #161;
14. November 16, 2010, #925; November 20, 2010, # 947; February 18, 2011, #93; July 14, 2011, #379; August 30, 2011, #478; December 28, 2011, #879; January 24, 2012, #57; February 3, 2012, #82; # 83; May 3, 2012, #360; August 15, 2012, #714; June 25, 2013, #499; November 15, 2013, # 915.
15. Territorial-administrative division of the Georgian SSR. Tbilisi, 1961; 1966; 1987.
16. Resolution of the Presidium of the Supreme Council of the Abkhaz Autonomous Soviet Socialist Republic (On renaming

17. some rural Soviets and villages and the unification of some villages of the Abkhaz Autonomous Soviet Socialist Republic). August 20, 1948.
18. Resolution of the Central Executive Committee of the USSR On the correct
19. inscription of names of settlements on August 23, 1936.
20. Minutes No. 43 of the meeting of the Presidium of the Supreme Council of the Abkhaz Autonomous Soviet Socialist Republic (On the renaming of the village of Ermolovsk to the village of Leselidze. June 12, 1944.
21. Decree of the Presidium of the Supreme Soviet of the USSR on September 11, 1957 "On streamlining the matter of assigning names of state and public figures to territories, regions, districts, as well as cities and other settlements, enterprises, collective farms, institutions and organizations." Gazette of the Supreme Soviet of the USSR, 1957, No. 19, p. 494.
22. Javakhishvili IV. Map of the Republic of Georgia, 1922. Scale: 10 versi per 1 inch (1:4200,000). In Georgian.
23. Javakhishvili Iv. Historical map of Georgia, 1923. Scale: 10 versi per 1 inch (1:4200,000). In Georgian.
24. Javakhishvili al. Map of the Socialist Soviet Republic of Georgia, 1931-1932. Scale 1:200,000.
25. Population census data [1989; 2002; 2014], collections of administrative-territorial division [1949; 1961; 1966; 1987; Abkhazskaya ACCP...,1953], during the Soviet period [Постановление..., 1936; 1948; Protocol..., 1944; Указ Пресидима] and after it [Decrees of the President of Georgia, 2006-2013].
26. Songulashvili A. "South Ossetia" in Georgia?! Tbilisi, 2009.
27. Tskhadaya P. Explanatory dictionary of onomastic terms, Tbilisi: TSU, 1988.
28. Kharadze K. For some issues of comparative research of old and new toponyms of Georgia. Proceedings of the Geographical Society of the Georgian SSR, XVI. Tbilisi: "Science", 1985. p. 137-143.
29. Khoranauli G. Georgian onomastics. Tbilisi, 2003.
30. Sartania D., Nikolaishvili D. Ujmajuridze A. Soviet Toponymy: the History and the Present. j.: Earth Science, Volume 6, Issue 5-1, Special issue: "New Challenge for Geography: Landscape Dimensions of Sustainable Development". pp. 49-55.

## Chemical Sciences

# Porous catalyst layer for PEM fuel cells based on platinum salt acids dispersed on high surface area carbon powder

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### ABSTRACT

One of the major breakthroughs in the fuel cell science was the significant reductions in Membrane Electrode Assembly's (MEA) platinum loadings from the high loadings of 5–10 mg/cm<sup>2</sup> Pt/C in the early 1990s to less than 1mg/cm<sup>2</sup> Pt/C in recent work, a development which was primarily due to the substitution of Pt-black catalysts with higher surface area carbon-supported Pt catalysts, as well as the use of perfluorosulfonic-ionomer binder in thin-film catalyst layers. In this work, a novel approach in the preparation of catalyst material with catalyst loadings of 10 and 30 wt. % Pt/Ca, using a platinum salt as the source of platinum, which is dispersed on carbon particles through an impregnation process is presented. Characterization indicated satisfactory dispersion of platinum particles on the carbon black, and acceptable chemical properties. The prepared catalyst was applied as a solution on both faces of the membrane using a brush method. To overcome application challenges, a catalyst layer was prepared in the form of a thin film away from the membrane and then was placed on both sides of the proton conducting polymer membrane as separate layers, which indicated satisfactory properties and potential for implementation in commercial fuel cells.

**KEY WORDS:** Proton exchange membrane fuel cell (PEMFC), Membrane Electrode Assembly (MEA), activation energy, catalyst layer, protonic conductivity, oxidation of hydrogen, reduction of oxygen.

## INTRODUCTION

The fuel cell is an electrochemical reactor that converts the chemical energy of its inputs to electrical energy in a chemical reaction without the need for combustion, hence avoiding harmful emissions and high energy losses due to the limitation of the combustion process. The principle of operation of fuel cells simply depends on the oxidation of hydrogen to produce water. In this process, hydrogen, which is the lightest atom composed of one proton and one electron, is split with the help of a catalyst material to its elementary constituents; the positive proton ion and the negatively charged electron. A schematic representation of a Proton exchange membrane fuel cell (PEMFC) is shown in figure 1 below [1].

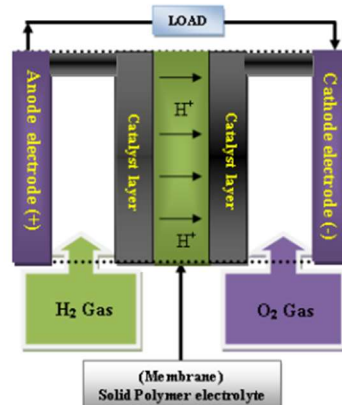


Figure 3. Schematic representation of a Proton exchange membrane fuel cell (PEMFC)

The catalyst promotes the rate of electrochemical reaction, which takes place at the surface of the catalyst, without the catalyst taking part in the reaction, and hence is not consumed or changed in the process. The Catalyst does this by reducing the activation energy, (units: KJ/mol or J/mol), which is the energy needed to start a reaction between two or more elements or compounds [2]. The energy of a reaction with and without a catalyst is shown in figure 2. below. The x-axis shows the progression of the reaction from reactant to product, while the y-axis shows the energy of the reaction. The catalyst layer constitutes 14% of the total cost of the fuel cell according to a study comparing Fuel cells to IC Engines, which reflects the importance of catalyst application in PEM fuel cells [3].

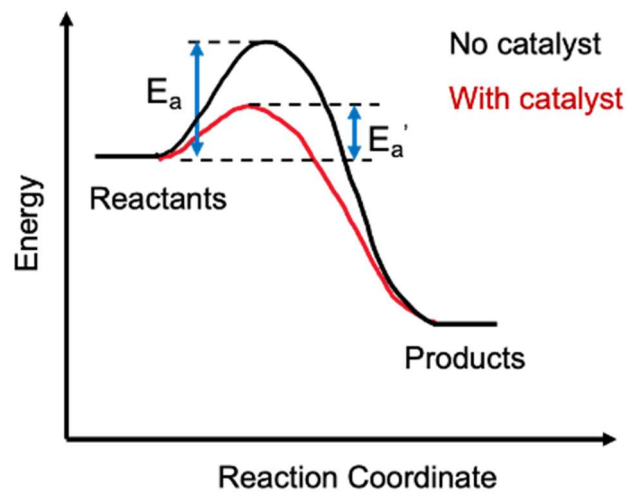


Figure 4 The energy of a reaction with and without a catalyst. (Source: Wikipedia Commons)

There are four main characteristics that are essential for an effective PEMFC catalyst: (a) Activity, which is the ability to adsorb the reactant to facilitate a reaction without blocking the catalyst (b) Selectivity; to make the desired product and minimise the production of undesirable

intermediates and side products. (c) Stability by withstanding the acidic operating environment in a fuel cell and the high and rapidly fluctuating temperatures during operation (d) Poisoning resistance due to potential existence of impurities in the fuel cell and in the feed gases. Platinum is the most used catalyst in PEMFC [4].

The electrochemical reaction in the fuel cell takes place within the porous catalyst layer at the boundaries of three phases: the gases, the electrolyte, and the catalyst surface. The performance of the fuel cell is limited by the electrochemical kinetics of these three components, where the catalyst determines the electrochemical kinetics of the reduction and oxidation reactions, the membrane determines the proton conduction, and the gas phase is concerned with the mass transport limitations.

The catalyst layer must cater for the three phases at the same time; it must generate the protons by breaking the bonds between hydrogen particles and then transport them to the surface of the membrane; hence, it should have the same protonic conductivity of the membrane material. It must transport the electrons to the electrodes; hence, it must be an electronic conductor, and it has to allow the gases to diffuse through it to the membrane.

As the oxidation of hydrogen and reduction of oxygen take place on the surface of the catalyst, the catalyst layer should have a large surface area. This does not only improve the reaction, but also reduces the amount of catalyst material used, which is the precious platinum.

The catalyst material is usually, dispersed on the surface of a high surface area carbon material, which helps reduce the amount of platinum used, increases the surface area of the catalyst material, and maintains its gas permeability and electronic conductivity. This platinum on carbon is then prepared in the form of an ink by mixing it with a solution of the membrane material, which gives enhances its bonding to the membrane and makes it protonically conductive, and then it is applied to the membrane surface by means of a brush, spray, or a decal method.

A novel approach in the application of catalyst material is presented in this work. Initially the platinum catalyst powder is prepared from platinic salt acids which are dispersed on high surface area carbon powder following a literature approach and then a catalyst layer is prepared in the form of a thin layer away from the membrane. The catalyst layer is placed on both sides of the proton conducting polymer membrane as separate layers.

#### CATALYST PREPARATION

One of the major breakthroughs in the fuel cell science was the significant reductions in MEA platinum loadings from the high loadings of 5–10 mg /cm<sup>2</sup> Pt/C in the early 1990s to less than 1mg/cm<sup>2</sup> Pt/C in recent work, a development which was primarily due to the substitution of Pt-black catalysts with higher surface area carbon-supported Pt catalysts as well as the use of perfluorosulfonic-ionomer binder in thin-film catalyst layers.

Great efforts have been made to explore various synthetic routes for the preparation of catalyst material with high surface area. By far the most attractive synthesis route is still the impregnation process due to its simplicity. However, this route is also limited by its drawbacks of large average metal particle size, broad distribution, and poor reproducibility [5].

As one of the main aims of this research is to investigate the technology of making PEM fuel cells, the techniques for preparing and applying the catalyst material is a significant part of this work, the intention here is not to propose a new technique for the preparation of the catalyst material, as this requires a great deal of knowledge and experience in this field, but the target is to achieve this knowledge and have hands on experience in the field of catalysis.

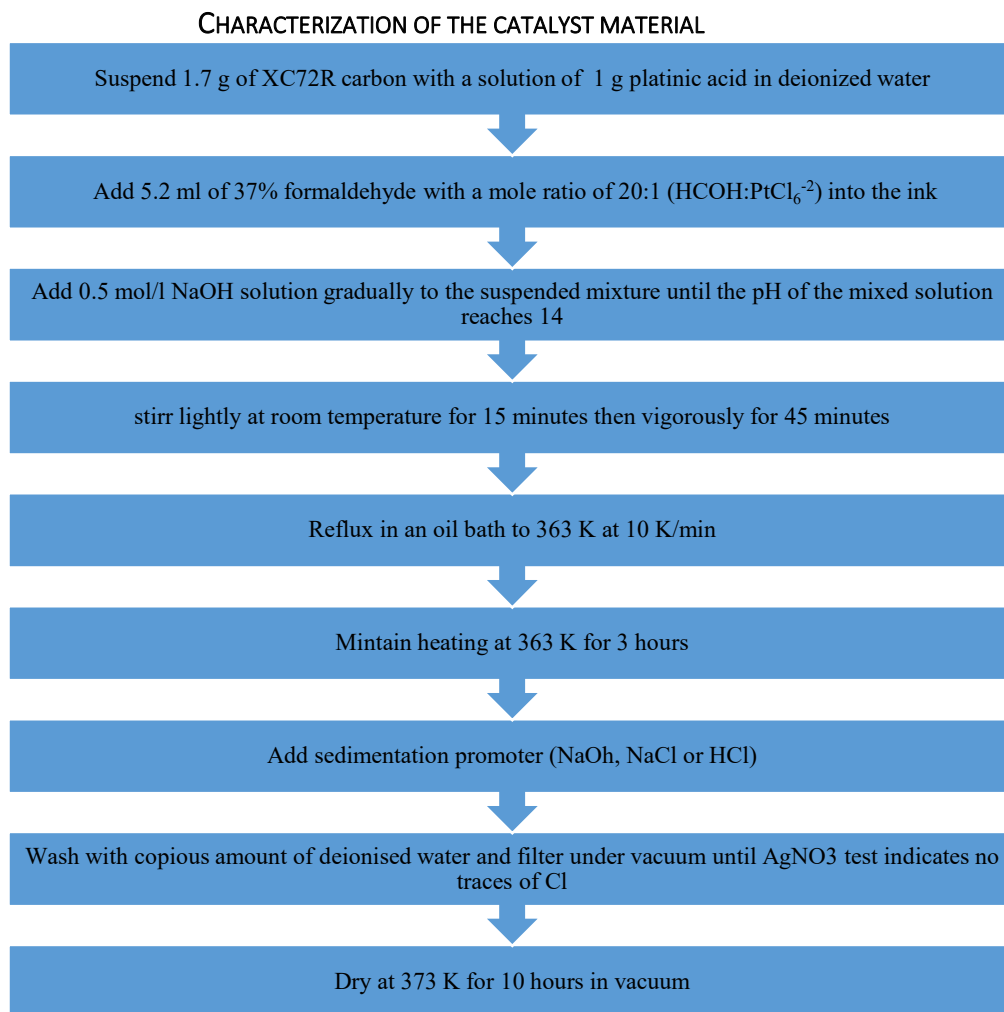
Zhou et al. [5] presented a technique for the preparation of 40 wt. % Pt/C electrocatalyst by an improved aqueous impregnation method based on previously reported literature, through which the Pt particle size is well controlled in the range of 1- 4 nm with an average size of 2.6 nm. It is claimed that such a highly dispersed Pt on a carbon support with high platinum loadings based on

impregnation techniques has not been achieved before. In this work a similar technique is adopted to produce catalyst materials with catalyst loadings of 10 and 30 wt. % Pt/C. A platinum salt is used as the source of platinum, which is dispersed on carbon particles through an impregnation process as will be described in this paper.

#### EXPERIMENTAL

The Pt/C samples were prepared by carefully controlling the main synthetic parameters such as pH, reaction temperature, heating rate, reactant concentration and impregnation time, to ensure that the redox reaction between  $\text{PtCl}_6^{2-}$  and formaldehyde occurs at a rapid rate.

1.7 g of XC72R carbon powder was obtained as a sample from Cabot Corp. (Surface Area = 237  $\text{m}^2/\text{g}$ ) was first suspended in an aqueous solution of the appropriate amount of Chloroplatinic acid calculated to be 1 g. Then 5.2 ml of 37% formaldehyde with a mole ratio of 20:1 formaldehyde to platinum acid ( $\text{HCOH}:\text{PtCl}_6^{2-}$ ) was added into the ink. Thereafter, a 0.5  $\text{mol L}^{-1}$  NaOH solution was gradually added to the suspended mixture until the pH of the mixed solution reached 14. Prior to heating, the mixture was impregnated for 15 min and 36 hours under vigorous stirring, then the mixture was refluxed in an oil bath from room temperature to 363 K at a rate of 10 K/min and maintained for 3 hours. Finally, a strong electrolyte such as  $\text{NaNO}_3$ ,  $\text{NaCl}$  or  $\text{HCl}$  solution was added as sedimentation promoters. The resulting solid was washed with a copious amount of distilled water until  $\text{Cl}^{-1}$  was not detected in filtrate, which was confirmed by means of ( $\text{AgNO}_3$  test) and then the product was dried at 373 K for 10 hours in vacuum. The result is a black powder which has a higher density than the starting carbon. Figure (3) shows a step-by-step chart of the procedure for the preparation of the catalyst.



*Figure 5 Step- by – Step catalyst preparation procedure.*

The catalyst layer in PEM fuel cells should satisfy three main requirements: it has to be gas permeable so that the hydrogen and oxygen gases can diffuse through the catalyst layer and reach the membrane electrolyte, the catalyst layer should have an effective particle distribution to optimize proton access to the catalyst and should have electronic continuity to allow the electrons to flow from the catalyst to the current collectors and the external circuit.

The main object in producing the catalyst material is to spread a small amount of platinum particles on the largest area possible using high surface area carbon material and at the same time maintain passages for gas flow, and electronic conductivity through the catalyst layer.

To confirm the large surface area of the produced catalyst material and the wide spread of platinum particles, the produced Pt/C catalyst samples were visualised under the Electro- scanning microscope (ESM). Thermogravimetric analysis (TGA) was also performed on the catalyst samples to examine their thermal behaviour. Eventually, the catalyst was applied in a working fuel cell using a novel approach which will be discussed later in this chapter.

#### **SAMPLE VISUALIZATION USING ELECTRO-SCANNING MICROSCOPE (ESM).**

The platinum loaded carbon in powder form was magnified 1000 times under the ESM at Coventry University as shown in figure (4). The large surface area of the (Cabot XC72R) carbon material is obvious. Traces of Platinum cannot be distinguished easily at this magnification power, but carbon is known to absorb light which tells that the light reflections in the sample are due to the presence of platinum which appears to be randomly and smoothly distributed on the carbon material.

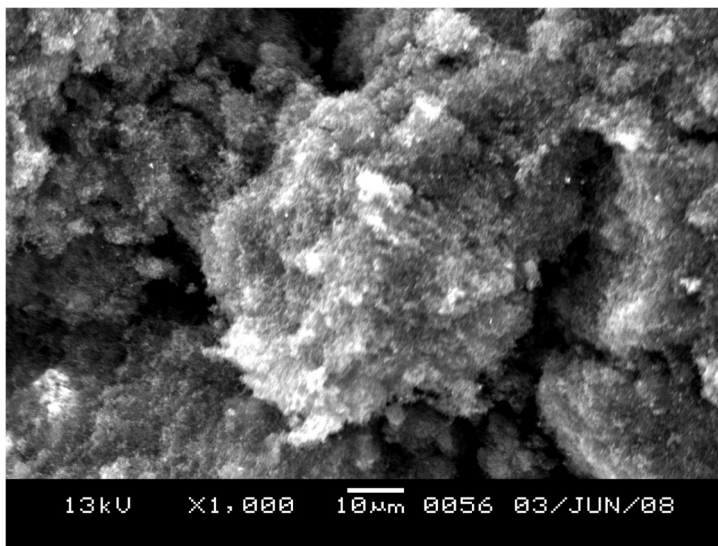


Figure 6 Platinum loaded carbon visualised under the ESM at a magnification power of 1000x.

### THERMOGRAVIMETRIC ANALYSIS (TGA)

Catalyst samples were examined using thermogravimetric analysis (TGA) to understand the thermal behaviour and the composition of the Pt/C material. Figure (5) depicts the results of one such analysis performed at 20 °C/min. A slight initial decrease in mass is observed at 100 °C which is due to the evaporation of water residues in the catalyst material. Further decrease in mass continues at a slow rate until temperature reaches just below 400 °C. This decrease is due to the combustion of some carbon material and the evaporation of other residues. A sharp decrease in mass starts to take place at 400 °C which is due to the combustion of the carbon material in the specimen.

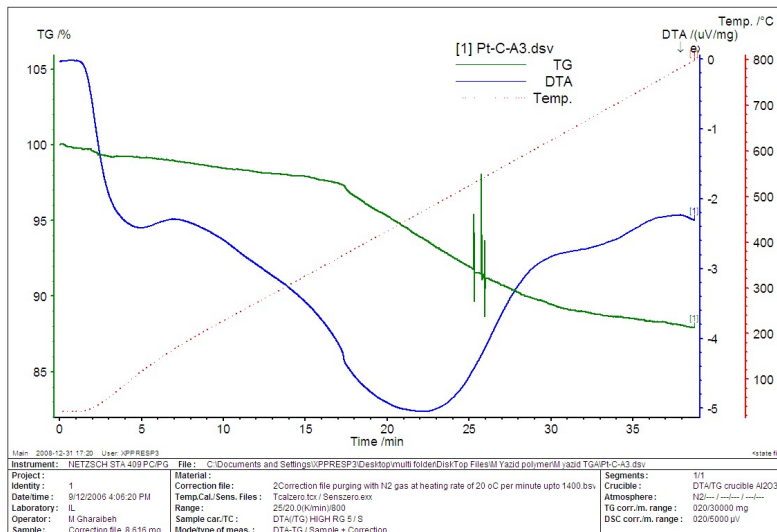


Figure 7 TGA Analysis of 30 wt % Pt/C catalyst sample at a heating rate of 20 °C/min.

#### APPLICATION OF THE CATALYST

Various methods of applying the catalyst to the membrane have been reported in the literature, the two most common techniques involve applying the catalyst as an ink, which is sprayed, painted, or stamped on the membrane surface to form a film. In one method described by Wilson et al. [6], the catalyst film is formed as an ink that is spread and cured on a film release blank. The cured film is then transferred to the SPE membrane and hot pressed into the surface to form a catalyst layer having a controlled thickness and catalyst distribution.

The catalyst material has different characteristics from the membrane material, this results in various issues concerning the proper bonding of the catalyst material to the membrane. Maintaining protonic conductivity through the catalyst layer and the membrane is another challenge, however, this has been resolved by using a solution of the membrane material as bonding material, but, in many cases, this hydrophobic binder displayed a tendency to block the proton and oxygen access to active catalyst sites in the cathode electrodes [7].

One major challenge with the catalyst material is the different coefficients of expansion and the swelling of the membrane under wet conditions, which results in delamination and separation of the catalyst layer from the membrane, resulting in discontinuity in the electronic conductivity of the catalyst layer, and reduced active cell area. In preparing the catalyst material in the form of an ink, a literature approach was adopted in which the carbon supported platinum was mixed with a 5% solution of the membrane material in an aprotic solvent such as (DMSO) or Nafion solution at a weight ratio of 1:3 Membrane solution: (dry)/Pt-C, then water and glycerol were added to the mixture at weight ratios of about 1:5:20 for carbon/water/glycerol. The ink was applied to a new series of six-membered ring sulfonated polyimides with different combinations of two comonomers in the non-sulfonated diamine membranes, which were prepared locally by one-step high-temperature polycondensation in *m*-cresol to improve the solubility of the resulting sulfonated polyimides using a paintbrush [8]. However, two challenges were encountered:

- a. Swelling and dissolution of the membrane due to the use of solvent.
- b. Flaking of the catalyst material due to the differential swelling of the membrane material and catalyst layer.

Figure (6) shows (A) a locally synthesized 30% SDSDA/SDA/NDA Membrane with a catalyst layer applied as an ink, swelling of the membrane occurs upon application of the catalyst and the membrane loses its physical integrity and (B) a 50% SDSDA/ODA/NDA Membrane with a platinum loaded carbon catalyst ink. Separation of the carbon from the membrane upon drying is obvious.

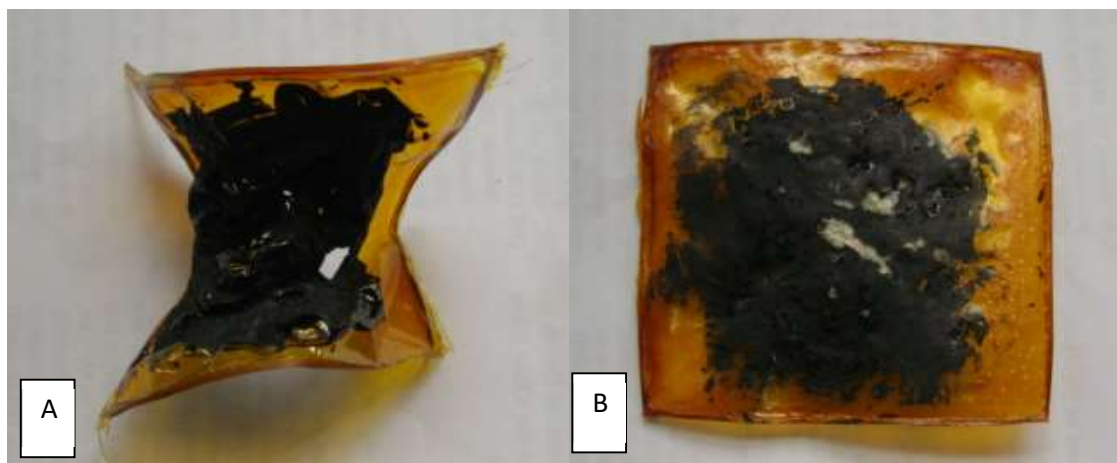


Figure 8. (A) 30% SDSDA/SDA/NDA and (B) 50% SDSDA/ODA/NDA membranes with a catalyst layer applied as an ink

To overcome these issues, the catalyst layer was produced as a membrane by mixing the proper quantity of catalyst material with membrane material to produce a thin membrane containing the proper catalyst loading per  $\text{cm}^2$ . No additional components were added to the mixture to produce the catalyst layer. It was found that a thin membrane of 50% sulfonation degree is very suitable for casting and can be produced as a flexible thin membrane. The same challenges faced with casting the membrane material were faced in preparing the catalyst layer such as: loss of shape integrity upon drying at high temperatures ( $>100^\circ\text{C}$ ), cracking of the membrane material and loss of flexibility as the sulfonation degree increases, However, application of the catalyst to Nafion<sup>®</sup> 211 membranes, which are prepared by dispersion casting, showed more satisfactory results as shown in figure (7).



Figure 9. Nafion<sup>®</sup> 211 membrane with catalyst layer applied as an ink

Another potential drawback that can affect the performance of the catalyst is the rapid oxidation of carbon black (CB) used as a catalyst support in polymer electrolyte fuel cells. An alternative conducting polymer, poly[2,2'-(4,4'-bipyridine)-5,5'-bibenzimidazole] (BiPyPBI), was synthesised

and used it to functionalize the surface of CB and homogeneously anchor platinum metal nanoparticles (Pt-NPs) on a CB surface is reported in [9].

Among the advantages of applying the catalyst in this way, is the reduced complexity of catalyst application and the easy recovery of the catalyst material. This approach, as far as the authors are acquainted, has not been reported in literature and is considered a novel method in catalyst application.

#### CONCLUSIONS

A novel approach in the preparation and application of catalyst material based on platinum acids for PEM fuel cell application is presented in this work. Initially the platinum catalyst powder is prepared from platinum salt acids which are dispersed on high surface area carbon powder following a literature approach and then a catalyst layer is prepared in the form of a thin layer away from the membrane. The catalyst layer is placed on both sides of the proton conducting polymer membrane as separate layers.

The main object in producing the catalyst material is to spread the smallest possible amount of platinum particles on the largest possible area of the protonic conductive membrane, using high surface area carbon material and at the same time maintain passages for gas flow, and the electronic conductivity through the catalyst layer.

The platinum loaded carbon in powder form was characterized and tested using various techniques. The catalyst sample was magnified 1000 times under the ESM to visually examine the dispersion of platinum particles on the surface area of the (Cabot XC72R) carbon material, which indicated satisfactory distribution of the catalyst. The chemical properties of the catalyst material were satisfactory.

Challenges were encountered in the application of catalyst ink on locally prepared sulfonated polyimide membranes, such as swelling and dissolution of the membrane due to the use of solvent and flaking of the catalyst material due to the differential swelling of the membrane material and catalyst layer. Those issues were overcome by preparing a film of catalyst material as a separate layer. However, application of the catalyst to Nafion® 211 membranes produced much improved results.

#### ACKNOWLEDGEMENT

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LIST OF SOURCES

- [1] Mohamad Y. Mustafa, Design and manufacturing of a (PEMFC) proton exchange membrane fuel cell, PhD thesis, Award date 2009. ed., Coventry: Coventry University, 2009.
- [2] C. & A. Energy, "Energy, Catalysts & Activation, Chem Talk," 21 March 2024. [Online]. Available: Catalysts & Activation Energy | ChemTalk (chemistrytalk.org).
- [3] Calay, R.K., M. Mustafa, and M.F. Mustafa, "Challenges Facing the Fuel Cell Technology to Replace Combustion Engines," *Advanced Materials Research*, no. vol. 1, pp. 715-722, 2013.
- [4] Oliver T. Holton and Joseph W. Stevenson, "The Role of Platinum in Proton Exchange Membrane Fuel Cells," *Platinum Metals Rev.*, Vols. 57, (4),, no. <http://dx.doi.org/10.1595/147106713X671222>, pp. 259–271,, 2013.
- [5] Zhou, Z., et al., "Preparation of highly active Pt/C cathode electrocatalysts for DMFCs by an improved aqueous impregnation method," *Phys. Chem. Chem. Phys.*, no. 5, pp. 5485 - 5488, 2003.
- [6] M. S. Wilson, S. Gottesfeld, "Thin-film catalyst layers for polymer electrolyte fuel cell electrodes," *J Appl Electrochem*, vol. 22, no. <https://doi.org/10.1007/BF01093004>, 1992.
- [7] Gasteiger, H.A., J.E. Panels, and S.G. Yan, "Dependence of PEM fuel cell performance on catalyst loading," *Journal of Power Sources*,, no. 127, pp. 162-171., 2004.
- [8] Abu-Orabi, F.M., Kailani, M.H., Sweileh, B.A. et al. "Sulfonated polyimide copolymers based on 4,4'-diaminostilbene-2,2'-disulfonic acid and 3,5,3',5'-tetramethylbenzidine with enhanced solubility.," *Polym. Bull.* 74, , no. <https://doi.org/10.1007/s>, p. 895–909 , 2017.
- [9] Mohamed R. Berber, Mohamad Y. Mustafa, "Poly[2,2'-(4,4'-bipyridine)-5,5'-bibenzimidazole] functionalization of carbon black for improving the oxidation stability and oxygen reduction reaction of fuel cells,," *RSC Advances* 02, no. <https://doi.org/10.1039/d0ra04289g>, pp. 30776 - 30784, 2020.

## Political Studies

# Navigating the New Silk Road: The Dynamics of Kazakhstan-China Relations in Contemporary Foreign Policy

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The intricate web of international relations is a stage where nations maneuver through a complex maze of alliances, rivalries, and partnerships. In this dynamic landscape, the relationship between Kazakhstan and China stands as a testament to the evolving nature of global diplomacy, particularly in the context of Eurasian geopolitics. As two significant players on the Eurasian stage, these nations have forged a partnership that reflects a confluence of interests, strategic objectives, and regional aspirations. This essay endeavors to explore the multifaceted dimensions of Kazakhstan-China relations in the contemporary era, focusing on the intricacies of their foreign policy, economic collaborations, security arrangements, and regional initiatives.

### **Economic Cooperation: The Backbone of Kazakhstan-China Relations**

The economic partnership between Kazakhstan and China is a cornerstone of their bilateral relations, serving as a vital conduit for mutual prosperity and regional development. Anchored by energy trade and infrastructure projects, this cooperation has evolved into a multifaceted economic engagement, encompassing various sectors and initiatives.

The energy sector stands at the heart of Kazakhstan-China economic cooperation. Kazakhstan, with its vast reserves of oil and natural gas, has emerged as a crucial energy supplier to China, which is the world's largest energy consumer. The completion of the Kazakhstan-China oil pipeline and the Central Asia-China gas pipeline has not only facilitated the direct export of Kazakhstani energy resources to China but has also enhanced the energy security of both nations. This energy partnership is a testament to the mutual trust and strategic alignment between the two countries, serving as a foundation for broader economic engagement.

The Belt and Road Initiative (BRI), launched by Chinese President Xi Jinping in 2013, is a transformative global development strategy aimed at enhancing regional connectivity and fostering economic growth across Asia, Africa, and Europe. The initiative draws its inspiration from the ancient Silk Road, which facilitated trade and cultural exchange between the East and the West. The modern BRI comprises two main components: the Silk Road Economic Belt and the 21st Century Maritime Silk Road.

The Silk Road Economic Belt, often referred to as the "Belt," is a network of overland routes that connect China with Europe via Central Asia. This component of the BRI seeks to revive the historical land routes through which silk, spices, and other goods were traded, thereby promoting economic cooperation and development along these corridors. The Belt aims to enhance

infrastructural development, including the construction of roads, railways, and energy projects, to facilitate trade and investment.

The 21st Century Maritime Silk Road, or the "Road," is a sea route that links China's coastal regions with Southeast Asia, South Asia, Africa, and Europe. This maritime component aims to strengthen China's connectivity with key ports and maritime trading hubs, thereby fostering smoother and more efficient trade routes across the oceans. The Road emphasizes the importance of maritime cooperation and infrastructure development in ports and shipping.

The overarching goals of the BRI are multifaceted. Firstly, the initiative seeks to promote economic development by creating new trade corridors and enhancing infrastructure, which in turn can stimulate investment and job creation in participating countries. Secondly, it aims to enhance regional connectivity by improving transportation networks and reducing trade barriers, thereby facilitating the easier movement of goods and services. Thirdly, the BRI strives to foster cultural exchanges and people-to-people bonds by encouraging tourism, educational exchanges, and cultural programs, which can lead to greater mutual understanding and respect among different cultures. Lastly, the initiative promotes technological cooperation in areas such as the digital economy, artificial intelligence, and green technologies, with the aim of driving innovation and sustainable development.

Despite its ambitious goals, the BRI has faced criticism and concerns from some quarters. Critics have raised issues related to debt sustainability, transparency, environmental impact, and geopolitical tensions. There are worries that some countries participating in the BRI may fall into a "debt trap," leading to increased dependency on China. Additionally, concerns about environmental degradation and lack of transparency in project implementation have been voiced.

In response to these challenges, the Chinese government has emphasized its commitment to ensuring that the BRI brings mutual benefits to all participating countries. China has expressed its willingness to engage in dialogue and cooperation to address concerns and promote sustainable and inclusive development through the initiative.

Despite the substantial progress in economic cooperation, there are challenges that need to be addressed to ensure sustainable and balanced growth. Issues such as trade imbalances, environmental concerns, and the need for greater transparency in investment projects have been areas of focus. Both countries are actively working to overcome these challenges through policy coordination, dialogue, and mutual

The economic cooperation between Kazakhstan and China is a testament to their commitment to mutual prosperity and regional development. As both nations navigate the complexities of the global economic landscape, their partnership is poised to play a pivotal role in shaping the future of Eurasian economic integration. The continued expansion and diversification of this economic cooperation will not only bolster the bilateral relationship but will also contribute to the stability and prosperity of the region.

### **Security and Strategic Interests: Navigating Shared and Divergent Concerns**

The security and strategic interests of Kazakhstan and China are intricately woven into the fabric of their bilateral relations. As two pivotal nations in the Eurasian landscape, their cooperation in addressing security challenges is crucial for regional stability and their own national security.

The extensive border between Kazakhstan and China is a critical area for security cooperation. Effective border management is essential to prevent cross-border crime, drug trafficking, and illegal migration, all of which can have destabilizing effects on both nations. The establishment of border trade zones and the implementation of modern surveillance technologies are part of the comprehensive measures taken to secure this strategic frontier.

The military cooperation between Kazakhstan and China has been growing, encompassing joint exercises, defense dialogues, and arms trade. This cooperation is aimed at enhancing the defense capabilities of both countries and fostering trust between their armed forces. The regular conduct of joint military exercises, such as the "Peace Mission" under the SCO framework, demonstrates their commitment to regional security and military collaboration.

The security landscape of Central Asia is fraught with challenges, from geopolitical rivalries to transnational threats. The ability of Kazakhstan and China to navigate these challenges will be crucial for the stability of their bilateral relations and the region as a whole. As they move forward, continued dialogue, cooperation, and a commitment to addressing both shared and divergent security concerns will be essential.

The security and strategic interests of Kazakhstan and China are key components of their bilateral relationship. Their collaboration in addressing regional security challenges, counterterrorism efforts, and military cooperation underscores the importance of their partnership for Eurasian stability. As they navigate the complexities of the security landscape, the strength of their ties will be instrumental in shaping the future of regional security and their own strategic objectives.

The dynamics of Kazakhstan-China relations extend beyond bilateral engagements to encompass regional initiatives and multilateral cooperation. These platforms serve as vital conduits for advancing shared interests, addressing common challenges, and fostering a stable and prosperous Eurasian region. This essay explores the various regional initiatives and multilateral frameworks that shape the interactions between Kazakhstan and China, highlighting their significance in the broader context of their strategic partnership.

The Shanghai Cooperation Organisation (SCO) stands as a testament to the commitment of Kazakhstan and China to regional security, economic development, and political cooperation. As founding members, both countries have played instrumental roles in shaping the SCO's agenda and priorities. The organisation serves as a platform for addressing security threats, enhancing economic collaboration, and promoting cultural exchange among member states. The SCO's focus on combating terrorism, separatism, and extremism aligns with the security interests of both Kazakhstan and China, reinforcing their cooperation in maintaining regional stability.

Environmental sustainability and water resource management are emerging as vital areas of collaboration between Kazakhstan and China, given their shared ecological challenges and interdependence. Initiatives aimed at preserving the region's natural resources, addressing climate change, and ensuring sustainable water usage are gaining prominence in their bilateral agenda. Joint projects and research efforts in environmental protection and green technology demonstrate their commitment to ecological sustainability and the well-being of future generations.

Cultural and educational exchanges form an integral part of Kazakhstan-China relations, enhancing mutual understanding and strengthening people-to-people ties. Programs such as student exchanges, language learning initiatives, and cultural festivals play a crucial role in bridging the gap between the two societies. These exchanges not only enrich the cultural fabric of both nations but also lay the groundwork for enduring friendship and cooperation.

While regional initiatives and multilateral cooperation offer numerous opportunities for Kazakhstan and China, there are challenges that need to be addressed to maximise their potential. Coordinating policies, aligning interests, and managing divergent perspectives among multiple stakeholders require diplomatic finesse and strategic vision. As Kazakhstan and China continue to engage in regional and multilateral platforms, their ability to navigate these challenges will be crucial for the success of their collaborative efforts.

### **Public Perception and Soft Power Dynamics: Shaping Kazakhstan-China Relations**

In the realm of international relations, the role of public perception and soft power dynamics cannot be understated. For Kazakhstan and China, the cultivation of a positive image and the ability to influence through cultural and ideational means are crucial components of their bilateral relationship.

Cultural exchanges between Kazakhstan and China serve as a foundation for enhancing mutual understanding and fostering people-to-people ties. Initiatives such as joint cultural festivals, art exhibitions, and traditional music performances provide opportunities for citizens of both countries to experience each other's cultural heritage. These exchanges not only promote appreciation for diverse traditions but also help to dispel stereotypes and misconceptions, contributing to a more nuanced and positive public perception.

Educational cooperation between Kazakhstan and China is a key element of their soft power dynamics. Initiatives such as student exchange programs, joint research projects, and the establishment of Confucius Institutes in Kazakhstan contribute to academic and cultural exchange. By providing opportunities for students and scholars to engage with each other's educational systems and cultures, these programs lay the groundwork for long-term understanding and collaboration.

Public perception and soft power dynamics play a crucial role in shaping Kazakhstan-China relations. Through cultural exchanges, media narratives, and educational cooperation, both countries can enhance mutual understanding and foster a positive image of their partnership. As Kazakhstan and China continue to navigate the complexities of their relationship, the effective management of public perception and soft power will be instrumental in building trust and cooperation for the future.

Despite the challenges, the prospects for the future of Kazakhstan-China relations remain promising. The strategic partnership has the potential to deepen further, with cooperation expanding into new areas such as digital technology, healthcare, and education. The shared interests in regional stability, economic development, and connectivity provide a strong basis for continued collaboration. By addressing the challenges and leveraging their complementary strengths, Kazakhstan and China can pave the way for a dynamic and mutually beneficial partnership.

Kazakhstan-China relations stand at a crossroads, with both challenges and opportunities on the horizon. Navigating the geopolitical landscape, diversifying the economic partnership, addressing environmental concerns, and fostering mutual respect are key areas that require attention. As both nations look to the future, their ability to work together in addressing these challenges and seizing the opportunities will be crucial in shaping the trajectory of their relationship and the broader Eurasian region.

The significance of regional initiatives and multilateral cooperation in shaping Kazakhstan-China relations cannot be overstated. Platforms like the Shanghai Cooperation Organisation (SCO) and the synergy between the Eurasian Economic Union (EAEU) and the BRI underscore the potential for collaborative regional development and integration. However, the success of these initiatives will depend on the ability of both countries to align their interests and navigate the complexities of regional dynamics.

Moreover, the role of public perception and soft power in influencing the trajectory of Kazakhstan-China relations highlights the importance of cultural exchange, media narratives, and educational cooperation. Fostering mutual understanding and respect will be crucial in overcoming stereotypes and building a foundation of trust and friendship between the people of Kazakhstan and China.

Navigating the New Silk Road of Kazakhstan-China relations requires a nuanced understanding of the historical, cultural, and geopolitical factors that shape their interactions. As

they chart their course in the contemporary foreign policy landscape, the ability of Kazakhstan and China to adapt, cooperate, and innovate will determine the strength and vitality of their strategic partnership in the years to come.

## **Geological and Mineralogical Sciences**

# DIRECT-PROSPECTING TECHNOLOGY OF SATELLITE AND PHOTO IMAGES FREQUENCY-RESONANCE PROCESSING: RESULTS OF TESTING ON THE TAJIKISTAN TERRITORY

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**Annotation.** The results of the direct-prospecting technology of satellite images and photographs frequency-resonance processing testing at oil and gas fields and during a reconnaissance survey within big blocks in Tajikistan are presented. Experimental researches of the reconnaissance nature were carried out with the aim of demonstrating the performance, efficiency and information content of direct-prospecting methods. During the work conducting, frequency-resonance processing of photographs of local areas from six hydrocarbon fields, as well as the exploration well drilling site, was carried out. At three oil and gas fields, a certain number of detailed experiments were carried out with the implementation of an expanded set of instrumental measurement procedures. Experimental measurements have shown that by scanning with a relatively large step of 1 m, the depth intervals in cross-section are recorded, within which it is advisable to search for individual productive formations. Individual layers (solid) can be identified in cross-section when scanning with step of 1 cm or finer. Experiments with various rock samples indicate the possibility of frequency-resonance methods using to determine the type of reservoir rocks in productive intervals of the cross-section, seals above deposits and individual layers. The frequency-resonance method of the photographs processing can also be used to quickly determine the presence (absence) of oil, condensate and gas in the core, extracted from wells. Experimental measurements using individual samples of oil and condensate indicate the feasibility of using samples of oil, condensate, gas, as well as reservoirs and seals rocks from drilled wells in the study area, when the detailed work performing. Additional use of samples from the work area will help increase the information content and reliability of the results of using the direct-prospecting methods of satellite images and photographs frequency-resonance processing and decoding. In general, the use of super-operational and low-cost direct-prospecting technology will significantly speed up the exploration process for oil, gas, natural hydrogen and ore minerals, as well as reduce the financial costs of its implementation. Mobile methods of direct-prospecting technology can also be used to study the deep structure of the structural elements of the Earth, establish the genesis of ring structures, examine volcanic complexes of various types. The direct-

prospecting technology can also be successfully used during the exploration of poorly explored areas and blocks within known oil and gas fields. Proven super-mobile technology of satellite images and photographs frequency-resonance processing is recommended for practical use on the territories of different countries for the purpose of preliminary assessment of the prospects for oil and gas content, ore content and water content of poorly studied and unexplored prospecting blocks and local areas.

**Keywords.** Tajikistan, hydrocarbon fields, well, oil, gas, condensate, methane, basalts, hydrogen, phosphorus, bacteria, direct searches, volcano, abiogenic genesis, sounding of the cross-section, remote sensing data processing.

### Introduction

The super-mobile direct-prospecting technology of satellite images and photographs frequency-resonance processing and decoding [21-22] provides an opportunity to conduct research in order to search for minerals of various types, as well as to study the deep structure of various structural elements in different regions of the globe. The technology was used also to study the structural features of various structural objects on the planets and satellites of the Solar system. During this technology large-scale testing and approbation in 2019-2023 [23-50] numerous facts (evidences) were obtained in favor of 1) deep (abiogenic) genesis of oil, condensate and gas in the process of the Earth hydrogen degassing, 2) migration of gas (methane), carbon dioxide and hydrogen into the atmosphere of the Earth planet and 3) a "volcanic" model of the formation of structural elements and the appearance of the Earth, planets and satellites of the Solar system, as well as deposits of hydrocarbons, ore minerals and water. The results of studies conducted in various regions of the globe showed also that the super-mobile technology used makes it possible to significantly speed up and optimize (cheapen) the exploration process for combustible and ore minerals, as well as water. Financial resources, saved during the exploration phases of oil and gas fields, can be used further at the stages of their extraction and energy production with using increased environmental standards regarding air polluting gases.

Approbation of mobile direct-prospecting methods was carried out at local areas and sites of the exploratory wells for oil and gas drilling on onshore and offshore, within large and small exploratory blocks in order to integrally assess the prospects for oil and gas content, in areas of volcanic complexes and ring structures of various types location, on local areas and sites along seismic profiles, as well as on some planets and satellites of the Solar system. The results of the experimental work carried out were published in journal articles, as well as in the materials of numerous scientific conferences [21-50].

In the course of experimental works, the possibility of targeted use of mobile direct-prospecting technology was additionally studied for detecting and localizing hydrogen accumulations in areas of visible hydrogen degassing and assessing (determining) the depths (intervals) of their occurrence, as well as an integral assessment of the prospects for detecting hydrogen deposits within local areas and large prospecting blocks. At present, the problem of searching for accumulations of natural hydrogen and organizing its production is quite relevant due to the intention of the world community to switch in the near future to carbon-free energy, in which an important place is given to hydrogen, the environmentally friendly fuel of the future. The main results of experiments already carried out (instrumental measurements) with the aim of studying the possibility of using direct-prospecting methods for localizing hydrogen accumulations in a cross-section were published in [23-26, 28, 33, 35-39, 42, 45-46].

From the standpoint of the deep (abiogenic) origin of hydrocarbons within the framework of the concept of deep degassing of the Earth, it can be assumed that in coal and shale basins, oil, condensate, and gas deposits also exist in deep (and ultra-deep) horizons of the cross-section. In this regard, the experimental studies of reconnaissance character were carried out using mobile

direct-prospecting methods in regions of coal deposit's location in China, India, Kazakhstan, France, Ukraine [44].

At the initial stages of the direct-prospecting methods testing, in many cases an expanded set of instrumental measurement procedures, including those of a detailed nature, was performed at survey sites. Recently, inspection of objects in such a (relatively detailed) mode is carried out in very rare cases (as part of the implementation of commercial projects exclusively). In this regard, it seems appropriate to publish materials on the processing (examination) of objects in various modes (including the implementation of an expanded set of procedures for instrumental measurements of images and photographs).

Testing of mobile direct-prospecting methods was also carried out on the territory of Tajikistan. At some survey sites, processing of satellite and photo images was carried out in a detailed mode, including the implementation of an expanded set of instrumental measurement procedures. The results of testing super-mobile direct-prospecting methods on the territory of Tajikistan are presented in this article.

### **Research methods**

Experimental studies of a reconnaissance and detailed nature are purposefully carried out using mobile methods of satellite images and photographs frequency-resonance processing and decoding, vertical scanning (sounding) of cross-section in order to determine (estimate) the depths and thicknesses of various rock complexes and sought minerals, as well as methods an integral assessment of the prospects for oil and gas potential (ore content, water content) of local areas and large blocks [21-22]. Some methods of the technology used are based on the principles of the "substance" paradigm of geophysical research [7], the essence of which is to search for a specific (searchable in each individual case) substance – oil, gas, gas condensate, gold, iron, water, etc. The developed methods are based on the standing electric waves discovered by Nikola Tesla in 1899 in the deep horizons of the Earth [16-17]. Mobile technology as a whole, as well as its individual methods, are actively used in the testing mode to search for hydrocarbon accumulations at the initial stages of the geological exploration process, including for the integral assessment of the oil and gas potential of large and hard-to-reach blocks and areas, as well as local areas of prospecting and exploratory wells drilling.

In modified versions of the methods of satellite images and photographs frequency-resonance processing, as well as vertical sounding (scanning) of cross-section, bases (sets, collections) of chemical elements, minerals, rocks and minerals (specific samples) are used [21]. Thus, the collection of oil samples used during instrumental measurements includes 117 samples, gas condensate – 15 samples (Fig. 1). Figure 2 shows a photomontage of several chemical elements and substances, the frequency spectrum of which is used to record responses of oil, condensate and gas during the implementation of one instrumental measurement procedure.

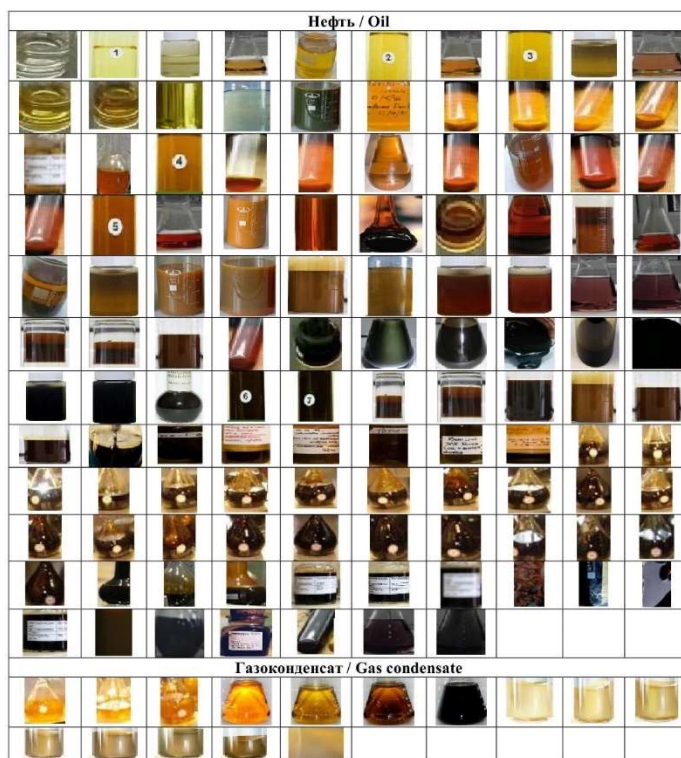


Fig. 1. Photographs of oil and gas condensate samples.

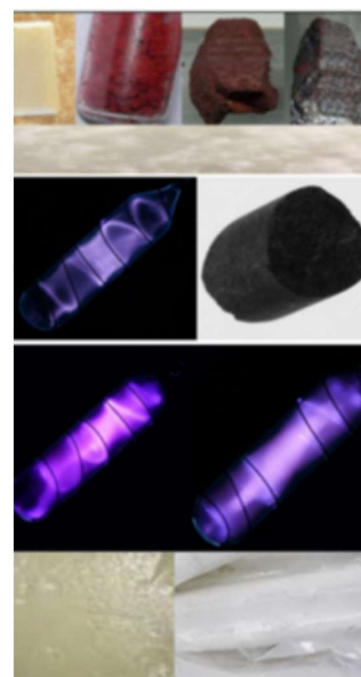


Fig. 2. Photomontage of the frequency spectrum of oil, condensate and gas.

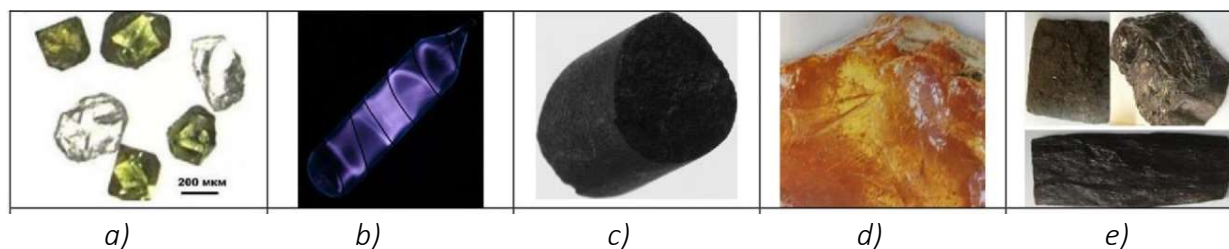
The set of photographs of sedimentary rocks consists of 11 groups: 1) psephites, monomineralic conglomerates (22 samples, sample numbers in the set are 2-23) (Fig. 3a); 2) psammites (18, 25-42) (Fig. 3b); 3) silts, mudstones, clays (6, 44-49) (Fig. 3c); 4) kaolinite mudstones (6, 51-57) (Fig. 3d); 5) kaolinite clays (10, 59-68) (Fig. 3e); 6) sedimentary-volcanoclastic rocks; tuff breccias (9, 70-78) (Fig. 3f); 7) limestones (24, 80-103) (Fig. 3g); 8) dolomites (11, 105-115) (Fig. 3h); 9) marls (10, 117-126) (Fig. 3i); 10) siliceous rocks (13, 128-140) (Fig. 3j); 11) salt.



**Fig. 3.** Photographs of rock samples whose resonant frequencies are used during images processing [3]: *a)* psephites, monomineralic conglomerates; *b)* psammites; *c)* silts, mudstones, clays; *d)* kaolinite mudstones; *e)* kaolinite clays; *f)* sedimentary-volcaniclastic rocks; tuff breccias; *g)* limestones; *h)* dolomites; *i)* marls; *j)* siliceous rocks; *k)* 1st group of granite rocks; *l)* gabbros and basalts; *m)* 7th group of igneous (ultramafic) rocks; *n)* kimberlites and lamproites.

The database of photographs of igneous and metamorphic rocks includes 18 groups: 1) granites and rhyolites (29 samples, sample numbers in the database are 1-29) (Fig. 3k); 2) granodiorites and dacites (7, 31-37); 3) syenites and trachytes (18, 39-56); 4) diorites and andesites (14, 58-71); 5) lamprophyres (14, 73-86); 6) gabbro and basalts (32, 88-119) (Fig. 3m); 7) non-feldspar ultramafic rocks (20, 121-140); 8) feldspathoid syenites and phonolites (23, 142-164); 9) feldspathoid gabbroids and basaltoids (6, 166-171); 10) feldspar-free ultramafic and mafic rocks (10, 173-182); 11) kimberlites and lamproites (20, 184-203) (Fig. 3n); 12) non-silicate carbonatites (8, 205-212); 13) metamorphic granulites (10, 214-223); 14) metamorphic gneisses (26, 225-250); 15) metamorphic crystalline schists (44, 252-295); 16) metamorphic microcrystalline schists (phyllites) (11, 297-307); 17) metamorphosed slates, cleaved sandstone (1, 308); 18) metamorphosed slates, cleaved siltstone (1, 309). Figure 3 shows 13 groups of rocks from the sets listed above. Photos of some chemical elements and minerals samples, used during satellite images processing, are shown in Fig. 4.

Photos of the used sets of samples of sedimentary, metamorphic and igneous rocks are borrowed from the electronic document [3]. Let us add to this that in our publications the rock classification proposed by the authors of the document [3] is also used.



**Fig. 4.** Photos of samples of chemical elements and minerals: *a)* diamonds; *b)* hydrogen; *c)* carbon; *d)* amber; *e)* coal.

Materials of earlier experimental studies, obtained with the used set of mobile direct-prospecting methods, are presented in publications [21-50]. The same articles describe the methodological features of measurements during the satellite images and photographs processing using the developed technical means.

When conducting numerous studies using the described direct-prospecting methods in 2019-2023, the optimal procedure (processing graph, sequence of actions) was worked out (and constantly improved), which is used when carrying out work within the blocks and areas of survey. The most used processing graph for a separate satellite image (or its local fragment) includes the following sequence of actions (steps).

1. The procedure for fixing responses (signals) from the surface at the frequencies of the following set of substances: oil, condensate, gas, amber, methane-oxidizing bacteria, oil shale, gas hydrates, ice, coal, anthracite, hydrogen, living (deep) water, dead water, diamonds, potassium magnesium salt, sodium chloride salt.

2. Graph of the response's registration from the groups of sedimentary, metamorphic and igneous rocks that make up the cross-section.

3. Procedure for determining the presence within survey area of deep channels (volcanoes), filled with various groups of rocks; depths assessment of the volcano's root's location.

5. Graph for determining groups of rocks (or individual samples of groups), from which signals are recorded at frequencies of oil, condensate, gas and water (deep, live).

6. The procedure for recording responses of oil, condensate, gas and phosphorus at the surface (depth) of 57 km – the boundary of the hydrocarbons and amber synthesis in deep channels (volcanoes), filled with certain groups of rocks.

7. Graph of signals registration of water (deep, live) on the surfaces of 11, 46, 57, 68 km – the predicted boundaries of water synthesis in volcanoes of a certain type.

8. The procedure for scanning a cross-section with different steps from the surface up to 15 km to determine the depth intervals, within which responses are recorded at the resonant frequencies of oil, condensate, and gas. Refinement of the depths of location of the most promising for hydrocarbons intervals of cross-section during additional scanning with a finer step.

9. Graph for assessing the depth of the upper boundary (edge) of basalts, as well as the depths of the beginning of fixing responses at the resonant frequencies of hydrogen and living (healing) water from basalts. It is implemented in case of fixing responses from the 6th group of igneous rocks (basalts) on the surveyed area.

10. Procedure for determining the depths of occurrence of the upper edge of kimberlites, as well as the depth interval within which responses at diamond frequencies are recorded. It is implemented when establishing the presence of signals from the 11th group of igneous rocks (kimberlites) in the survey area.

Given the reconnaissance nature of the studies performed, the described set of separate procedures for satellite images processing in full was not implemented within all surveyed areas.

*Possible stages of direct-prospecting methods application.* Numerous results of approbation and practical application of the frequency-resonance technology for satellite images processing [23-50] have shown that this super-mobile direct-prospecting technology can be successfully used on the following stages of prospecting for oil and gas, natural hydrogen, ore minerals and water:

a) *stage 1: demonstration* – processing of a satellite image or a photograph of the well or field location, known to the potential Customer, to further demonstrate the operability and efficiency of mobile direct-prospecting technology;

b) *stage 2: integral* – detailed processing of satellite images of large areas in order to determine the types of volcanic structures, present within survey area, as well as minerals for which it is advisable to conduct reconnaissance and detailed prospecting;

c) *stage 3: reconnaissance* – splitting satellite images of large areas into sequences of fragments and their detailed processing in order to identify the most promising local blocks for conducting detailed prospecting for the desired minerals;

d) *stage 4: detailed* – detailed processing of images of the most promising local blocks, identified at the previous stage (reconnaissance), in order to select sites for drilling prospecting and exploration wells.

*Possible projects for working with national and foreign Partners:*

1. Reconnaissance survey of large blocks or the entire territory of a particular country in order to identify local areas of detailed exploration for: a) oil, gas, condensate; b) natural hydrogen; c) ore minerals.

2. The detailed exploration works carrying out within the most promising areas for hydrocarbons and natural hydrogen in order to assess the feasibility of drilling exploratory wells within them and the choice of sites for their laying.

3. Detailed survey of local areas (sites) of drilled wells for oil and gas in order to identify missed oil and gas layers and assess the prospects of HC deposits detection in the cross-section below the wells bottom.

4. Detailed inspection within the sites of design wells for oil and gas location in order to further assess the feasibility of their drilling.

5. Survey within areas of the springs with living and dead water location in the country in order to study the healing properties of healing waters and assess the feasibility of its production.

6. Detailed survey of local areas, promising for precious and non-ferrous metals (cuprum, lithium, cobalt and others), as well as rare earth chemical elements.

Once again, we focus on the distinctive feature of the direct-prospecting frequency-resonance methods being developed. Unlike classical geophysical methods, the methods used make it possible in each specific case to fill the cross-section under study with the complexes of sedimentary, metamorphic and igneous rocks present in it, as well as to determine in the first approximation (and refine at the stages of detailing) the intervals of cross-section that are promising for the detection of combustible and ore minerals, immediately, in the process of measurements (registration of signals) by the developed instrumentation and measuring devices (i.e. without additional stages of modeling and geological interpretation of the results of instrumental measurements). In this article, as well as in other published materials, the emphasis is mainly on the presentation of measurement results.

We also note that the developed technology uses the frequency-resonant principle of the useful signals' registration [7]. Satellite images or photographs of research objects, as well as photographs of rock samples, minerals and chemical elements, are, in principle, antinodes of

standing electric waves, discovered by Nikola Tesla in 1899 in the deep horizons of the Earth [16, 17].

When carrying out instrumental measurements using the developed computerized complexes, the spectra of satellite or photographic images of objects studied are sequentially compared with the spectra of rock samples, the desired minerals and chemical elements. In the process of comparison, the measuring unit registers resonances (electromagnetic responses), which make it possible to draw a conclusion about the presence (absence) of specific rocks, the desired minerals and chemical elements in the cross-section of the object of study. Such features of the developed methods of satellite images processing and decoding are the basis for the use of the terms "frequency-resonance technology" ("frequency-resonance methods").

The processing of satellite images and photographs is carried out in laboratory conditions, without organizing and conducting field geological and geophysical studies. This provides an opportunity to quickly conduct research in any region of the globe, and, consequently, developing technology is super-mobile.

In addition to what was said in the previous paragraph, it is worth adding the following. As a result of testing and practical application of the developed measuring equipment in various regions of the world, numerous evidences (facts) have been obtained in favor of the "volcanic" model of the formation of many structural elements of the Earth (and other planets and satellites of the solar system), as well as deposits of combustible and ore minerals (hydrogen and water as well). Instrumental measurements established the existence of 10 types of volcanic complexes filled with various types of rocks. And what is characteristic, the roots of all volcanoes are almost always fixed by scanning the cross-section at the same depths, namely: 95-98 km, 214-218 km, 470 km, 723 km, 996 km.

It is quite natural that the depths of the roots of 470 km or 723 km of a salt or dolomite volcano cause rejection and skepticism among many experts. We also note that at the initial stages of testing the technology, such depths of roots were also surprising to the authors of the experiments. However, the ubiquitous repetition of such depth values during many hundreds of measurement experiments gives grounds for the assumption that such strictly predetermined values of the depths of the roots of various volcanic complexes are due to certain wave processes in the solar system and our galaxy.

In this regard, it is only regrettable that such skepticism in relation to the depths of the roots of volcanoes is automatically (without detailed consideration and analysis of materials) transferred to the results of instrumental measurements in the upper part of cross-section accessible for drilling.

#### **Processing of photographs of local areas from hydrocarbon fields of Tajikistan**

Photographs from 6 different hydrocarbon deposits for frequency resonance processing were provided to the performers by the potential Partner and are shown in Figs. 5-10. In the process of experimental studies conducting, photographic images of three local areas were processed using an expanded set of instrumental measurement procedures.

**South Kum oil field.** During image (Fig. 5) of the field local area processing, responses at the resonant frequencies of oil (weak) were recorded from the surface; signals of condensate, gas, hydrogen, water, sodium chloride and potassium-magnesium salt were not recorded.

From the surface, responses were received of the 7th group of sedimentary rocks (limestones), as well as the 7th, 8th and 9th groups of igneous rocks.

By recording responses from the 7th group of igneous (ultramafic) rocks, followed by scanning the cross-section from a depth of 7 km, step 10 cm, the upper edge of these rocks was determined at a depth of 7050 m. At this depth, responses of ultramafic rocks from the upper part

of cross-section were not obtained (measurements carried out for control), and signals of the 7th group of sedimentary rocks were recorded.

At the surface of 7050 m (depth), only responses of oil were recorded from the upper part of cross-section; responses of oil, condensate and gas were not received from the lower part of cross-section.

By recording responses of ultramafic rocks at various depths (50, 150, 195, 196 km), it was established that the lower edge of these rocks is located in the depth range of 195-196 km (in the layer of the plastic state of the substance).

At a depth of 7 km from the lower part of cross-section, responses were recorded at the resonant frequencies of industrial microdiamonds (lonsdaleites).

By scanning cross-section from the surface, step 50 cm, responses (signals) at oil frequencies were recorded from the following depth intervals, m: 1) 824-995; 2) 1190-1220.

By scanning within the first interval, step 1 cm, responses of oil were obtained in the depth range of 828-837 m. After moving to a step of 5 cm, signals were recorded from two more intervals: 885-895 m and 926-983 m (intensive signal).

When scanning the second interval, step 5 cm, responses of oil were obtained in the depth range of 1187-1220 m.

At a depth of 3 km, a very weak signal at oil frequencies was obtained from the lower part of cross-section.



**Fig. 5.** Photograph of the local area within the South Kum oil field.



**Fig. 6.** Photograph of the local area within the Kichikbel oil and gas field.

*Additional research.* For the South Kum fields, responses were received at frequencies of 60, 62, 106, and 110-113 oil samples from the collection used (Fig. 1).

Signals of the following samples of the 7th group of sedimentary rocks (limestones) were also recorded: oolitic limestone (sample 93); pelitomorphous limestone, lithographic stone (sample 95); pelitomorphous limestone (sample 96) (Fig. 3g).

Results of recording responses at frequencies of seven oil samples from oolitic limestone in four intervals are following:

1) 828 – 837 m: step 1 mm, transition to step 5 mm: responses from the interval were not received;

2) 885 – 895 m: step 1 mm; responses were obtained from the depth interval 885 – 894.7 m;

3) 926 – 983 m: step 1 mm; 1) signal from a depth of 927 m; transition to 5 mm steps to a depth of 952 m; 2) 953.5 – 955 m; 3) 956 – 966 m; 4) 967 – 968 m; 5) 971.7 – 983 m.

4) 1187 – 1220 m: 5 mm step: 1) 1187.3 – 1191.6 m; 2) 1193 – 1195 m; 3) 1202 – 1203.7 m; 4) 1205.7 – 1215 m; 5) 1218.8 – 1220.5 m; transition to a step of 5 cm – there are no further signals.

Below are the results of recording responses at frequencies of seven oil samples from pelitomorph limestone, lithographic stone (sample 95) in four intervals; 5 mm step:

- 1) 828 – 837 m: 1) 828.5 – 837 m;
- 2) 885 – 895 m: no responses received;
- 3) 926 – 983 m: no responses received;
- 4) 1187 – 1220 m: no responses received.

At the surface of 837 m, responses of oil from sample 95 of limestone were obtained only from the upper part of cross-section.

Results of recording responses at frequencies of seven oil samples from pelitomorph limestone (sample 96) in four intervals:

- 1) at surfaces of 837 and 895 m, responses were received only from the lower part of cross-section, and at a depth of 1187 m, there were no signals of oil from the lower part;
- 2) when scanning from a depth of 926 m, step 5 mm, responses were obtained from the intervals: 1) 930.7 – 932 m; 2) 947 – 948.3 m; 3) 950.3 – 951.4 m; 4) 963.3 – 964.3 m.

**Kikchibel oil field.** During frequency resonance processing of a photograph (Fig. 6) of the field local area, weak signals at oil frequencies and very weak ones of gas were recorded from the surface.

Responses were received of the 7th group of sedimentary rocks (carbonates, limestones), as well as the 11th, 12th and 13th groups of igneous rocks. There was no response from diamonds.

By recording responses at various depths, the lower edge of the 7th group of sedimentary rocks was determined at a depth of 2872 m.

At the surface of 2872 m, signals of the 11th group of igneous rocks (kimberlites) were obtained only from the lower part of cross-section. By recording responses at various depths, the lower edge of the kimberlites was determined in the depth range of 195 – 196 km (layer of the plastic state of matter).

At the 2872 m surface, oil responses were obtained only from the upper part of cross-section.

By scanning cross-section from the surface, step 50 cm, signals at the resonant frequencies of oil were recorded in the following depth intervals, m: 1) 250 – 300, 2) 500 – 570, 3) 1272 – 1320, 4) 2190 – 2265.

Clarification of values in four intervals:

- A) from a depth of 250 m, step 1 cm: 1) 252 – 257 m; 2) 264 – 265 m; 3) 286 – 287 m; 4) 294 – 295 m; 5) 297 – 298 m;
- B) from a depth of 500 m, step 5 cm: 1) 525 – 538 m; 2) 550 – 560 m; 3) 566 – 568 m;
- B) from a depth of 1272 m, step 5 cm: 1) 1285 – 1306 m; 2) 1312 – 1317 m;
- D) from 2190 m, step 5 cm: 1) 2202 (intensive)–2240 (intensive)–2247 m; 2) 2266 – 2270 m.

Note that an intensive signal was recorded in the depth range of 2235–2247 m, and by scanning from a depth of 2265 m, step 1 cm, responses were obtained from small intervals: 2267.5 – 2268.5 m and 2270.4 – 2270.8 m.

*Additional research.* At the field, responses were received from the following oil samples used in the collection: No. 26 (light), 27, 29, 30, 31, 33, 35, 38 (Fig. 1).

Signals of the 7th group of sedimentary rocks (limestones) were recorded: sample 94 – oncolite limestone, sample 95 – pelitomorph limestone, sample 96 – pelitomorph limestone, sample 98 – marly limestone, sample 99 – band limestone, sample 100 – siliceous spiculous limestone, sample 101 – limestone with pound texture, sample 102 – calcareous tuff.

The values of the intervals for recording signals at oil frequencies by scanning cross-section with a step of 1 cm have been clarified:

- 525 – 538 m: 1) 526 – 528; 2) 534.5 – 539;

550 – 560 m: 1) 551 – 552; 2) 557.5 – 558; 3) 560 – 560.6; 4) 567 – 567.7;  
1285 – 1306 m: 1) 1287 – 1288; 2) 1295.5 – 1299.5; 3) 1302.5 – 1304; 4) 1305.5 – 1306.4;  
1312 – 1317 m: 1) 1312.5 – 1317.7 m.  
2202 – 2247 m: (intensive signals): 1) 2204 – 2205; 2) 2232 – 2234; 3) 2235 – (intensive) –

2247 m.

2266 – 2270 m: 1) 2267 – 2270 m.

From the depth interval of 2235-2247 m, signals were obtained at oil frequencies only from the samples 95 and 96 of the 7th group of sedimentary rocks (limestones). During additional measurements of responses at oil frequencies from the sample 95 of limestones, signals were recorded of oil sample 26, 27, 31, 33, 35 and 38, and from sample 96 of limestones – only of oil sample 29.

In the depth range 0-2247 m, responses were received of the oil sample 30 and sample 95 of limestones.

At the surface of 2872 m, responses were received only from the 7th group of sedimentary rocks, and from the lower part of cross-section – from the 11th, 12th and 13th groups of igneous rocks.

By recording responses at various depths, the lower boundary of the 11th group of igneous rocks (kimberlites) was determined in the depth range of 196 – 197 km.

**Akboshadir oil and gas condensate field.** During processing a photograph (Fig. 7) of the field local area, responses (signals) were recorded from the surface at the frequencies of oil, condensate, gas, amber, dead water, sedimentary rocks of 1-6 groups and igneous rocks of the 7th and 8th groups.

By recording responses from the 7th group of igneous (ultramafic) rocks at various depths, followed by scanning from 4500 m, step 10 cm, the upper edge of these rocks was determined at a depth of 4525 m.

On the surface of 4525 m from the lower part of cross-section, responses at the resonant frequencies of lonsdaleites (technical microdiamonds) were recorded.

At the surface of 50 km, there were no responses of ultramafic rocks from the lower part of cross-section. Signals were recorded of the 11th group of igneous rocks (kimberlites). By recording responses at various depths, the upper boundary of kimberlites was determined in the depth range of 47–48 km, and the lower boundary – in the depth range of 195–197 km (layer of the plastic state of matter).

By scanning cross-section from the surface, step 50 cm, responses at oil frequencies were recorded from the following intervals, m: 1) 380 – 453, 2) 1205 – 1276, 3) 194 – 2021.

At the surface of 2021 m from the lower part of cross-section, there were no responses of condensate, but responses of gas were recorded (with a delay).

By scanning cross-section from a depth of 2021 m, a step of 5 cm, gas responses were obtained in the depth range of 2029-2076 m. At the surface of 2076 m, there were no gas signals from the lower part of cross-section.

Clarification the values of the intervals of responses, recording from oil at a depth of 380 m, step 5 cm: 1) 395 – 410 m; 2) 422 – 428 m; 3) 445 – 451 m.

Clarification of the values of the second interval from a depth of 1205 m, step 5 cm: 1) 1211 – 1218 m; 2) 1227 – 1241 m; 3) 1266 – 1273 m.

Clarification of the values of the third interval from a depth of 1948 m, step 5 cm: 1) 1954 – 1968 m; 2) 1991 – 1997 m; 3) 2016 – 2021 m.

By recording responses from gas at various depths, followed by scanning cross-section from a depth of 1000 m, step 20 cm, signals at gas frequencies were obtained from the following intervals, m: 1) 1155 (intensive signal) – 1305, 2) 1664 – 1760.

By scanning cross-section from a depth of 500 m, step 20 cm, responses at condensate frequencies were recorded from the intervals, m: 1) 577 – 640, 2) 714 – 730, 3) 806 – 865.

*Additional research.* At the field, responses were received from oil samples No. 89, 91, 92, used in the collection, as well as from the 1st and 2nd gas condensate samples (Fig. 1).

Signals from the following sedimentary rock samples were recorded from the surface; 1st group – 22, 23; 2nd group – 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35; 3rd group – 44, 45, 46; 4th group – 51, 52, 53, 54, 55; 5th group – 59, 60, 61, 66, 67; 6th group – 73, 74, 75.

Responses were also received from 7, 8 and 11 groups of igneous rocks.

Responses of oil were obtained from 26, 28 and 29 sample of sedimentary rocks, condensate – from 27, 30, 32 (intensive) and 33 sample, and gas – from 28, 31, 34 and 35 sample of sedimentary rocks.

Signals at amber frequencies were recorded from the 44 and 45 sample of sedimentary rocks.

Clarifying the values of signal recording intervals at oil frequencies by scanning cross-section with a step of 1 cm:

1211 – 1218 m: 1) 1212 – 1213 m; 2) 1216 – 1218 m;

1227 – 1241 m: 1) 1228 – 1229.5 m; 2) 1232 (intensive) – 1242 m;

1266 – 1273 m: 1) 1267 – 1273 m (intensive);

1954 – 1968 m: 1) 1954.5 – 1956 m; 2) 1962 – 1964 m; 3) 1966 – 1968 m;

1991 – 1997 m: 1) 1992 (intensive) – 1997 m;

2016 – 2021 m: 1) 2016.5 (intensive) – 2022 m.



**Fig. 7.** Photograph of the local area within the Akboshadir oil and gas condensate field.



**Fig. 8.** Photograph of the local area within the Surkhimskoye oil and gas condensate field.

On the surface of 2022 m, responses at the frequencies of oil, condensate and gas were not received from the lower part of cross-section, but from the upper part they were recorded!

Clarification of the response interval at gas frequencies by scanning with steps of 1 cm:

1155-1305 m: 1) 1156 (intensive) – (1162 – intensive) – 1167 m; 2) 1234 – 1238.5 m; 3) 1261 – (intensive) – 1278 – 1282 m; 4) 1302 – 1305 m;

1664-1740 m: 1) 1665 – 1668 m; 2) 1721 – 1725 m; 3) 1746 – 1750 m; 4) 1767 – 1771 m.

Clarification of the response interval at condensate frequencies by scanning with steps of 1 cm:

577-640 m: 1) 578 – 590 (intensive) – 593 m; 2) 611 – 617 m; 3) 634 – 641 m;

714-730 m: 1) 718 (intensive) – 730 m;

806-865 m: 1) 806.5 (very intensive) – 818 – 826 m; 2) 828 – 856 (very intensive) – 843 m; 3) 855-858 m; 4) 864-866 m.

**Surkhimskoye oil and gas condensate field.** During the experimental work, a small fragment of the photograph indicated in Fig. 8 by a rectangular outline was processed.

From the surface at the survey site, responses were recorded at the resonant frequencies of oil, condensate, gas, amber, oil shale, argillic breccia, gas hydrate rocks, gas hydrates, ice, coal, anthracite and “dead” water. Signals of 1–6 groups of sedimentary rocks and 11th (kimberlites) group of igneous rocks were recorded.

By recording responses at various depths, the upper edge of the kimberlites was determined in the depth range of 5–6 km, and the lower edge – in the depth range of 196–197 km (layer of the plastic state of matter).

By recording responses of HC at various depths, it was established that signals at HC frequencies are recorded in the depth range of 1 – 4 km.

By scanning cross-section from 1000 m, step 20 cm, responses at gas frequencies were recorded from the following intervals, m: 1) 1048 – 1172, from a depth of 1350 m – step 50 cm: 2) 1475 – 1512 m; 3) 1662 – 1930 m; 4) 2722 – 2764 m; 5) 3265 (intensive) – 3778 m (traced up to 4 km).

By scanning cross-section from a depth of 1000 m, step 50 cm, responses at oil frequencies were obtained from the following intervals, m: 1) 1100 – 1171 m; 2) 1669 – 1720 m; 3) 1819 – 1871 m; 4) 2109 (intensive) – 2500 (intensive) – 2818 m; 5) 3491-3540 m.

***Patinak oil and gas condensate field.*** From the surface, when processing a photograph of the field site (Fig. 9), responses of oil, condensate, gas, “dead” water and salt (intensive) were recorded.

Responses from the 1st – 2nd groups of sedimentary rocks were also recorded; no signals were received from igneous rocks.

By recording responses at various depths (2, 3, 5, 10, 50, 150, 250, 450, 480, 470 km), the root of the channel (volcano), filled with salt, was determined at a depth of 470 km!

By scanning cross-section from a depth of 2000 m, step 50 cm, the upper boundary of the salt was determined at a depth of 2327 m. By further scanning, step 5 m, responses from the salt were traced to a depth of 45 km (no further scanning was carried out).

At the surface of 2337 m from the lower part of cross-section, only responses of oil were recorded; no signals were received from condensate and gas. There were no oil signals from the upper part of cross-section on this surface.

Signals of oil, condensate and gas were also recorded at the surface of 57 km.

By scanning cross-section from a depth of 2337 m, a step of 10 cm, signals at the resonant frequencies of oil were recorded in the depth range of 2361-2514 m. With further scanning, a step of 50 cm, from a depth of 2580 m, responses from oil were recorded in another depth interval; step 10 cm: 3240 – 3295 (intensive) – 3446 m.



**Fig. 9.** A photograph of a local area within the Patinak oil and gas condensate field.



**Fig. 10.** Photograph of a local section within the Northern Kurgan oil and gas condensate field.

***Northern Kurgan oil and gas condensate field.*** During frequency-resonance processing of a photograph (Fig. 10) of a section of the field, responses of oil, condensate, gas, 7th group of sedimentary rocks (carbonates, limestones) and 1st group of igneous rocks (granites) were recorded from the surface.

By recording responses of granites at various depths and subsequent scanning of cross-section from a depth of 5 km, step 1 m, the upper edge of the granites was determined at a depth of 5460 m.

By recording responses of granites at various depths (50, 150, 250, 350, 450, 550, 750, 950, 990, 995, 996 km), the root of the granite channel (volcano) was determined at a depth of 996 km.

At the 5 km surface, responses of oil, condensate and gas were obtained only from the upper part of cross-section.

By scanning cross-section from the surface, step 50 cm, responses at gas frequencies were recorded from the following depth intervals; m: 1) 150 – 200 m, 2) 436 – 455 m, 3) 1300 – 1365 m, 4) 4081 – 4423 m, 5) 4538 – 4598 m, 6) 4727 – 4759 m.

By scanning cross-section from the surface, step 50 cm, responses at condensate frequencies were obtained from the following depth intervals, m: 1) 256 – 300 m, 2) 836 – 1130 m, 3) 1574 – 1672 m, 4) 2503 – 2834 m, 5) 3246 – 3560 m, 6) 4279 – 4377 m.

By scanning cross-section from the surface, step 50 cm, responses at oil frequencies were recorded from the following depth intervals; m: 1) 584 – 647 m, 2) 2168 – 2477 m, 3) 3406 – 3445 m, 4) 3657-4089 m, traced to a depth of 5000 m.

### **Processing satellite images of large blocks of Tajikistan in integrated mode**

Experimental work was also carried out on the Tajikistan territory in order to improve methodology for the integral assessment of the oil and gas potential of large blocks of the territory. During the experiments, frequency-resonance processing of satellite images of large blocks in five regions of Tajikistan was carried out. Satellite images of the blocks prepared for processing are shown in Fig. 11. Rectangular contours on the images indicate individual fragments, the processing of which with frequency-resonance methods using was carried out separately. Let us note that in the process of this work carrying out, a limited set of instrumental measurement procedures was performed, and the measurement process itself was carried out in an accelerated mode. The results of the experimental work are as follows.

**Satellite image of block No. 1 (Fig. 11A).** Eight fragments of the image of the block territory, indicated by rectangles, were processed.

*Fragment 1 (Fig. 11A, rectangle a).* During image processing, signals were recorded at the frequencies of hydrocarbons (oil, gas, condensate), dead water, 7th group of sedimentary rocks (limestones) and 1st (granites), 2nd, 4th, 7th (ultramafic), groups of igneous rocks.

*Fragment 2 (Fig. 11A, rectangle b).* When image processing, signals were recorded at frequencies of hydrocarbons (oil, gas, condensate), dead water, 7th group of sedimentary rocks (limestones) and 1st (granites), 2nd, 4th, 7th (ultramafic), 8th, 9th groups of igneous rocks.

*Fragment 3 (Fig. 11A, rectangle c).* Signals were recorded from the surface at frequencies of the 9th (marls) group of sedimentary rocks, as well as the 7th (ultramafic), 8th, 9th groups of igneous rocks.

*Fragment 4 (Fig. 11A, rectangle d).* Signals from the surface were recorded at frequencies of the 1st (granites), 2-5, 9-10, 14-15 groups of igneous rocks, as well as 1-6 groups of sedimentary rocks. The root of the volcano of sedimentary rocks is identified at a depth of 470 km. The responses at the resonant frequencies of hydrocarbons (oil, condensate, gas) were recorded from the surface.

*Fragment 5 (Fig. 11A, rectangle e).* Signals were recorded from the surface at frequencies of 1 (granites), 2-10, 11 (kimberlites), 15 groups of igneous rocks, as well as 1-6 groups of sedimentary rocks. The root of the volcano of sedimentary rocks is identified at a depth of 470 km. The responses at the resonant frequencies of hydrocarbons (oil, condensate, gas) were recorded from the surface.

*Fragment 6 (Fig. 11A, rectangle f).* Signals were recorded from the surface at the frequencies of oil, gas, condensate, dead water, 7th group of sedimentary rocks (limestones) and 1 (granites), 2, 4, 7 (ultramafic) groups of igneous rocks.

*Fragment 7 (Fig. 11A, rectangle g).* Signals from the surface were recorded at frequencies of 1 (granites), 2-10, 11 (kimberlites), 14, 15 groups of igneous rocks, as well as 1-6 groups of sedimentary rocks. The root of the volcano of sedimentary rocks is identified at a depth of 470 km. The responses at the resonant frequencies of hydrocarbons (oil, condensate, gas) were recorded from the surface.

*Fragment 8 (Fig. 11A, rectangle h).* During processing, responses were recorded at frequencies of the 10th (siliceous) group of sedimentary rocks and dead water. The root of the volcano of siliceous rocks is recorded at a depth of 470 km.

**Satellite image of block No. 2 (Fig. 11B).** The entire image was processed (Fig. 11B), as well as one fragment of the image of the block territory (rectangle a).

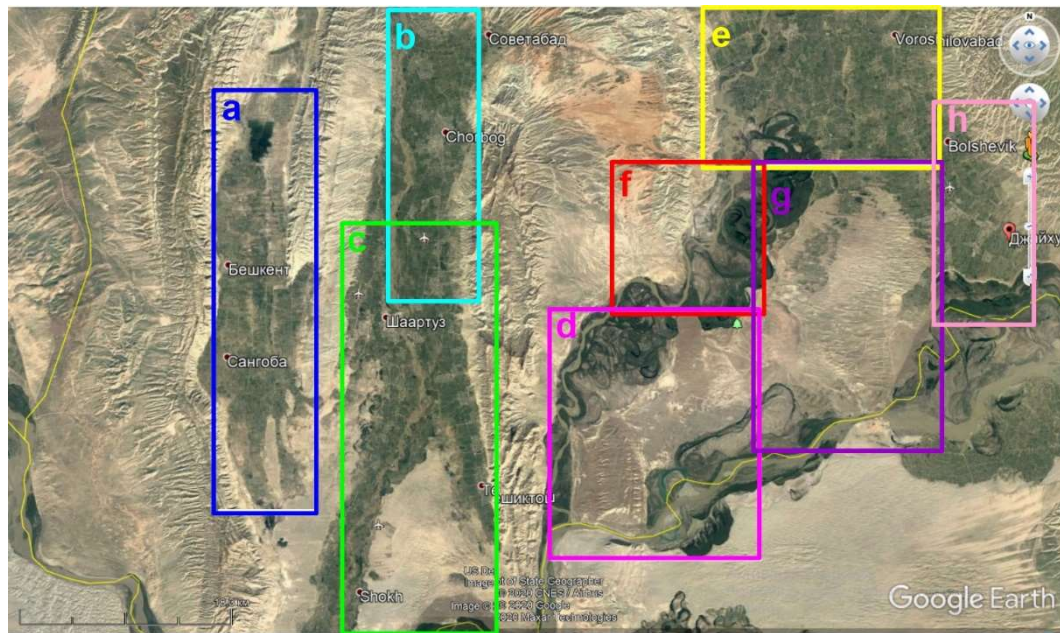
When processing two images, responses were recorded at frequencies of the 10th (siliceous) group of sedimentary rocks and dead water. The root of the volcano of siliceous rocks is recorded at a depth of 470 km.

**Satellite image of block No. 3 (Fig. 11C).** The entire image was processed (Fig. 11C) with fragments cut out in rectangles, as well as two fragments of the image of the block territory (rectangles a and b).

*Photo with cutouts of rectangles a and b (Fig. 11C).* From the surface the signals at frequencies of the 1st (granites), 2nd, 4th, 7th (ultramafic), 14th, 15th groups of igneous rocks were recorded.

*Fragment 1 (Fig. 11B, rectangle a).* During processing, signals were recorded at the frequencies of oil, condensate, dead water, as well as the 7th group of sedimentary rocks (limestones) (at 14 s of instrumental measurements) and 1st (granites), 2nd, 4th, 7th (ultramafic), 14th, 15th groups of igneous rocks.

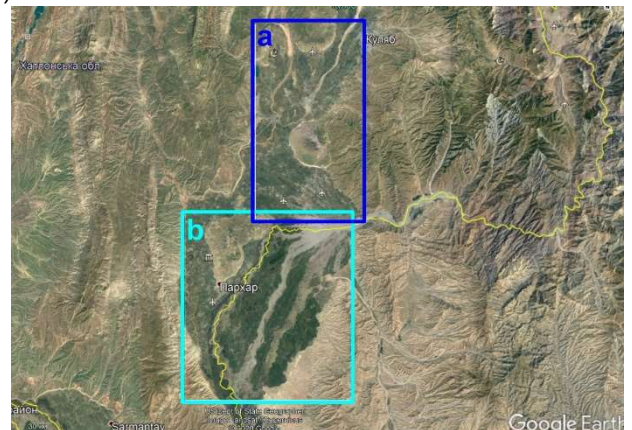
*Fragment 2 (Fig. 11B, rectangle b).* During processing, signals were recorded at the frequencies of oil (low intensity), condensate, gas, dead water, as well as the 7th group of sedimentary rocks (limestones) and the 14th, 15th groups of igneous rocks. The root of the volcano, filled with limestone, was identified at a depth of 470 km.



A)



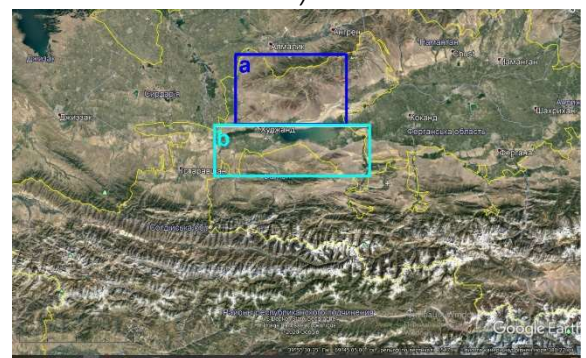
B)



C)



D)



E)

**Fig. 11.** Satellite images of reconnaissance survey within large areas in Tajikistan. Rectangular contours on the images indicate individual fragments of frequency-resonance processing in accelerated mode.

*Satellite image of block No. 3 (Fig. 11C).* The entire image was processed (Fig. 11C) with fragments cut out in rectangles, as well as two fragments of the image of the block territory (rectangles a and b).

*Photo with cutouts of rectangles a and b (Fig. 11C).* From the surface the signals at frequencies of the 1st (granites), 2nd, 4th, 7th (ultramafic), 14th, 15th groups of igneous rocks were recorded.

*Fragment 1 (Fig. 11B, rectangle a).* During processing, signals were recorded at the frequencies of oil, condensate, dead water, as well as the 7th group of sedimentary rocks (limestones) (at 14 s of instrumental measurements) and 1st (granites), 2nd, 4th, 7th (ultramafic), 14th, 15th groups of igneous rocks.

*Fragment 2 (Fig. 11B, rectangle b).* During processing, signals were recorded at the frequencies of oil (low intensity), condensate, gas, dead water, as well as the 7th group of sedimentary rocks (limestones) and the 14th, 15th groups of igneous rocks. The root of the volcano, filled with limestone, was identified at a depth of 470 km.

**Satellite image of block No. 4 (Fig. 11D).** Only a fragment of the image of the block territory was processed (rectangle a).

*Fragment 1 (Fig. 11D, rectangle a).* During processing, signals were recorded at the frequencies of oil (low intensity), condensate, gas, dead water, as well as the 7th group of sedimentary rocks (limestones) and 1st (granites), 2nd, 7th (ultramafic), 14-th, 15th group of igneous rocks. Signals from limestones were recorded up to 3 km, the 14th and 15th groups of igneous rocks - up to 17 km, granites - up to 23 km, ultramafic rocks - 196 km.

**Satellite image of block No. 5 (Fig. 11E).** Two fragments of the image of the block territory were processed (rectangles a and b).

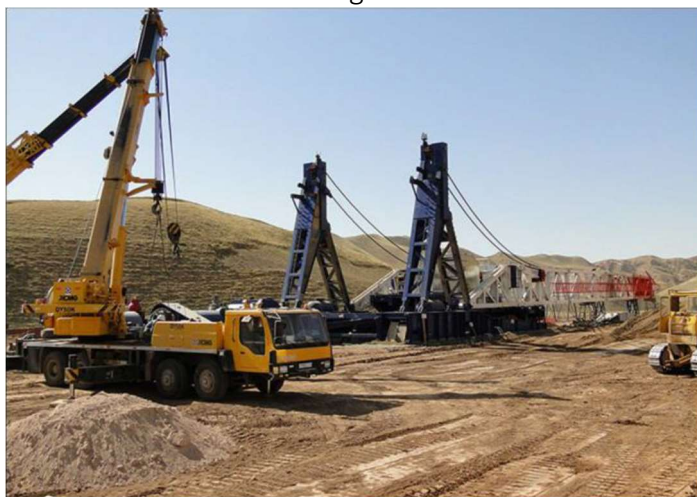
*Fragment 1 (Fig. 11E, rectangle a).* During processing, responses were recorded at frequencies of the 10th (siliceous) group of sedimentary rocks and dead water. The root of the volcano of siliceous rocks is recorded at a depth of 470 km.

*Fragment 2 (Fig. 11E, rectangle b).* Signals were recorded from the surface at frequencies of the 1st (granites), 2-5, 6th (basalts), 11th (kimberlites), 14, 15 groups of igneous rocks, as well as 1-6 groups of sedimentary rocks. The root of the volcano of sedimentary rocks is identified at a depth of 470 km. The responses at the resonant frequencies of hydrocarbons (oil, condensate, gas) were recorded from the surface.

Signals at frequencies of basalts were recorded up to 95 km, 14-15 groups of igneous rocks - up to 18, kimberlites - up to 200 km.

### Well drilling site in Tajikistan

Figure 12 shows a photograph of the installation for a well drilling in Tajikistan [18]. During frequency-resonance processing of this image, very weak signals from oil were obtained; no responses were recorded from condensate and gas.



**Fig. 12.** A photograph of an installation for well drilling at site in Tajikistan [18].

At the site, responses were recorded only from the 10th group of sedimentary (siliceous) rocks; there were no signals from igneous rocks. By recording responses at various depths (50, 150, 450, 550, 470 km), the root of the siliceous rock volcano was determined at a depth of 470 km.

Additionally, on the surface of 1.5 km from the upper part of cross-section, responses were received from 1-6 groups of sedimentary rocks, as well as from oil. Signals from other rocks and condensate, gas and amber were not received on this surface from the upper part of cross-section.

*Comments:* in volcanoes filled with sedimentary rocks of 10th group (siliceous rocks), signals at HC frequencies have never been recorded.

### **About efficiency of geological-geophysical exploration for oil and gas**

In many publications, including [12], it is noted that the efficiency of prospecting and exploration for oil and gas does not exceed 25–30%. It is also stated here that the main reasons for this situation are “the dogma of the organic genesis of hydrocarbons and the orientation of deep drilling towards positive structural traps of the sedimentary cover, the fund of which is currently close to exhaustion” [12]. At the end of this article, the authors also draw “attention to the need for a mass transition to “direct” prospecting, which is important in the conditions of low success in hydrocarbon exploration” [12].

The authors of the monograph [13] in the introduction write (state) that in «the South Caspian Basin, the largest Western multinational companies and their consortium for period from 1995 to 2008, having drilled 28 exploratory wells with depths up to 7301 m on 21 highly promising structures, previously surveyed by high-resolution 3D seismic, **did not discover a single commercially viable field, spending about \$1 billion on their search**» [13, p. 10]. We add to this fragment of the text that some results of direct-prospecting methods testing in the Caspian Sea, which testify in favor of the expediency of their use in the exploration process for oil and gas in combination with traditional geological and geophysical ones, are presented in published article [40]. The publications [28-29, 43, 48] present materials of examination of sites for exploratory wells drilling in offshore areas in various regions of the globe.

The document on the website [11] provides the following information: “In the most recently updated resource accounts, the NPD estimates that there is a lot of oil and gas left on the Norwegian shelf. As of now, about **1,250 exploration** wells have been drilled in the North Sea. Despite many discoveries, **more than half of the wells are dry**”.

The article [19, p. 37] provides the following information about the results of well drilling: “During the long period of study of deep horizons in the Shebelynka deposit, a significant amount of seismic research was conducted and **11 wells with a depth of 4491–6106 m were drilled from 1997 to 2002. No industrial inflows were received.** Industrial gas inflows from Upper Carboniferous deposits were obtained only from well No. 701 within 10 hours”.

The above considerations in [12, 13] do not raise any objections from the authors of this paper. Moreover, they can be confirmed by the results of a large-scale (long-term) approbation of mobile direct-prospecting methods in various regions of the globe on large exploration blocks, local areas and drilling sites of exploration wells.

**Comments and suggestions.** Obtained during the testing process in 2019-2023 of super-mobile direct-prospecting methods new data can be characterized in the form of the following comments and suggestions.

*New geological facts.* As a result of a large volume of instrumental measurements, numerous facts (evidence) were obtained in favor of:

a) a volcanic model of the formation of the external appearance (surface), as well as the structural elements of the Earth, planets and satellites of the solar system;

b) a volcanic model of the formation of ore and combustible minerals, as well as water (mineralized, mineral, living, dead) in volcanic complexes of a certain type;

c) abiogenic (deep) synthesis of oil, gas and condensate [34] in the process of hydrogen degassing of the Earth [14] within volcanic structures, filled with some types of sedimentary and igneous rocks.

*Reasons of low efficiency.* Based on the results of studies conducted using direct-prospecting methods, the low efficiency of exploration for oil and gas can be summarized as follows.

1. Conducted experimental studies in various regions of the globe on Earth established the presence of 10 types of volcanic complexes filled with 1) salt; sedimentary rocks 2) 1-6th, 3) 7th (limestones), 4) 8th (dolomites), 5) 9th (marls) and 6) 10th (siliceous) groups, as well as igneous rocks 7) 1st (granites), 8) 6th (gabbro and basalts), 9) 7th (ultramafic) and 10) 11th (kimberlites) groups.

2. Numerous experiments have shown that the conditions for the synthesis of oil, condensate and gas at the boundary (surface) of 57 km are created only in 5 types of the 10 volcanic complexes listed above: 1) salt, 2) 1-6th groups of sedimentary rocks, 3) limestone, 4) granite and 5) ultramafic rocks. It should be noted that the conditions for HC synthesis do not arise in all volcanoes of the 5 listed types.

3. In the contours of volcanic structures, in which conditions are created for the synthesis of hydrocarbons at the boundary of 57 km, detailed studies fix vertical channels for the migration of hydrocarbons, fluids and mineral matter into the upper horizons of the cross-section. In the process of vertical migration, hydrocarbons fill reservoirs and form (and replenish) oil and gas deposits.

4. In the process of volcanic activity, the 10 types of volcanic complexes, listed above, can create anticlinal structures, which are quite confidently mapped by seismic methods. However, anticlinal traps in volcanic complexes, where there are no conditions for hydrocarbon synthesis, cannot be filled with oil and gas. Hydrocarbons can get into such traps only from adjacent volcanic structures, in which conditions for the synthesis of hydrocarbons and their migration to the upper horizons of the cross-section exist (and if such volcanoes are located nearby).

5. The results of the reconnaissance survey of the locations of "dry" drilled wells showed that almost all of them are located in the contours of volcanic complexes, in which there are no conditions for hydrocarbon synthesis! The low efficiency of prospecting for oil and gas is reasonably justified by the results of instrumental measurements by direct-prospecting methods. Such results should be considered weighty arguments in favor of the expediency of using direct-prospecting methods and technologies to search for hydrocarbon deposits, as well as ore minerals and water.

An additional survey of sites of exploratory wells drilling using direct-prospecting methods will significantly increase the drilling success rate. To assess the objectivity and information content of additional processing, a well-studied interval in an already drilled well can also be processed in parallel.

It should also be noted that a detailed survey by direct-prospecting methods of the structure, on which drilling of an exploratory well is planned, will provide additional information to assess the prospects for detecting hydrocarbon accumulations in industrial (commercial) volumes within the structure being drilled.

A detailed examination of the structure can reveal and localize a vertical channel of hydrocarbon migration from the synthesis boundary to the upper horizons of the cross-section, if the structure is located in the contours of a volcanic complex in which there are conditions for hydrocarbon synthesis (in the central part of the volcano). Drilling wells in the vicinity of such channels can help increase fluid inflows from prospective horizons.

6. When using the developed direct-prospecting methods, the criteria for the prospects of hydrocarbons detecting within of exploration areas are following:

a) fixation from the surface of anomalous responses at the frequencies of oil, condensate and gas;

b) registration of signals from the surface at the frequencies of methane-oxidizing bacteria (bacteria whose populations are analyzed in the method of microbiological exploration for oil and gas of MicroPro GmbH company);

c) establishing the presence of a volcanic structure in the survey area, in which there are conditions for hydrocarbon synthesis at a depth of 57 km; additional fixation of responses from oil, condensate and gas at this depth;

d) determination by the cross-section scanning of intervals (depths and thicknesses) of responses at the frequencies of oil, condensate and gas;

e) the listed criteria's have fully demonstrated their effectiveness and information content in the process of direct-prospecting methods testing in the areas (sites) of exploratory wells drilling on land and shelf in various regions of the globe.

*Perspectives for efficiency improving.* Above, the emphasis is on increasing the success rate of drilling exploratory wells. And the large-scale use of super-mobile technology of frequency-resonance processing and decoding of satellite images and photographs provides an opportunity to significantly increase the efficiency of geological exploration for oil and gas in general – to reduce the time and financial resources spent on its implementation. In this regard, let us pay attention to the following points.

1. Processing of satellite images and photographs of blocks and areas of study is carried out promptly in a laboratory mode without organizing and conducting field geological and geophysical work. The amount of time it takes to do this is very small.

2. The technology of integrated assessment of the prospects of discovering oil and gas deposits within the big blocks and local areas of study allows obtaining additional information with minimal time to make a decision on the feasibility of detailed work carrying out within a specific area (site).

*Possible direction of direct-prospecting methods application.* Let us briefly characterize a possible scenario for the mobile direct-prospecting technology using.

1. In some regions, licensed blocks (areas) are put up for auction (bidding) for geological exploration and subsequent development of discovered oil and gas deposits. At the same time, a certain amount of geological and geophysical work can already be performed on these blocks and areas.

2. Potential Investor (Subsoil User, Company) intends to take part in the auctions for some license areas.

3. For a more informed decision on the blocks of interest to the Investor, he can be offered to quickly assess the prospects of hydrocarbon deposits discovering in the required blocks by processing satellite images of these blocks in the integral mode. Prior to such an assessment, the performance and information content of the technology can be demonstrated to the Investor at promising intervals of 1-2 drilled wells, known to him.

4. After promptly carried out frequency-resonance processing of satellite images of licensed blocks, the Investor receives additional (and fairly objective) information to make an informed decision on which blocks to participate in the auction (including the block of First Priority, i.e., participation in the auction until victorious end). Let's add to the above that the information content of the processing materials for the priority block can be additionally confirmed by the results of the integral processing of the satellite image of the block known to the Investor, where hydrocarbons are already being produced.

5. After the Investor makes a decision on the Priority block, even before the auction, the satellite image of this block can be processed in a detailed mode to assess the prospects of commercial (industrial) hydrocarbon deposits detecting within it. If such local areas are found, within the most optimal site, a detailed cross-section scanning can be carried out to select the location of the exploratory well, as well as to prepare design documentation for its drilling.

6. And as soon as the Investor wins the auction for the Priority block, he immediately, without carrying out additional geophysical work within it, initiates actions to prepare for drilling and implements the drilling project itself. We also note that in case of loss at the auction, the Investor can sell the results of using direct-prospecting methods on the Primary block to the winning Competitor.

7. If the commercial volumes of oil or gas in the Priority block are confirmed by drilling, detailed studies can be carried out within it using direct-prospecting methods to assess the prospects of detecting hydrocarbon deposits in the deep horizons of the cross-section, detecting and localizing vertical channels of deep (abiogenic) hydrocarbons migration, as well as in local (promising) areas in other parts of the block. If a decision is made on the expediency of selling a block (or part of its cost) to another Investor (Company), 3D seismic surveys can be carried out on the area, where the block is located.

Note also that currently seismic surveys (in 3D modification in particular) are the main method of oil and gas prospecting. In this regard, when assets are sold, the availability of seismic data increases their value.

On the other hand, experts also note that even with a significant increase in the detail of 3D seismic methods, the drilling success rate does not increase significantly. And it is quite clear why – only the accuracy of mapping structures increases. But the seismic method is not direct-prospecting, and what the structure is filled with from seismic data is not determined with the required reliability.

Of course, the best option in this situation is the combination of seismic and direct-prospecting methods. But seismic specialists will not agree to this – they will not advertise super-mobile direct-prospecting technologies, their potential competitor.

*Direct-prospecting technologies and management.* The proposed strategy can work only if a management structure (body), interested in accelerating (increasing efficiency) the search and exploration process and increasing oil and gas production, takes up its implementation.

Hydrocarbons deposits, discovered during the implementation of such a strategy, can be transferred (sold) in the future to mining companies or private investors. And the management structure itself can be engaged in the implementation of projects of a similar nature in other promising areas and sites.

*Theories of oil and gas genesis.* It has already been noted above that the biogenic theory of oil and gas formation does not contribute to the increase of the efficiency of geological exploration for hydrocarbons – most oil and gas geologists are not supporters of abiogenic (deep) hydrocarbon synthesis.

The influence of the biogenic concept is most clearly manifested in the oil and gas shale basins of the world. In these basins, the development of deposits takes place mainly in shale plays, in the upper part of the cross-section.

A survey by direct-prospecting methods of some areas (sites), located within the shale basins, showed that most of them are located in the contours of volcanic structures, in which, at a depth of 57 km, there are conditions for the synthesis of oil, condensate and gas. When scanning the cross-section in these areas, the intervals of responses at the frequencies of oil and gas in the deep horizons of the cross-section are fixed. A detailed survey of sites in shale plays in horizons, promising for the hydrocarbon's detection, can determine the types of reservoir rocks and seals.

In general, the results of a direct reconnaissance survey of a number of areas in shale basins allow us to reasonably assert that in these basins the volumes of oil and gas in the deep horizons of the cross-section significantly exceed the volumes of hydrocarbons in shale reservoirs directly.

Purposeful application of direct-prospecting methods and technologies in shale basins will speed up the study and assessment of the oil and gas potential of the deep horizons of the cross-section and significantly increase the volume of oil and gas production.

*Natural hydrogen searching.* At present, the processes of transition to hydrogen energy are taking place on a large scale in the world. Unfortunately, in this direction, the emphasis is on the production of hydrogen, and not on the search for and extraction of natural hydrogen. One of the reasons for this state of affairs is the lack of proven methods for natural hydrogen accumulations searching.

In this regard, we note once again that direct-prospecting methods of satellite images and photographs frequency-resonance processing can move the problem of searching for and extracting natural hydrogen accumulations from a dead center. The reconnaissance survey of numerous zones of visible hydrogen degassing, as well as basalt volcanic structures in various regions of the world, testify to the huge volumes of natural hydrogen in the bowels of the Earth.

Financial costs for the natural hydrogen searching using direct-prospecting methods and its subsequent extraction will be significantly less than for its production.

### **Discussion of results and main conclusions**

The article presents the materials (results of instrumental measurements), obtained during experimental studies for purpose of additional testing, as well as improving the methodological technique of mobile direct-prospecting methods using during hydrocarbons deposits searching.

A fundamentally important results of the direct-prospecting methods testing in different regions of the world (in Tajikistan including) are additional facts (evidence), obtained during the satellite images and photo image processing, in favor of the deep (abiogenic) genesis of oil, condensate and gas in the process of hydrogen degassing of the Earth [14]. At the moment, most specialists are guided in their practice by the principles and provisions of the biogenic theory of the hydrocarbon's genesis. From this point of view, the estimates of the volumes of methane and other gases, that migrate into the planet's atmosphere, can be significantly underestimated. Numerous facts of fixing signals (responses) from oil, condensate and gas at the boundary of their synthesis 57 km in various regions of the world (including within the surveyed areas) allow us to make an assumption about the migration of abiogenic methane into the Earth's atmosphere in colossal volumes!

The processes of hydrocarbon abiogenic synthesis continue to this day. Hydrocarbons synthesized at the 57 km synthesis boundary migrate to the upper horizons of cross-section, where they form deposits and replenish existing (known) ones. In areas where many known fields are located, as well as in promising for hydrocarbon blocks, the facts of gas (methane) and carbon dioxide migration into the atmosphere were recorded by instrumental measurements! In areas of basalt volcanic complex's location, facts of hydrogen migration into the atmosphere are recorded also. Therefore, stopping the oil and gas use will not stop the migration into the atmosphere of methane and carbon dioxide pollutants!

We also focus attention on the fact that results of experimental investigation, presented in this paper, as well as in other publications of the authors, performed with the developed measuring equipment using, are weighty arguments in favor of the "volcanic" model of the formation of various structural elements and the external appearance of Earth, planets and satellites of the solar system, as well as deposits of combustible and ore minerals (hydrogen and water including).

In general, the results of experimental studies at some blocks and sites in the Tajikistan, replenish the existing database of the examined structures and mineral deposits in various regions of the world. The research materials accumulated in this database will allow us to formulate statistically substantiated recommendations of a methodological nature for the combustible and ore minerals searching.

The conducted studies show also that the super-mobile technology used makes it possible to significantly speed up and optimize (cheapen) the exploration process for combustible and ore minerals, as well as water.

We also note that many researchers focus on the expediency of accelerating the exploration process for various types of minerals. In particular, the article [2] discusses and analyzes the paradigms of prospecting studies for oil and gas, and proposes a new model of prospecting works: "Faced with a challenging economic scenario and the need to prospect immense frontier areas that could provide new and rewarding exploratory opportunities, the oil and gas industry needs to adopt a new exploration model, focused on a faster, less expensive and more direct way of identifying and assessing prospective leads. New and emerging technologies are the key to achieving this change. Fortunately, several of these technologies are now available, and they have proven to be effective and compatible with the new exploration model proposed" [2, P. 140].

In the article [6] the breakthrough technologies for minerals prospecting are discussing. The author of this article [6] also notes the importance of using Earth remote sensing (ERS) data in the exploration process. We add to the above that modern technologies of remote sensing data processing and interpreting have made it possible to detect tens of thousands of volcanic structures of various types on Earth [5], Mars [9] and Venus [20], which significantly strengthens the position of the volcanic model of the formation of structural complexes of the Earth and planets and satellites of the Solar System.

It is necessary add to the above that NASA has developed the EMIT (Earth Surface Mineral Dust Source Investigation) technology, which is used to detect methane plumes on the surface [8, 10]. Using its satellite capability, NASA says it has located at least 50 so-called "methane super-emitters" worldwide. Direct-prospecting technology can be used to study the deep structure in the areas of the methane plume's location.

The results of a reconnaissance survey of a local area within the large Shenfu coalbed methane deposit [50] once again confirm the conclusions drawn from previously conducted studies about the possibility of oil, condensate and gas deposits detecting in the deep and ultra-deep horizons of coal basins. It is advisable to carry out detailed geological exploration work in order to search for hydrocarbon deposits in areas of coal deposit's location in various regions of the world!

Materials of experimental studies at the Fuman oil field site and the Luntan-1 deep well drilling site [50] indicate the potential possibility and feasibility of direct-prospecting methods using during the most optimal locations selecting for drilling deep exploratory wells for oil and gas.

The results of the approbation of direct-prospecting methods of frequency-resonance processing of satellite and photo images within areas of coal deposit's location in various regions of the globe [44] indicate that accumulations of hydrocarbons can be detected in the lower horizons of coal basins within the deep channels of fluid and mineral substance migration. In areas with lignite deposits, in the accelerated mode of conducting instrumental measurements, responses at oil frequencies are not recorded.

A certain number of detailed experiments were carried out at three oil and gas fields in Tajikistan, as well as at the sites with productive wells in other regions. The results obtained allow us to state the following.

1. Experimental measurements have shown that cross-section scanning with a relatively large step of 1 m allow to determine depth intervals within which it is advisable to search for individual productive layers. Individual layers (solid) can be identified in a cross-section when scanning with step of 1 cm or finer. The procedure of a cross-section scanning with a step of 1 cm can be used to detect low-thickness productive formations missed during drilling. In addition, according to the results of instrumental measurements, when scanning with a relatively large step of 1 m, thin layers may not be recorded (missed).

2. Experiments with various rock samples from the used collection (Fig. 3) indicate the possibility of frequency-resonance methods using to determine the type of reservoir rocks in productive intervals of cross-section and individual layers. The types of rocks in the seals above the reservoirs can also be determined in a similar way. The frequency-resonance method of photographs processing can also be used to quickly determine the presence (absence) of oil, condensate and gas in the core extracted from wells.

3. Experimental measurements using individual samples of oil and condensate from the collection used (Fig. 1) indicate the feasibility of using samples of oil, condensate, gas, as well as the rocks of reservoirs and seals from drilled wells in the research area when performing detailed work. Additional use of samples from the work area will help increase the information content and reliability of the results of using direct-prospecting frequency-resonance methods of satellite images and photographs processing and decoding.

Within the areas and blocks that are promising for the hydrocarbon's deposits discovery, identified at the stage of the integral assessment of their oil and gas potential, detailed studies can be carried out using frequency resonance methods for satellite images processing. Detailed studies allow:

- a) detect and localize within blocks and areas local anomalous zones of recording responses (signals) at the resonant frequencies of oil, condensate, gas;
- b) within the mapped anomalous zones, using the vertical cross-section scanning technique, determine (and clarify using a smaller scanning step) the depths intervals of response at the resonant frequencies of oil, gas and condensate;
- c) within intervals of response at HC frequencies, determine the types of reservoir rocks;
- d) establish what types of rocks are seals for the detected intervals of responses at the resonant frequencies of oil, condensate and gas;
- e) determine the types of oil and condensate from which signals (responses) are recorded in the cross-section intervals (in the frequency-resonance methods traditionally 117 oil samples and 15 gas condensate samples are used (Fig. 1)).

The problem of natural hydrogen searching for and producing is currently quite relevant for the energy sector of the world economy. Mobile technology of the satellite images and photographs frequency resonance processing has been used repeatedly for reconnaissance surveys of zones of visible hydrogen degassing. Features and the results of hydrogen deposits searching by direct-prospecting methods in different regions of the globe may be commented as following.

1. When testing direct-prospecting methods with numerous instrumental measurements in the contours of volcanic structures of a certain type at a depth of 57 km, a boundary was established at which conditions were created for the synthesis of oil, condensate and gas from hydrogen and carbon migrating from below. Signals (responses) at the frequencies of oil, condensate and gas are recorded at this boundary and above, and deeper – only of hydrogen and carbon.

2. Such results of instrumental measurements suggest that if not all hydrogen at this boundary is used for the synthesis of hydrocarbons (due to a lack of carbon, among other things), then it, together with hydrocarbons, can migrate to the upper horizons of cross-section and fill

together with them the oil and gas reservoirs of cross-section. Hydrogen was discovered in wells that were drilled for oil and gas.

3. When conducting experimental studies at survey sites and areas in various regions in reconnaissance (accelerated) mode, with virtually no delays, intense responses were often recorded at the resonant frequencies of hydrogen and the 6th group of igneous rocks (basalts). Moreover, if the procedure for recording signals at basalt frequencies was carried out first, then responses at hydrogen frequencies were recorded almost always at the stage of performing the procedure for recording signals from hydrogen, and vice versa.

4. In this regard, in the future, when carrying out experimental work in order to detect and localize areas, promising for detailed geological exploration of natural hydrogen, procedures for measuring responses (signals) at the frequencies of basalts, hydrogen, hydrogen bacteria and red phosphorus were carried out. Additionally, instrumental measurements were also carried out in order to establish the presence (absence) of migration of hydrogen and red phosphorus into the atmosphere. Let us also note that hydrogen bacteria create their colonies in the near-surface parts of cross-section in areas of hydrogen migration into the atmosphere, and signals at red phosphorus frequencies are almost always recorded in the contours of basaltic volcanic complexes.

5. To the above, it is advisable to add a fragment of text from the article [1]: "Some scientists hold a different opinion regarding the coexistence of hydrogen and methane. In particular, in the work [15], it is noted that hydrogen deposits can be formed outside of hydrocarbon deposits, since hydrogen is spent on the formation of methane and its homologues. Although it is emphasized that the detection of hydrocarbon and hydrogen deposits should be solved as a single complex task, according to the principle: where there are hydrocarbons, there is no hydrogen. According to [15], this estimated hydrogen is already largely spent on the formation, maintenance and possible modern increase of hydrocarbon reserves in the basin. Only those parts of it that, due to the lack of active carbon and other reasons, remained not involved in the formation of hydrocarbons can be promising. Probably, both points of view regarding the coexistence of methane and hydrogen are appropriate, which is caused by various processes of their natural genesis. If the source of origin is common, for example, biogenic, then both methane and hydrogen can be present in the gas composition of rock massifs. In those cases where hydrogen, together with carbon, is the building material for the formation of methane, the amount of hydrogen will be limited or it will be completely absent."

6. The work carried out by the HyTerra Company [4] at the Hoarty NE3 well in Geneva (Nebraska, USA) to test promising intervals for hydrogen has not yet been completed with the publication of information about the discovery of hydrogen accumulations in commercial volumes. Most likely, HyTerra will not continue further work on the well. To this we add that in 2019, frequency resonance processing of a photograph from the well drilling site was carried out. Based on the results of the frequency resonance processing of a fragment of the photograph, it was concluded that hydrogen accumulations in the drilled well in commercial quantities will not be detected. The drilling area is promising for hydrocarbon exploration. The results of the processing were published in 2019 [25]. Now we can state that these results have been confirmed by drilling. It is also advisable to pay attention to the time interval: 2019 – 2023!

7. The results of a reconnaissance survey of areas for searching and drilling wells for natural hydrogen allow us to conclude that the focus of Investors and Companies on conducting prospecting work and drilling in the areas, where drilled wells are located in which hydrogen is discovered, will not lead to the discovery of its accumulations in industrial (commercial) volumes in the near future! In this situation, the geological, geophysical and mining industries of the world economy are losing the race for financing large-scale projects to convert the economies of the world to the use of environmentally friendly fuel of the future – hydrogen!

8. Large-scale testing of super-mobile direct-prospecting methods for frequency-resonance processing of satellite images and photographs [23-26, 28, 33, 35-39, 42, 45-46] in local areas and large blocks in various regions of the globe has shown that intensive signals at the frequencies of natural hydrogen are almost always recorded within volcanic complexes, filled with basalts. In many cases, responses of hydrogen are also recorded at shallow depths in rock complexes overlying basalts. Such results allow us to conclude that the areas and blocks with basalt complexes are the primary targets for detailed prospecting work and drilling wells for natural hydrogen conducting.

In general, the results of the experimental reconnaissance studies, presented above, once again clearly demonstrate the operability, information content and efficiency of direct-prospecting methods for frequency-resonance processing of satellite images and photographs during the integral assessment of the prospects of detecting accumulations of oil, gas and natural hydrogen within survey areas, as well as when determining the depths of occurrence and thicknesses of predicted deposits in the cross-section. The materials of the article testify to the expediency of using the mobile technology of frequency-resonance processing and decoding of satellite images and photographs for the detection and localization of oil and gas accumulation zones within large blocks and local areas. The use of this technology can bring a significant effect in the search for industrial accumulations of hydrocarbons in unconventional reservoirs (including areas of shale, coal-bearing formations, and crystalline rocks distribution). Additional surveys promptly carried out using direct-prospecting methods in local drilling areas of prospecting and exploratory wells will contribute to an increase in the drilling success rate (an increase in the number of wells with commercial hydrocarbon inflows). The laying of wells in the areas, where vertical fluid migration channels are located, can lead to an increase in hydrocarbon inflows. Mobile technology can also be successfully used during the exploration of poorly explored areas and blocks within known oil and gas fields. The application of super-efficient and low-cost direct-prospecting technology will significantly speed up the exploration process for oil, gas, natural hydrogen and ore minerals, as well as reduce financial costs for its implementation.

### References

1. Bezruchko K.A. Natural sources and conditions of geological hydrogen generation (in the context of hydrogen deposits searches). *Geophysical Journal*, 2022. 44(2), 93–124. DOI: <https://doi.org/10.24028/gj.v44i2.256267>
2. Cleveland M. Jones. The oil and gas industry must break the paradigm of the current exploration model. *J Petrol Explor Prod Technol* (2018) 8:131–142. <https://doi.org/10.1007/s13202-017-0395-2>
3. “Electronic petrographic reference book-identifier of magmatic, metamorphic and sedimentary rocks”. <http://rockref.vsegei.ru/petro/> (in russian).
4. HyTerra (ASX:HYT) <https://hyterra.com/>
5. “It’s just mind boggling.” More than 19,000 undersea volcanoes discovered. <https://www.science.org/content/article/it-s-just-mind-boggling-more-19-000-undersea-volcanoes-discovered>
6. Kazuya Okada. Breakthrough technologies for mineral exploration. *Mineral Economics* (2022) 35:429–454. <https://doi.org/10.1007/s13563-022-00317-3>
7. Levashov S.P., Yakymchuk N.A., Korchagin I.N. Frequency-resonance principle, mobile geoelectric technology: new paradigm of geophysical investigations. *Geofizicheskiy zhurnal*, 2012, vol. 34, no. 4, pp. 166-176 (in Russian).
8. Methane ‘Super-Emitters’ Mapped by NASA’s New Earth Space Mission. [https://www.jpl.nasa.gov/news/methane-super-emitters-mapped-by-nasas-new-earth-space-mission?utm\\_medium=email](https://www.jpl.nasa.gov/news/methane-super-emitters-mapped-by-nasas-new-earth-space-mission?utm_medium=email)

9. NASA Confirms Thousands of Massive, Ancient Volcanic Eruptions on Mars. <https://www.nasa.gov/feature/goddard/2021/nasa-confirms-thousands-of-massive-ancient-volcanic-eruptions-on-mars>

10. NASA discovers massive methane plume over Permian Basin. <https://energymarketingpro.org/energy-news/nasa-discovers-massive-methane-plume-over-permian-basin/>

11. New Technology Unlocks New Insight from Old Wells. <https://www.oceannews.com/news/energy/new-technology-unlocks-new-insight-from-old-wells>

12. Rachinsky M.Z., Karpov V.A. On the issue of increasing the efficiency of exploration work. // *Geology and subsoil use*. 2022. No. 1. P. 158-161 (in Russian).

13. Rachinsky M.Z., Kerimov V.I. Geofluid dynamics of oil and gas potential of mobile belts. Scientific editor: M.V. Gorfunkel. John Wiley & Sons, Inc., Hoboken, New Jersey, and Scrivener Publishing LLC, Salem, Massachusetts. 2015. 494 p. (in Russian).

14. Shestopalov V.M., Lukin A.E., Zgonik V.A., Makarenko A.N., Larin N.V., Boguslavsky A.S. Essays on Earth's degassing. Kiev, BADATA-Intek Service. 2018. 632 p. (in Russian).

15. Shestopalov, V.M. On geological hydrogen. *Geophysical Journal*, 2020. 42(6), 3-35. <https://doi.org/10.24028/gzh.0203-3100.v42i6.2020> (in Russian).

16. Tesla N. Patents. - Samara: Publishing House "Agni", 2009. - 496 p. (in Russian).

17. Tesla N. Articles. - Samara: Publishing House "Agni", Moscow: Publishing House "Russian Panorama", 2010. - 584 p. (in Russian).

18. The volumes of drilling upset Tajikistan. <https://www.fergananews.com/news.php?id=31347>. (in Russian)

19. Z. M. Tovstuk, S. M. Yesypovych, O. V. Titarenko, S. G. Semenova, T. A. Yefimenko, M. O. Svideniuk, O. A. Rybak, A. D. Bondarenko, O. P. Golovashchuk, I. V. Lazarenko. Detailed investigation algorithm for hydrocarbons deposits exploration in terms of the Shebelynske gas-condensate field. *Ukrainian Journal of Earth Remote Sensing*, 2021, 8 (3), 37–43. (in Ukrainian)

20. Venus has thousands more volcanoes than we thought, and they might be active (85,000). [https://www.livescience.com/venus-volcano-map?utm\\_term=44ECB896-8E87-4E40-BB4B-378A1DAC13A3&utm\\_campaign=C8BE61D2-E32A-4D67-9F95-2269F88D92E6&utm\\_medium=email&utm\\_content=3B3942FA-8062-4397-8D72-42A55926B151&utm\\_source=SmartBrief](https://www.livescience.com/venus-volcano-map?utm_term=44ECB896-8E87-4E40-BB4B-378A1DAC13A3&utm_campaign=C8BE61D2-E32A-4D67-9F95-2269F88D92E6&utm_medium=email&utm_content=3B3942FA-8062-4397-8D72-42A55926B151&utm_source=SmartBrief)

21. Yakymchuk N.A., Korchagin I.N., Bakhmutov V.G., Solovjev V.D. Geophysical investigation in the Ukrainian marine Antarctic expedition of 2018: mobile measuring equipment, innovative direct-prospecting methods, new results. *Geoinformatika*, 2019, no. 1, pp. 5-27. (in Russian).

22. Yakymchuk N.A., Korchagin I.N. Integral estimation of the deep structure of some volcanoes and kimberlite pipes of the Earth. *Geoinformatika*, 2019, no. 1, pp. 28-38 (in Russian).

23. Yakymchuk, N. A., Korchagin, I. N. Ukrainian Shield: new data on depth structure and prospects of oil, gas condensate, gas and hydrogen accumulations detection. *Geoinformatika*, 2019, no. 2, pp. 5-18 (in Russian).

24. Yakymchuk, N. A., Korchagin, I. N., Levashov, S. P. Direct-prospecting mobile technology: the results of approbation during searching for hydrogen and the channels of migration of deep fluids, mineral substances and chemical elements. *Geoinformatika*, 2019, no. 2, pp. 19-42 (in Russian).

25. Yakymchuk N.A., Levashov S.P., Korchagin I.N. Application of technology of frequency-resonant processing of satellite images and photographs on area of hydrogen production and hydrogen degassing of the Earth. Conference Proceedings, 18th International Conference on Geoinformatics - Theoretical and Applied Aspects, May 2019, Volume 2019, p.1 -5 DOI:

<https://doi.org/10.3997/2214-4609.201902022>

<https://www.earthdoc.org/content/papers/10.3997/2214-4609.201902022>

26. Yakymchuk, N. A., Korchagin, I. N. Application of mobile frequency-resonance methods of satellite images and photo images processing for hydrogen accumulations searching. *Geoinformatika*, 2019, no. 3, pp. 19-28 (in Russian).

27. Yakymchuk, N. A., Korchagin, I. N. Studying the internal structure of volcanic complexes of different type by results of frequency-resonance processing of satellite and photo images. *Geoinformatika*, 2019, no. 4, pp. 5-18 (in Russian).

28. Yakymchuk, N. A., Korchagin, I. N. Technology of frequency-resonance processing of remote sensing data: results of practical approbation during mineral searching in various regions of the globe. Part I. *Geoinformatika*, 2019, no. 3, pp. 29-51; Part II. *Geoinformatika*. 2019. no. 4, pp. 30-58; Part III. *Geoinformatika*. 2020. no. 1, pp. 19-41; Part IV. *Geoinformatika*. 2020. no. 3, pp. 29-62; Part V. *Geoinformatika*. 2021. no. 3-4, pp. 51-88. (in Russian).

29. Yakymchuk, N. A., Korchagin, I. N. Approbation of direct-prospecting technology of frequency-resonance processing of satellite images and photo images at known hydrocarbon deposits in different regions. *Geoinformatika*, 2020, no. 2, pp. 3-38 (in Russian).

30. Yakymchuk, N. A., Korchagin, I. N., Yanushkevich K.P. Approbation of frequency-resonance methods of satellite and photo images processing on the geological structure "Chicxulub Crater". *Geoinformatika*, 2020, no. 2, pp. 39-49 (in Russian).

31. Yakymchuk, N. A., Korchagin, I. N. On the possibility of application the frequency-resonance technology of satellite images and photos images processing for studying objects of the solar system and far space *Geoinformatika*, 2020, no. 2, pp. 98-108 (in Russian).

32. Yakymchuk, N. A., Korchagin, I. N., Yanushkevich K.P. Features of the depth structure and prospects of oil and gas potential of the Carpathian region by results of cross-section frequency resonance sounding. *Geoinformatika*, 2020, no. 2, pp. 50-68 (in Russian).

33. Yakymchuk, N. A., Korchagin, I. N. Direct-prospecting technology of frequency-resonant processing of satellite images and photos images: results of use for determining areas of gas and hydrogen migration to the surface and in the atmosphere. *Geoinformatika*, 2020, no. 3, pp. 3-28 (in Russian).

34. Yakymchuk, N. A., Korchagin, I. N. New evidence in favor of the abiogenic genesis of hydrocarbons from the results of the testing of direct-prospecting methods in various regions of the world. *Reports of the National Academy of Sciences of Ukraine*. 2020. № 9. P. 55-62. <https://doi.org/10.15407/dopovidi2020.09.055> (in Ukrainian)

35. Yakymchuk, N. A., Korchagin, I. N. Direct-prospecting technology of frequency-resonance processing of satellite images and photo images: potential opportunities and prospects of application for natural hydrogen accumulations searching. *Geoinformatika*, 2020, no. 4, pp. 3-41 (in Russian)

36. Yakymchuk, N. A., Korchagin, I. N. Depth structure features of large zones of hydrogen degassing in various regions of the earth by results of frequency-resonance processing of satellite and photos images. *Geoinformatika*, 2021, no. 1-2, pp. 3-42 (in Russian).

37. Yakymchuk, N. A., Korchagin, I. N. On the prospects of the technology of remote sensing data frequency-resonance processing using when conducting profiles geoelectric and seismic studies. *Geoinformatika*. 2021. no. 3-4, pp. 18-50. (in Russian).

38. Yakymchuk M., Korchagin I. [2022] Direct-prospecting technology of satellite images and photos images frequency-resonance processing: results of large blocks and hydrogen degassing areas surveying in Greece and Italy. *Annali d'Italia*. №32/2022. Pp. 61-77. ISSN 3572-2436 DOI: 10.5281/zenodo.6684155 <https://www.anditalia.com/>

39. Yakymchuk, N. A., Korchagin, I. N. Results of a reconnaissance survey of large zones of hydrogen degassing in various regions of the world. Reports of the National Academy of Sciences of Ukraine. 2022. № 1. P. 79-91. <https://doi.org/10.15407/dopovidi2022.01.079> (in Ukrainian)

40. Yakymchuk N.A., Korchagin I.N., Javadova A. Results of a survey by mobile direct-prospecting methods in the location of the active Dashly volcanic complex in the Caspian Sea. Azerbaijan Geologist. # 25, 2022. P. 42-53. <https://www.azgeologist.com/geolog/>

41. Yakymchuk Mykola, Korchagin Ignat, Levashov Sergiy, Solovyov Valery. Volcanism and degassing processes in the structures of the Earth's polar regions (review based on the results of frequency-resonance studies). Dodo Books Indian Ocean Ltd. And OmniScriptum S.R.L Publishing group. 2022. 276 p. (in Ukrainian). ISBN: 978-620-0-63606-5 <https://morebooks.de/shop-ui/shop/search?q=978-620-0-63606-5&page=1>

42. Yakymchuk Mykola, Korchagin Ignat. Direct-prospecting technology of satellite images and photos images frequency-resonance processing: results of large blocks and hydrogen degassing areas surveying in Great Britain. New Concepts in Global Tectonics Journal. Volume 10, No 2, June 2022. P. 120-155. ISSN 2202-0039. <http://www.ncgtjournal.com/journals.html>

43. Yakymchuk Mykola, Korchagin Ignat. Direct-prospecting methods of satellite and photos images frequency-resonance processing: results of approbation on Australia and New Zealand territories. New Concepts In Global Tectonics Journal. Vol. 11, N 3, September 2023. P. 179-213. [www.ncgtjournal.com](http://www.ncgtjournal.com)

[http://users.neo.registeredsite.com/6/9/1/18560196/assets/NCGTJV11N3\\_pub.pdf](http://users.neo.registeredsite.com/6/9/1/18560196/assets/NCGTJV11N3_pub.pdf)

44. Yakymchuk Mykola, Korchagin Ignat, Soloviev Valery. About prospects of oil and gas deposits detecting in deep horizons of coal basins by direct-prospecting methods of satellite and photos images frequency-resonance processing. Publisher.agency: Proceedings of the 5th International Scientific Conference «Modern scientific technology» (December 21-22, 2023). Stockholm, Sweden, 2023. P. 170-191. ISBN 978-4-9640-8601-0 DOI 10.5281/zenodo.10429724 <https://ojs.publisher.agency/index.php/MS/issue/view/62>

45. Yakymchuk Mykola, Korchagin Ignat. Direct-prospecting technology of satellite images and photographs frequency-resonance processing: about expediency of its practical application for hydrocarbons and hydrogen searching and deep structure of earth studying. Publisher.agency: Proceedings of the 2nd International Scientific Conference «Foundations and Trends in Modern Learning» (April 27-28, 2023). Berlin, Germany, 2023. P. 342-362. ISBN 978-2-9003-7194-7 DOI 10.5281/zenodo.7882250

<https://ojs.publisher.agency/index.php/FTML/issue/view/28>

46. Yakymchuk Mykola, Korchagin Ignat, Solovyov Valery. Technology of satellite images and photographs frequency-resonance processing: results of application for studying the territory of "Taoudenni 002" meteorite founding in Mali. Publisher.agency: Proceedings of the 3rd International Scientific Conference «World Scientific Reports» (June 29-30, 2023). Paris, France, 2023. P. 161-173. ISBN 978-6-3690-8142-3. DOI 10.5281/zenodo.8106753. <https://ojs.publisher.agency/index.php/WSR/issue/view/37>

47. Yakymchuk, M., Korchagin, I., Soloviev, V., 2023. Some Results of Direct FR Technology Applied to Study Methane Seepage Areas in the Arctic Region. Advances in Geological and Geotechnical Engineering Research. 5(3): 25-38. DOI: <https://doi.org/10.30564/agger.v5i>

48. Yakymchuk Mykola, Korchagin Ignat. Technology of satellite and photo images frequency-resonance processing: results of testing at three large exploration blocks and well drilling sites on the Lebanon and Israel offshore. Publisher.agency: Proceedings of the 5th International Scientific Conference «Foundations and Trends in Research» (February 15-16, 2024). Amsterdam, Netherlands, 2024. P. 136-160. ISBN 978-3-4547-7498-7 DOI 10.5281/zenodo.10676608 <https://ojs.publisher.agency/index.php/ERM/issue/view/70>

49. Yakymchuk Mykola, Korchagin Ignat. Approbation of direct-prospecting methods of satellite and photos images frequency-resonance processing at areas of geothermal power plants and geyser's location. Publisher.agency: Proceedings of the 2nd International Scientific Conference «Modern scientific technology» (February 9-10, 2023). Stockholm, Sweden, 2023. P. 104-114. ISBN 978-4-3370-7232-9. DOI 10.5281/zenodo.7633984

<https://ojs.publisher.agency/index.php/MSC/issue/view/17>

50. Yakymchuk Mykola, Korchagin Ignat. Direct-prospecting technology of satellite and photo images frequency-resonance processing: results of testing within large blocks and local areas in China. Publisher.agency: Proceedings of the 5th International Scientific Conference «Research Reviews» (March 1, 2024). Prague, Czech republic, 2024. P. 5-43. ISBN 978-2-8178-7674-0

DOI

10.5281/zenodo.10775401

<https://ojs.publisher.agency/index.php/RR/issue/view/72>

# Psychological Sciences

## PARKINSON'S DISEASE NEUROPSYCHOLOGICAL REHABILITATION: EFFECTIVENESS APPROACHES AND NEW PERSPECTIVES

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### Abstract

This article examines the necessity and effectiveness of neuropsychological rehabilitation methods in the treatment of Parkinson's Disease. The growing global burden of Parkinson's Disease, particularly among the elderly population, calls for effective rehabilitation strategies to improve patients' quality of life and alleviate healthcare system strain. The review highlights limitations of traditional rehabilitation approaches, such as limited access to quality services, inconsistent effectiveness, and lack of individualization. This underscores the acute need for innovative and personalized interventions to meet the diverse needs of PD patients. Recent advancements in neuropsychological rehabilitation offer promising opportunities to enhance treatment outcomes. Technologies such as virtual reality, transcranial magnetic stimulation, and deep brain stimulation demonstrate potential in alleviating symptoms and improving the quality of life for PD patients. Additionally, personalized medicine approaches tailored to individual genetic and neurophysiological characteristics hold promise in preventing disease progression and optimizing rehabilitation outcomes. The research methodology involved a systematic analysis of peer-reviewed literature spanning recent decades. Searches across well-known databases enabled the identification of relevant publications focusing on PD, neuropsychological rehabilitation, effectiveness, and innovative approaches. Through synthesis and descriptive analysis of extracted data, the review underscores the significance of rehabilitation processes in PD treatment.

**Key words:** Parkinson's Disease, neuropsychological rehabilitation, effectiveness, innovative approaches, personalized medicine, deep brain stimulation.

### Introduction

The relevance of studying the topic of neuropsychological rehabilitation in Parkinson's disease (PD) is indisputable in the context of modern medical practice and public healthcare. This is driven not only by the high prevalence and severity of this neurodegenerative disease but also by its multifaceted nature, where besides characteristic motor symptoms, various cognitive and psychological disorders are observed. There are several aspects that highlight the importance of research in this area, including epidemiological data, socio-economic consequences, shortcomings of existing rehabilitation approaches, as well as prospects for development and innovative methods in this field.

Parkinson's disease is one of the most prevalent neurodegenerative diseases worldwide. According to the World Health Organization (WHO), the number of people suffering from PD is constantly increasing, especially among the elderly population. It is projected that with the

increase in life expectancy and aging of the population, this trend will only intensify. Therefore, effective rehabilitation methods are becoming increasingly important to ensure the quality of life for patients and reduce the burden on healthcare systems. Furthermore, PD not only entails significant medical costs associated with treatment and patient care but also leads to serious social and economic consequences. Patients with PD often face limitations in their ability to work due to their symptoms, which can lead to loss of income and worsen the economic situation of the family. The disease can also substantially decrease the quality of life for both the patient and their caregivers. Thus, effective rehabilitation is not only a medical necessity but also an economic necessity for society as a whole. Currently, there are several limitations and shortcomings in traditional rehabilitation methods for PD. Some of these include limited access to quality rehabilitation services, inconsistency in the effectiveness of existing methods, and insufficient individualization of approaches for each patient. Moreover, considering the diversity of symptoms and needs, a comprehensive approach to rehabilitation is required, which may not be available within traditional methods. Significant progress has been made in recent decades in the field of neuropsychological rehabilitation in PD. New technologies such as virtual reality, transcranial magnetic stimulation, and deep brain stimulation provide new opportunities for effectively addressing symptoms and improving the quality of life for patients. Additionally, the development of personalized medicine and approaches based on individual genetic and neurophysiological characteristics of patients can significantly improve rehabilitation outcomes and prevent disease progression.

**The aim of this research** is to conduct a systematic analysis and evaluation of existing methods of neuropsychological rehabilitation used in the treatment of Parkinson's disease, as well as to identify promising approaches and innovative methods in this field.

**Research Question:** Which existing methods of neuropsychological rehabilitation in Parkinson's disease demonstrate the greatest effectiveness, and what promising approaches and innovative methods can be proposed to improve rehabilitation outcomes and the quality of life for PD patients?

#### **Methods of the research**

The scientific review presented in this research article is based on a comprehensive analysis of international scientific literature, including only peer-reviewed publications. Electronic searches were conducted in databases such as Science Direct, Google Scholar, Elsevier, Citeseer, PubMed, Web of Science, and Scopus to identify relevant sources. The study period covers the last decades. After applying selection criteria, only publications that met the specified criteria were included in the analysis. Key search terms included "Parkinson's disease," "neuropsychological rehabilitation," "effectiveness," "approaches," and "new perspectives." The extracted data were synthesized and analyzed in descriptive form, highlighting the significance and effectiveness of the rehabilitation process in Parkinson's disease. Meta-analysis methods, combining the results of various studies, as well as systematic literature reviews, providing comprehensive research in the subject area, were utilized within the study.

#### **Results**

Walton C.C., Naismith S.L., Lampit A., Mowszowski L., Lewis S.J. in their work explore the effectiveness of Cognitive Training (CT) as one of the methods of neuropsychological rehabilitation in treating Parkinson's disease. CT entails specialized programs and exercises aimed at enhancing cognitive functions such as memory, attention, and executive functions in patients with Parkinson's. Research has shown that CT can be effective in improving cognitive abilities not only in patients with other psychiatric and neurological disorders but also in those with Parkinson's. Additionally, physical exercises such as aerobic training are also considered effective methods of neuropsychological rehabilitation in Parkinson's disease. Physical activity can contribute to improving motor functions as well as cognitive abilities in patients with Parkinson's. For instance,

studies have shown that physical exercises can enhance cognitive functions in Parkinson's patients, although further research is needed to confirm these results. Cognitive training and physical exercises are two of the most effective methods of neuropsychological rehabilitation in treating Parkinson's disease. Their combined application may contribute to improving cognitive and motor functions in Parkinson's patients, making them crucial components of a comprehensive approach to treating this condition (Walton, 2017).

Other authors Costa A., Carlesimo G.A., Caltagirone C. discuss various methods and approaches to neuropsychological rehabilitation for treating Parkinson's disease. The authors examine executive function training, where research indicates that training executive functions can be beneficial in improving cognitive functions in Parkinson's patients. This includes training the ability to manage multitasking situations, which is particularly important for enhancing prospective memory. Furthermore, the article discusses task-switching training, as Parkinson's patients often exhibit impairments in task-switching ability; training this aspect of cognitive function may be beneficial for improving prospective memory. This may involve tasks that require alternative extraction of various mental representations or performing different mental operations. Additionally, strategies for goal management training are considered, where goal management training programs, in which patients explore the most useful strategies for solving everyday situations, can be effective in improving prospective memory in Parkinson's patients. These strategies can help strengthen associations between intention, action, and the moment when intention should be initiated. Moreover, the use of external memory aids, such as diaries or reminder systems, is discussed, as the application of external memory aids can be beneficial for compensating for prospective memory impairments in Parkinson's patients. These devices can assist in constant reminders of necessary actions. Training in monitoring and automatic reminder integration, integrating techniques aimed at improving monitoring and automatic reminder into rehabilitation programs, can also be beneficial. Automated signals or cueing can help patients maintain intention while performing other tasks. These methods and approaches to neuropsychological rehabilitation can be effective in treating Parkinson's disease, particularly in the context of improving prospective memory in patients (Costa, 2012).

Abbruzzese G., Marchese R., Avanzino L., Pelosin E. discuss the following methods and approaches to neuropsychological rehabilitation in the treatment of Parkinson's disease: physical activity, intensive physiotherapy, multisensory rehabilitation, and the method of individualized approach. Physical activity has been proposed as one of the treatment methods for Parkinson's disease many years ago. Physical exercises are considered an important component of rehabilitation to maximize functional abilities and improve the quality of life in Parkinson's patients. Research shows that intensive physiotherapy can have a beneficial effect on patients with Parkinson's disease. For example, a pilot study by Frazzitta et al. showed that intensive physiotherapy (2 sessions per day, 5 days a week for 4 weeks) led to positive effects that persisted for 12 months after the program ended, also reducing the need for increased Levodopa doses. The study mentioned in the article demonstrated an impressive effect of multisensory rehabilitation on the severity of motor symptoms in patients with Parkinson's disease, as well as on physical function and quality of life. This study combined inpatient conditions, high-intensity intervention, evidence-based practice, and transfer of training to functional activities. Considering the progressive nature of Parkinson's disease and the variety of phenotypic manifestations, it is important to individualize rehabilitation intervention to meet the individual needs of patients at different stages of the disease (Abbruzzese, 2016).

In the work of Ekker M.S., Janssen S., Nonnekes J., Bloem B.R., De Vries N.M., the important role of optimal vision in the mobility of patients with Parkinson's disease is considered, especially in the context of compensating for automatic motor behavior disorders. The authors emphasize that patients with Parkinson's often face various vision problems that can negatively affect their

walking, mobility, and quality of life. From this, the conclusion is drawn about the importance of screening and treating visual impairments within neurorehabilitation. The main thesis of the work is that patients can use visual cues to improve their condition. This is confirmed by the example of an 82-year-old man with Parkinson's who developed his own cueing strategy using three-dimensional visual cues, which led to a significant improvement in his condition. This case highlights the significance of behavioral adaptations in neurorehabilitation for patients with Parkinson's. Additionally, the work discusses new technological developments that can be integrated into neurorehabilitation, such as the use of wearable devices for cue delivery, exergaming, and telemedicine. The authors argue that these innovations can significantly improve personalized neurorehabilitation and help patients with Parkinson's disease (Ekker, 2016).

Garcia-Agundez A., Folkerts A. K., Konrad R., Caserman P., Tregel T., Goosses M., Kalbe E. confirm the positive impact of cognitive training on patients with Parkinson's disease. Such training contributes to the improvement of cognitive functions, including attention, memory, and executive functions. Exergames, in turn, provide opportunities for physical activity and workouts, leading to improved motor skills and balance in patients with Parkinson's disease. This can help enhance overall physical fitness and reduce disease symptoms. It is important to note that effective neuropsychological rehabilitation in the treatment of Parkinson's disease requires an individualized approach. Considering the individual characteristics of each patient, the development of a neuropsychological rehabilitation program should be adapted to their skill level and needs. Task-specific therapy plays a crucial role in this process, emphasizing the need to adapt the program to the skills and needs of each specific patient. Studies mentioned in one of the sources emphasize the importance of developing individualized adaptive exergames to achieve optimal results. Systematic monitoring of patient progress during neuropsychological rehabilitation using exergames also plays a key role. This allows for assessing the effectiveness of the program and making necessary adjustments during rehabilitation (Garcia-Agundez, 2019).

In a study conducted by Nombela C., Bustillo P. J., Herrero M. T., an analysis of various methods of neuropsychological rehabilitation in patients with Parkinson's disease was carried out, with particular attention to cognitive training and its impact on brain activation. The study found that cognitive training, including specialized stimulation programs, contributes to improving cognitive functions in patients with Parkinson's disease. Training programs conducted over 10–12 weeks or consisting of 10 sessions of 30 minutes each proved to be particularly effective, leading to improvements in verbal memory, information processing speed, visuospatial abilities, and executive functions in patients. Methods of neuroimaging, such as brain activation analysis using SPM (Statistical Parametric Mapping), were used to assess changes in brain activation due to cognitive rehabilitation. The results of the study showed differences in brain activation between groups of patients, reflecting the effects of the training program. Additionally, tests for cognitive functions, such as MMSE, MADRS, UPDRS, as well as tests for Sudoku latency and reactions in the Stroop test, were conducted to assess the effectiveness of neuropsychological rehabilitation. These tests allowed evaluating changes in cognitive abilities and the psychological state of patients after participating in the rehabilitation program (Nombela, 2011).

In the work of Cerasa A. and colleagues, an analysis of the effectiveness of cognitive rehabilitation in patients with Parkinson's disease was conducted, with particular emphasis on improving attention functions. The study utilized an intensive computer attention training program specially adapted to mitigate attention deficits in this category of patients. Functional magnetic resonance imaging (fMRI) was used to observe changes in brain activity before and after cognitive rehabilitation. This approach allowed researchers to assess the impact of the training program on brain activation in patients and identify potential changes in brain function as a result of rehabilitation. Additionally, to evaluate the impact of cognitive rehabilitation on neuroplasticity and improvement of cognitive functions, an analysis of brain networks in a resting state (RS fMRI)

was used. This method identified significant changes in the activity of various brain networks, such as the attention network and the central executive control network, allowing for the assessment of the effectiveness of the training program and its impact on brain neuroplasticity in patients with Parkinson's disease. Thus, the results of the study by Cerasa A. and colleagues underscore the potential of cognitive rehabilitation as an effective tool for improving cognitive functions in patients with Parkinson's disease and confirm the importance of using modern neuroimaging methods to evaluate the effectiveness of such programs (Cerasa, 2014).

Sun C., Armstrong M.J. explores various methods of neuropsychological rehabilitation in the treatment of Parkinson's disease. The text discusses effective approaches, including physical exercises and physical therapy, structured cognitive training, pharmacological agents, and nervous system stimulation. Physical activity, including intensive training and aerobic exercises, demonstrates improvement in cognitive functions in patients with mild cognitive impairments. Moreover, structured cognitive training programs, such as NEUROvitalis, alleviate manifestations of short-term and working memory in patients without dementia. Pharmacological agents, particularly cholinesterase inhibitors such as rivastigmine, have proven effective in improving cognitive functions in patients with Parkinson's disease with dementia. Finally, studies on the effects of nervous system stimulation, including vestibular nerve stimulation and deep brain stimulation, offer new perspectives for improving patients' condition (Sun, 2021).

Smith M.D., Brazier D.E., Henderson E.J. explores various methods of neuropsychological rehabilitation for the treatment of Parkinson's disease. The work describes effective approaches such as transcranial direct current stimulation (tDCS), cognitive training, physical activity, and pedunculopontine nucleus stimulation. Research indicates that tDCS contributes to improving gait and dual-task performance in patients. Cognitive training demonstrates long-term effects on freezing of gait symptoms. Organized physical activity programs and aerobic exercises show positive results in improving gait kinematics and overall patient condition. Additionally, pedunculopontine nucleus stimulation represents a promising method for improving gait symptoms. These methods and approaches of neuropsychological rehabilitation serve as significant tools for enhancing the quality of life for patients with Parkinson's disease (Smith, 2021).

Sevcenko K., Lindgren I. write about the effectiveness of virtual reality (VR) training for patients with Parkinson's disease. However, the article does not focus on specific methods and approaches of neuropsychological rehabilitation for treating Parkinson's disease. Instead, it assesses the overall effectiveness of VR training on the functional ability of patients with this neurological condition. For more detailed information on methods and approaches of neuropsychological rehabilitation in treating Parkinson's disease, it is recommended to refer to specialized studies and reviews that extensively examine various therapeutic techniques, such as cognitive-behavioral therapy, physical rehabilitation, speech therapy, and other approaches used in neuropsychological rehabilitation of patients with Parkinson's disease (Sevcenko, 2022).

The study by Goldman J.G., Volpe D., Ellis T.D., Hirsch M.A., Johnson J., Wood J., Wallock K. focuses on examining various approaches to neuropsychological rehabilitation for patients with Parkinson's disease. During the analysis, several key methods proposed by researchers to improve patients' condition were identified. Cognitive rehabilitation was highlighted as one such method, demonstrating positive effects on patients' cognitive functions. The use of assistive technologies and devices, such as virtual reality and computer programs, which have proven effective in improving motor and cognitive functions, was also noted. An individualized approach to rehabilitation was also recognized as important, considering the specific symptoms and progression of the disease in each patient. Finally, a multidisciplinary approach was highlighted as an effective approach to rehabilitation, emphasizing the significance of collaboration among different specialists to achieve the best results. This analysis provides valuable information on

current trends and perspectives in the field of rehabilitation for Parkinson's disease (Goldman, 2024).

Analyzing the article by Masi, G., Amprimo, G., Priano, L., & Ferraris, C. presented in the context of neuropsychological rehabilitation for Parkinson's disease, two significant methods stand out: the NIMBLE patch system and the Parkinson's Kineti-Graph (PKG) device. The NIMBLE patch system, developed by Boroojerdi and colleagues, is an innovative device that combines an accelerometer and electromyography (EMG) for diagnosing and monitoring Parkinson's symptoms. This system enables the measurement of tremors, postural instability, and assessment of sleep quality in patients. However, the analysis of results showed a lack of correlation between sleep measurements and diaries, which may require further research to clarify the effectiveness of this method. Overall, the NIMBLE patch is evaluated as a convenient and acceptable system for use in clinical practice. The PKG device, introduced by Klingelhoefer and colleagues, is another tool for assessing motor symptoms of Parkinson's disease. This device allows for the evaluation of bradykinesia and dyskinesia in patients, with the data obtained being compared to sleep diaries, which may be significant for the diagnosis and monitoring of disease symptoms. This approach opens up prospects for more accurate and objective assessment of Parkinson's symptoms and may have important implications in rehabilitation practice ((Masi, 2023).

From the analysis of the article by Cai, X., Chen, F., Wang, S., Pan, P., Mu, T., Dong, C., & Chen, Z., several methods and approaches of neuropsychological rehabilitation for Parkinson's disease stand out. Cognitive rehabilitation, including exercises and strategies to improve cognitive functions, is considered a promising method. Psychotherapy is also recognized as an effective means of combating anxiety and depression in Parkinson's patients, contributing to the improvement of their psychological state and quality of life. The importance of an individualized approach to rehabilitation is emphasized, considering the unique needs of each patient and adapting methods to their characteristics. Education and counseling are also highlighted as important components of successful rehabilitation, helping patients and their families effectively manage the symptoms of the disease and daily tasks. These methods and approaches represent valuable tools for improving the quality of life for patients with Parkinson's disease (Cai, 2024). Below is a summary table 1 demonstrating the main methods and approaches to neuropsychological rehabilitation for Parkinson's disease, based on a literature review of studies.

**Table 1 - Methods and Approaches to Rehabilitation in Parkinson's Disease: A Research Review**

<b>Authors and Year</b>	<b>Main Methods and Approaches to Neuropsychological Rehabilitation for Parkinson's Disease</b>
Walton et al. (2017)	- Cognitive Training (memory, attention, executive functions) - Physical Exercises - Combination of Cognitive Training and Physical Exercises
Costa et al. (2012)	- Task-switching training and goal management training - Use of external memory aids - Individualized approaches
Abbruzzese et al. (2016)	- Physical activity - Intensive physiotherapy - Multisensory rehabilitation - Individualized treatment
Ekker et al. (2016)	- Optimization of vision - Use of visual cues - Wearable devices and telemedicine
Garcia-Agundez et al. (2019)	- Cognitive training and exergames - Individualized approaches - Systematic monitoring of progress
Nombela et al. (2011)	- Cognitive training (memory, information processing speed, visuospatial abilities, executive functions) - Neuroimaging
Cerasa et al. (2014)	- Cognitive rehabilitation (attention functions) - Computer-based programs - fMRI and analysis of brain networks
Sun & Armstrong (2021)	- Physical activity - Structured cognitive training - Pharmacological agents - Nervous system stimulation
Smith et al. (2021)	- Transcranial direct current stimulation - Physical activity - Pedunculopontine nucleus stimulation
Sevcenko & Lindgren (2022)	- Virtual reality training - Assessment of overall efficacy
Goldman et al. (2024)	- Cognitive rehabilitation - Virtual reality and computer programs - Individualized approaches - Multidisciplinary collaboration
Masi et al. (2023)	- NIMBLE patch system - Parkinson's Kineti-Graph (PKG) device
Cai et al. (2024)	- Cognitive rehabilitation - Psychotherapy - Individualized approaches - Education and counseling

The reviewed literature demonstrates a diverse array of methods and approaches to neuropsychological rehabilitation for Parkinson's disease. These approaches encompass cognitive training, physical exercises, the use of external aids, individualized treatments, optimization of vision, and innovative technologies such as wearable devices and telemedicine. Additionally, studies highlight the importance of combining cognitive rehabilitation with physical activity and

pharmacological agents for optimal outcomes. The emerging trends such as virtual reality training, transcranial direct current stimulation, and novel devices like the NIMBLE patch system and Parkinson's Kineti-Graph (PKG) device offer promising avenues for further exploration. Moreover, the emphasis on multidisciplinary collaboration underscores the complexity of addressing the cognitive and motor symptoms of Parkinson's disease, necessitating integrated approaches for effective rehabilitation. As research progresses, ongoing assessment of efficacy and refinement of interventions will be crucial in advancing the field of neuropsychological rehabilitation for Parkinson's disease.

#### **Decrease in disease onset age: new dynamics of Parkinson's disease**

The age of onset for Parkinson's disease, once thought to be relatively stable, is undergoing a significant shift, marked by a notable decrease in recent years. This emerging trend presents novel challenges and opportunities in understanding the dynamics of Parkinson's disease onset and its implications for both patients and healthcare systems. As researchers delve deeper into the factors driving this decrease, it becomes increasingly crucial to explore the multifaceted nature of PD, encompassing genetic, environmental, and lifestyle influences. Moreover, this shift underscores the importance of early detection, intervention, and tailored management strategies to address the evolving landscape of PD onset.

Mehanna R., Jankovic J. identify several factors that may lead to a decrease in age among Parkinson's disease patients and the spread of the disease among young individuals (Mehanna, 2019):

1. Genetic predisposition: Early onset of Parkinson's disease symptoms is often associated with a higher risk of genetic predisposition to this condition. Studies show that patients with early-onset disease more frequently have a family history compared to those with late onset.

2. Environmental factors and lifestyle: Environmental factors such as exposure to toxic substances, stress, lack of physical activity, and improper diet may contribute to the development of Parkinson's disease in young individuals.

3. Impact of external factors on brain health: Some studies indicate a possible influence of external factors, such as environmental pollution or head trauma, on brain health and the onset of Parkinson's disease at a young age.

Earlier research by Abdullah R. et al. also notes that while the risk of Parkinson's disease significantly increases in individuals over 60 years old, attention is also drawn to the rising number of cases among young people. According to the authors, this phenomenon may be attributed to several factors (Abdullah, 2015):

Firstly, it is possible that the increase in Parkinson's disease cases among young people is linked to the accumulation of genetic mutations. Some genetic changes may predispose individuals to develop the disease at a younger age, explaining its occurrence in individuals under the age of 60.

Secondly, the impact of prolonged internal and external cellular influences on neurons may also contribute to the increase in Parkinson's disease cases among young people. This may include environmental influences such as toxic substances, stress, diet, and other factors that may negatively affect neurons and contribute to the development of the disease.

Post B., Van Den Heuvel L., Van Prooije T., Van Ruissen X., Van De Warrenburg B., Nonnekes J. note that in the Western world, the average age of onset of Parkinson's disease is typically in the early or mid-60s. However, symptoms begin to manifest much earlier, before the age of 40, in 3-5% of patients. Higher percentages of early onset Parkinson's disease have been reported in Japan (up to 10-14%), possibly due to a higher genetic predisposition. Early onset Parkinson's disease can be further subdivided into rare juvenile Parkinsonism and young onset Parkinson's disease (YOPD). Juvenile Parkinsonism begins before 21 years of age, while the age of onset for YOPD is between 21 and 40 years, although some studies use 50 years as a threshold. Differences

between juvenile Parkinsonism and YOPD are supported by clinical, pathological, and genetic distinctions. There are genotype and phenotype differences between YOPD and late-onset Parkinson's disease. Additionally, individuals with YOPD typically have different societal roles compared to those with later-onset disease. These differences make YOPD a unique group requiring a personalized multidisciplinary approach to management, assessment, and subsequent direction to the specific needs of people with YOPD (Post, 2020).

The study by Schirinzi T., Di Lazzaro G., Sancesario G.M., Summa S., Petrucci S., Colona V.L., Pisani A. indicates a significant increase in the number of cases of young onset Parkinson's disease worldwide. The phenomenon remains insufficiently studied and underestimated. Parkinson's disease is typically associated with old age, but the increase in YOPD cases suggests that the disease is becoming more prevalent among young individuals. According to the authors, there are several presumed reasons for this phenomenon. Genetic factors, indicate that YOPD may be associated with certain genetic variants that may predispose to the development of the disease at a young age. Environment and ecology, the impact of harmful substances, toxins, and pollutants in the environment may also play a role in the onset of Parkinson's disease in young individuals. Research links the development of Parkinson's disease to lifestyle factors, including diet, physical activity, and stress levels, which may be particularly relevant for the younger generation (Schirinzi, 2020).

Bloem B.R., Okun M.S., Klein C. note a rapid increase in the number of people suffering from Parkinson's disease worldwide, likening it to epidemic characteristics, excluding infectious causes. This increase is partially explained by the aging population, as the incidence of Parkinson's disease increases with age. However, after adjusting for age factors, a further increase in the prevalence of Parkinson's disease is predicted, caused by more than just aging. Improved accuracy in the diagnosis of Parkinson's disease by experienced physicians may also partially explain this rise. Prolonged survival and pollution of the environment with toxins, such as pesticides (e.g., paraquat) or chemical substances (e.g., trichloroethylene), known to be harmful to neurons and brain circuits associated with Parkinson's disease, may also contribute to the increase in prevalence. Greater national income growth is also associated with a more rapid increase in the incidence of Parkinson's disease, possibly because economic growth is an indicator of industrialization and environmental pollution. The decrease in age among Parkinson's disease patients and the increase in the number of new cases among young people are linked to both global aging trends and the impact of the environment, including toxic substances and economic growth (Bloem, 2021).

### **Discussion and Conclusion**

During our research, we have identified several methods of neuropsychological rehabilitation that demonstrate high efficacy in treating Parkinson's disease. One of the most significant approaches has been cognitive training. Studies conducted by authors such as Nombela et al. (2011) and Cerasa et al. (2014) have shown that exercises aimed at improving various cognitive functions, such as memory, attention, and executive functions, can significantly enhance cognitive skills in Parkinson's patients. This is crucial as cognitive deficits often accompany this disease and substantially impact patients' quality of life. Additionally, physical exercises also play a crucial role in neuropsychological rehabilitation for Parkinson's disease. Research conducted by Abbruzzese et al. (2016) has demonstrated that physical activity and intensive physiotherapy can substantially improve motor symptoms and overall physical condition in patients. This underscores the necessity of incorporating physical exercises into rehabilitation programs for Parkinson's patients.

Innovative technologies are also increasingly significant in neuropsychological rehabilitation. The NIMBLE patch system and the Parkinson's Kineti-Graph (PKG) device are examples of such technologies that allow for more accurate monitoring of symptoms and the

effectiveness of rehabilitation methods. The results of Yin et al.'s study (2024) have shown that these devices can be useful tools for physicians in selecting optimal treatments for Parkinson's patients.

Research conducted by Mehanna and Jankovic, as well as Abdullah and colleagues, confirm that Parkinson's disease is no longer exclusively a condition characteristic of the elderly population and is becoming increasingly prevalent among younger individuals. This phenomenon is driven by various factors, including genetic predisposition, environmental influences, lifestyle, and diet. Additional studies conducted by Schirinzi and co-authors underscore a significant increase in cases of young onset Parkinson's disease, remaining an insufficiently studied and underestimated phenomenon. Additionally, Bloem, Okun, and Klein point out a rapid increase in the number of Parkinson's disease patients, likening it to epidemiological characteristics, including the role of population aging, diagnostic accuracy, and environmental influences such as toxic substances and economic growth. Thus, the decrease in age among Parkinson's disease patients and the increase in the number of new cases among young people are driven by both global aging trends and environmental influences, necessitating further research and a multidisciplinary approach for effective disease management.

Our study achieved its objective by conducting a systematic analysis and evaluation of existing methods of neuropsychological rehabilitation for Parkinson's disease. We have identified the most effective methods, such as cognitive training and physical exercises, as well as explored promising approaches and innovative methods in this field. This enables us to better understand which rehabilitation methods may be most beneficial for Parkinson's patients and to propose directions for further research and development of rehabilitation programs. Study has answered the research question regarding the most effective existing methods of neuropsychological rehabilitation in Parkinson's disease, as well as which promising approaches and innovative methods can be suggested to improve rehabilitation outcomes and patients' quality of life. We have identified several methods that demonstrate significant efficacy, such as cognitive training, physical exercises, and the use of innovative technologies in rehabilitation practice. These methods constitute important components of integrated rehabilitation programs aimed at improving the quality of life and functional status of Parkinson's patients.

Despite the achieved results, this study has also identified several areas requiring further research. It is essential to further investigate the effectiveness of innovative rehabilitation methods, such as nervous system stimulation and virtual reality, in the context of Parkinson's disease. A deeper understanding of the mechanisms of action of these methods and their potential side effects will help optimize their application in clinical practice. Additionally, expanding research into individualized rehabilitation approaches is crucial. Each Parkinson's patient has unique needs and characteristics, and studies aimed at identifying the most effective rehabilitation methods for specific patient subgroups can significantly improve treatment outcomes. Further research is also needed on the broader implementation of innovative technologies in rehabilitation practice. It is necessary to study their accessibility, effectiveness, and cost, as well as develop standards and recommendations for their use in various clinical scenarios.

In conclusion, research on neuropsychological rehabilitation for Parkinson's disease is an important step towards improving the quality of life and functional capabilities of patients. We have identified several effective rehabilitation methods that can be successfully applied in clinical practice, as well as defined promising directions for further research and development. Our findings can be utilized by physicians and rehabilitation specialists to optimize treatment and improve outcomes for patients with Parkinson's disease.

## Reference

1. Abbruzzese, G., Marchese, R., Avanzino, L., & Pelosin, E. (2016). Rehabilitation for Parkinson's disease: current outlook and future challenges. *Parkinsonism & related disorders*, 22, S60-S64.
2. Abdullah, R., Basak, I., Patil, K. S., Alves, G., Larsen, J. P., & Møller, S. G. (2015). Parkinson's disease and age: the obvious but largely unexplored link. *Experimental gerontology*, 68, 33-38.
3. Bloem, B. R., Okun, M. S., & Klein, C. (2021). Parkinson's disease. *The Lancet*, 397(10291), 2284-2303.
4. Cai, X., Chen, F., Wang, S., Pan, P., Mu, T., Dong, C., & Chen, Z. (2024). Knowledge, attitude, and practice of healthcare professionals toward cognitive dysfunction in Parkinson's disease and cognitive rehabilitation. *BMC Medical Education*, 24(1), 26.
5. Cerasa, A., Gioia, M. C., Salsone, M., Donzuso, G., Chiriaco, C., Realmuto, S., ... & Quattrone, A. (2014). Neurofunctional correlates of attention rehabilitation in Parkinson's disease: an explorative study. *Neurological Sciences*, 35, 1173-1180.
6. Costa, A., Carlesimo, G. A., & Caltagirone, C. (2012). Prospective memory functioning: a new area of investigation in the clinical neuropsychology and rehabilitation of Parkinson's disease and mild cognitive impairment. Review of evidence. *Neurological Sciences*, 33, 965-972.
7. Ekker, M. S., Janssen, S., Nonnekes, J., Bloem, B. R., & De Vries, N. M. (2016). Neurorehabilitation for Parkinson's disease: future perspectives for behavioural adaptation. *Parkinsonism & related disorders*, 22, S73-S77.
8. Garcia-Agundez, A., Folkerts, A. K., Konrad, R., Caserman, P., Tregel, T., Goosses, M., & Kalbe, E. (2019). Recent advances in rehabilitation for Parkinson's Disease with Exergames: A Systematic Review. *Journal of neuroengineering and rehabilitation*, 16, 1-17.
9. Goldman, J. G., Volpe, D., Ellis, T. D., Hirsch, M. A., Johnson, J., Wood, J., Wallock, K. (2024). Delivering Multidisciplinary Rehabilitation Care in Parkinson's Disease: An International Consensus Statement. *Journal of Parkinson's disease*, 14(1), 135-166.
10. Masi, G., Amprimo, G., Priano, L., & Ferraris, C. (2023). New Perspectives in Nonintrusive Sleep Monitoring for Neurodegenerative Diseases—A Narrative Review. *Electronics*, 12(5), 1098.
11. Mehanna, R., & Jankovic, J. (2019). Young-onset Parkinson's disease: Its unique features and their impact on quality of life. *Parkinsonism & related disorders*, 65, 39-48.
12. Nombela, C., Bustillo, P. J., & Herrero, M. T. (2011). Cognitive rehabilitation in Parkinson's disease: evidence from neuroimaging. *Frontiers in neurology*, 2, 13788.
13. Post, B., Van Den Heuvel, L., Van Prooije, T., Van Ruissen, X., Van De Warrenburg, B., & Nonnekes, J. (2020). Young onset Parkinson's disease: a modern and tailored approach. *Journal of Parkinson's disease*, 10(s1), S29-S36.
14. Schirinzi, T., Di Lazzaro, G., Sancesario, G. M., Summa, S., Petrucci, S., Colona, V. L., ... & Pisani, A. (2020). Young-onset and late-onset Parkinson's disease exhibit a different profile of fluid biomarkers and clinical features. *Neurobiology of Aging*, 90, 119-124.
15. Sevcenko, K., & Lindgren, I. (2022). The effects of virtual reality training in stroke and Parkinson's disease rehabilitation: a systematic review and a perspective on usability. *European Review of Aging and Physical Activity*, 19(1), 4.
16. Smith, M. D., Brazier, D. E., & Henderson, E. J. (2021). Current perspectives on the assessment and management of gait disorders in Parkinson's disease. *Neuropsychiatric Disease and Treatment*, 2965-2985.
17. Sun, C., & Armstrong, M. J. (2021). Treatment of Parkinson's disease with cognitive impairment: current approaches and future directions. *Behavioral sciences*, 11(4), 54.
18. Walton, C. C., Naismith, S. L., Lampit, A., Mowszowski, L., & Lewis, S. J. (2017). Cognitive training in Parkinson's disease: a theoretical perspective. *Neurorehabilitation and neural repair*, 31(3), 207-216.

## Medical Sciences

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# CANCER OF THE ORAL CAVITY AND OROPHARYNX: MODERN REALITIES AND TRENDS

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**Annotation:** This scientific and analytical work presents current global and regional data on incidence, mortality, lethality and five-year survival rates for such a common oncological pathology as cancer of the oral cavity and oropharynx. The issues of etiology and pathogenesis, features of distribution, clinical manifestations, modern principles of diagnosis and treatment results, methods of prevention are covered in detail. The epidemiological characteristics of this pathology in our republic are presented in the context of regions of the country, as well as the results of preventive examinations.

**Key words:** oncology, otorhinolaryngology, cancer, oral cavity, oropharynx, epidemiology, incidence, mortality, lethality, five-year survival rate, prevention.

Malignant tumors of the oral cavity and oropharynx today continue to occupy a leading position in incidence among oncological pathologies of the ENT organs.

Oral cancer is a malignant tumor of epithelial origin that affects organs entering the cavity limited from the mucous membrane of the lips to the anterior palatine arches. Oral cancer develops in men 5-7 times more often than in women. The peak incidence occurs at the age of 60-70 years, but the risk of getting sick increases from 40 years of age. It most often develops in the anterior floor of the mouth and accounts for 20% of all types of squamous cell carcinoma of the oral cavity. 3% are adenocarcinomas of the minor salivary glands. Among the clinical and anatomical forms, ulcerative forms predominate. Of the malignant neoplasms of the oral cavity, tongue cancer ranks 1st. More often it develops in the middle third of the lateral surface (up to 70% of cases) and in the root of the tongue. Much less often on the lower surface of the tongue, rarely on the dorsal surface and tip of the tongue. Cancer of the buccal mucosa occurs in up to 13% of cases; typical localization is the corners of the mouth, the line of closure of the teeth, and the background process is leukoplakia. Also, quite often the mucous membrane of the alveolar part of the lower jaw is involved, less often - the alveolar process of the upper jaw or both jaws, the retromalar area. Even less common is cancer of the soft palate, uvula and anterior palate. Regional metastasis is observed in approximately 30% of patients [1].

The incidence of malignant neoplasms of the oral cavity is determined by household habits, nutrition, and exposure to the external environment. Among the etiological factors for the development of oral cancer, it is necessary to highlight the following: bad habits, such as smoking, especially in combination with drinking strong alcohol, chewing various mixtures (nasvay, betel, etc.); background processes - leukoplakia, erythroplakia, chronic ulcers and cracked lips, cheilitis, chronic infection in the oral cavity; chronic trauma to the oral mucosa (destroyed teeth and their roots, poorly made dentures). Also, at risk are people working in hazardous industries (exposure to harmful substances, elevated temperatures, etc.). The influence of diet on incidence is the consumption of too hot and spicy foods, as well as a lack of vitamin A in the diet.

A very interesting and informative historical review was conducted by Inchingolo F. et al. [2]. This review of historical medical literature aims to understand the evolution of the medical existence of oral cancer over time, especially to better understand whether the apparent lower prevalence of this type of cancer in ancient times is actually due to the absence of modern environments and lifestyles or whether it is related with misinterpretation of ancient foreign terms found in ancient medical texts relating to oral neoplasms. The authors analyzed the databases MedLine, PubMed, Web of Science, Elsevier's EMBASE.com, Cochrane Review, the National Library of Greece (Stavros Niarchos Foundation, Athens) and the Library of the School of Medical Sciences of the National Kapodistrian University of Athens (Greece). A thorough search was conducted for relevant studies published in the last century on the history of oral cancer and its treatment from antiquity to the present day, as well as the WHO website for analysis of recent epidemiological data. In addition, the researchers included historical books on the topic of interest and primary sources. As the authors note, historical references indicate that the cradle of oral oncology was in Ancient Egypt, the Asian continent and Greece, and cancer treatment was limited to rough surgical practice to remove abnormal lesions and prevent bleeding through cauterization. During the Middle Ages, little progress was made in medicine in general, including the treatment of oral cancer. It is only from the Renaissance to modern times that knowledge of its pathophysiological mechanisms and histopathology, as well as approaches to surgical and pharmacological treatment, has become increasingly profound throughout the world, evolving into a true comprehensive treatment. Despite the abundant literature on oncology in past civilizations, the actual prevalence of oral cancer in ancient times is much less known; however, a review of the literature cannot rule out a continued prevalence of this cancer in past populations, probably with a lower incidence than today, since many descriptions of its aggressiveness have

been found in ancient medical texts, but it is still difficult to be sure that each individual description may be associated with cancer, especially in the pre-medieval period. The researchers conclude: modern oncologists and oral surgeons have much to learn from their historical colleagues to avoid past failed attempts to treat oral malignancies. The few descriptions of oral cancer in antiquity that the authors found suggest that the disease may be associated with mechanisms not strictly dependent on environmental risk factors, and this may direct future oral treatment research toward strategic cellular and molecular approaches.

Paré A. et al. [3] note that the oral cavity is the most common anatomical site of malignant neoplasms of the upper digestive tract. Squamous cell carcinoma is the most common histological type and accounts for more than 95% of oral cancers. The main risk factors are exposure to tobacco and alcohol, and potentially malignant lesions. These precancerous lesions are a chronic disease of the oral mucosa and are responsible for about 20% of oral cancers. Treatment of oral cancer depends on the clinical, radiological and endoscopic stage and in accordance with the decision of the multidisciplinary oncological committee. Indeed, tumor staging provides information on locoregional and metastatic spread. Treatment may include surgery, radiation therapy, and chemotherapy. However, the prognosis mainly depends on the resectability of the tumor and the patient's comorbidities. Tumor removal is often associated with reconstructive procedures to restore phonation, swallowing, and breathing functions with an acceptable aesthetic result. The usual late diagnosis explains the poor prognosis of oral cancer, despite attempts to prevent relapses and use anti-relapse therapy. Indeed, the profile of tobacco smoking and alcoholism outside the medical system, the high relapse rate and the incidence of secondary primary malignancies explain the stable incidence over many years.

As indicated by Montero P.H. et al. [4], although early diagnosis of oral cancer is relatively easy, manifestations of late stages of the disease are not uncommon. The standard of care is primary surgical resection with or without postoperative adjuvant therapy. Improvements in surgical techniques combined with the routine use of postoperative radiation or chemoradiation therapy have resulted in improved survival. Successful treatment relies on multidisciplinary treatment strategies to maximize oncologic control and minimize the impact of therapy on form and function. Prevention of oral cancer requires better education about lifestyle risk factors, as well as increased awareness and tools for early diagnosis.

Wong T. et al. [5] emphasize that the treatment of oral cancer is an interdisciplinary task, since each patient poses a unique set of problems to treating physicians, the solution of which affects both survival and quality of life. This article focuses on the treatment of oral cancer. The authors highlight the epidemiology and risk factors of oral cancer in Australia, various clinical manifestations and the course of the oncological process at various stages of the disease. In the vast majority of cases, surgery remains the main treatment method. Radiation medical oncology techniques are typically used in the adjuvant context. Dental professionals play a critical role in many stages of treatment, from initial identification to optimizing dental health before treatment and managing the short- and long-term effects of treatment. Monitoring for relapses and the development of second primary tumors is key.

D'souza S. et al. [6] in their literature review, which concerns the prevention of this pathology, say that oral cancer creates an alarming situation throughout the world and causes global concern, since it is the 11th most common carcinoma in the world. After cardiovascular disease, cancer is the next biggest killer. Approximately 90% of all oral malignancies are squamous cell carcinoma. The etiological basis of oral cancer is tobacco use, smoking, smokeless tobacco (snuff or chewing tobacco), alcohol and areca nut consumption, excessive sun exposure, reverse smoking and human papillomavirus (HPV). Treatments for oral cancer are very expensive and accessibility is low. Therefore, taking preventative measures in the first place is of great importance in itself. Prevention is an interdisciplinary approach involving coordinated efforts from

all sectors of society. Preventive measures are divided into primary, secondary and tertiary. Along with various screening tests used to detect oral cancer, the review focuses on biomarkers, melatonin, tea components, polyphenols, chemoprevention, Chios mastic extract, optical imaging agent targeting poly (ADP-ribose) polymerase 1 (PARP1), and their role in the prevention and control of oral cancer.

As for the development of the oncological process and the clinical picture, in the initial period there are painless nodules, compactions, superficial ulcers or cracks that are not amenable to conservative treatment. Patients may also complain of discomfort when eating in the form of burning or tingling. In the developed period, pain is observed in almost 100% of cases and can have varying intensity and radiate to the ear and temporal area. Due to the addition of a secondary infection and the disintegration of the tumor, foul odor appears from the mouth. The tumor is characterized by three forms of growth: exophytic, endophytic (ulcerative, infiltrative or ulcerative-infiltrative) or mixed. In the exophytic form, mushroom-shaped, plaque-like growths on the mucous membrane with clear boundaries are noted. In the endophytic form, the ulcer may be limited to a tumor ridge, and the tumor may spread deep into the tissues in the form of an infiltrate without clear boundaries. In the advanced period, there is massive destruction of surrounding tissues involving bone structures, the vestibule of the mouth, skin, and muscles [1].

The diagnosis is established on the basis of: 1) anamnestic data, namely the presence of a neoplasm that is not amenable to conservative treatment within 2-3 weeks; 2) physical examination, including a thorough clinical examination, palpation of the formation and adjacent tissues and regional lymph nodes; 3) cytological examination of scrapings, smears, punctate from the primary tumor, punctate from enlarged or suspicious lymph nodes; 4) pathological examination of biopsy (surgical) material; 5) instrumental examination methods, including ultrasound examination of oral tissues, ultrasound of the neck, computed tomography (CT)/magnetic resonance imaging (MRI), positron emission computed tomography, fibrolaryngoscopy according to indications [1].

Regarding diagnosis, Bron G. et al. in their work [7] describe a new dynamic CT method "Mouth open with tongue extended" which, according to the authors, can optimize TNM staging of oral and oropharyngeal cancer. Colleagues describe that cross-sectional imaging is essential to determine the local extent of oral and oropharyngeal cancers and determine TNM staging, but complex anatomy and frequent dental metal artifacts make this difficult. This study assessed the clinical benefit of the dynamic mouth-open-tongue-out maneuver on CT (CTmote) compared with conventional CT (CTconv) and MRI. Retrospectively, the study included 58 patients with histologically confirmed cancer of the oral cavity - 34 patients, oropharynx - 24 patients. All of them underwent endoscopy with biopsy, MRI, and CT. Data were divided into 3 data sets, and measurements were performed blinded by 2 independent radiologists. The gold standard was pTNM in 31% of cases; otherwise, cTNM obtained at a multidisciplinary team meeting using endoscopy and biopsy mapping was used. CTmote was applicable to all patients, including those already treated with surgery or radiation therapy. Accurate TNM staging was obtained in 68%, 83%, and 83% of cases on CTconv, CTmote, and MRI, respectively. The best pairwise comparison exam scores were 3%, 47%, 50% for CTconv, CTmote, and MRI, respectively. CTmote and MRI observer agreements, image quality, and confidence ratings were comparable and higher compared with CTconv ( $p < 0.001$ ). As a result of the data obtained, the researchers concluded that CTmote improves the assessment of the stage of tumors of the oral cavity and oropharynx compared to CTconv, while its performance is close to that of MRI. In clinical practice, the combination of CT with "Mouth open with tongue extended" maneuver and MRI appears to be the optimal imaging strategy for local staging.

A similar study on a comprehensive evaluation of the dynamic open mouth maneuver and an algorithm for reducing metal artifacts on CT images of the oral cavity and oropharynx was

carried out by Bae Y.J. et al. [8]. The purpose of the study was to determine the optimal utility of the open mouth technique and the orthopedic implant metal artifact reduction (O-MAR) technique for oral and oropharyngeal CT. Between July 2017 and May 2019, this retrospective study included 59 subjects who underwent both conventional head and neck CT and open-mouth head and neck CT. All images were reconstructed using the O-MAR algorithm. Using conventional CT with/without O-MAR (CTc\_O/CTc) and open-mouth CT with/without O-MAR (CTo\_O/CTo), one reader measured noise levels in several anatomical areas of the oral cavity and oropharynx. Visual scores for banding artifact and overall subjective image quality were assessed by two independent readers. The following results were obtained. For the mobile tongue, retromolar trigone, and tonsil, mean noise was significantly lower and mean visual scores were significantly higher with CTo than with CTc or CTc\_O (all  $p < 0.001$ ). Mean vision scores were higher with CTo\_O than with CTo for the mobile tongue and tonsil (all  $p < 0.001$ ). In contrast, for the floor of the mouth and base of the tongue, mean noise was significantly higher with CTo\_O than with CTc or CTc\_O, and mean visual scores were significantly higher with CTc than with CTo or CTo\_O (all  $p < 0.001$ ). Conclusions: The open mouth maneuver and O-MAR technique may have different effects on CT image quality depending on the anatomical areas of the oral cavity and oropharynx.

In addition, there are data from Tota J.E. et al. [9] on inflammatory conditions of the tongue and the risk of oral cancer. The authors note that the incidence of tongue and oral cavity cancer has increased since the 1980s among men and women in the United States for unknown reasons. The association of inflammatory diseases of the tongue with the risk of oral cavity and oropharyngeal cancer among older adults in the United States (age 65 years and older) was examined. The researchers conducted a case-control study (2,534 oral cancers, 6,832 other oral cancers, 9,373 oropharyngeal cancers, and 200,000 controls) within the SEER-Medicare dataset (1992–2013). Medicare records were used to identify patients with clinically diagnosed inflammatory conditions of the tongue (glossitis, benign migratory glossitis, median rhomboid glossitis, atrophic glossitis, glossodynia, other specified conditions (eg, atrophy and hypertrophy), and other unspecified conditions) and precancerous oral conditions (leukoplakia /erythroplakia). Only conditions preceding cancer/control selection by more than 12 months were included. The following results were obtained. The prevalence of tongue inflammatory disease was significantly higher in patients with tongue cancer than in controls (6.0% vs. 0.6%; odds ratio [OR] adjusted for age, gender, race, Medicare use, and precancerous lesions, 5.8 [95% confidence interval (CI), 4.7-7.2]). This overall association was primarily due to glossitis - 5.6 (95% CI 4.4 to 7.2); other specified conditions - 9.1 (95% CI 5.5 to 15.2); and other unspecified conditions – 13.7 (95% CI 8.0 to 23.7). These associations remained strongly elevated for more than 5 years before tongue cancer (argument against reverse causation), in specialist-diagnosed conditions (argument against misclassification), and among patients who had an oral biopsy (argument against missing cancer). In 2013, approximately 1 in 11 patients with tongue cancer had previously been diagnosed with inflammatory tongue disease. Associations with inflammatory tongue disease were relatively weak for other oral cancers (OR 1.8 [95% CI 1.5 to 2.3]) and oropharyngeal cancers (OR 1.3 [95% CI 1.0 to 1.6]) and were observed only in those closest to the diagnosis of cancer. The authors concluded that inflammatory diseases of the tongue are associated with a significantly increased risk of oral cancer and precede cancer diagnosis by several years, highlighting the need for increased clinical surveillance among patients with such apparently benign diagnoses.

Tang M. et al. [10] emphasize that the molecular etiology and pathogenesis of tongue cancer remains unclear. In their study, the authors elucidated the pathogenesis of tongue cancer and explored new potential diagnostic and therapeutic targets. Four matched pairs of cancerous and paracancerous tongue tissues were collected for RNA sequencing (RNA-Seq) and differentially expressed genes were analyzed. RNA-Seq data from tongue cancer tissues were further analyzed using bioinformatics and quantitative reverse transcription-PCR analysis. Sequenced reads were

quantified and qualified according to analysis requirements. Transcriptomes of tongue cancer tissues and paired paracancerous tissues were analyzed, and 1700 upregulated genes and 2249 downregulated genes were identified. Gene Ontology analysis revealed significant enrichment of terms related to extracellular matrix (ECM) organization, cell adhesion, and collagen catabolic processes. Kyoto Encyclopedia of Genes and Genomes analysis revealed that these differentially expressed genes were mainly present in the focal adhesion pathway, ECM-receptor interaction pathway, phosphoinositide 3-kinase (PI3K)-Akt pathway, and cell adhesion molecules. Comprehensive gene tree and pathway network analysis revealed that most cell cycle genes were upregulated, while most genes related to intracellular response, cell adhesion, and cell differentiation were downregulated. The ECM receptor, focal adhesion kinase (FAK) and PI3K-Akt pathways were closely related to each other and occupied key positions in differential signaling pathways. The ECM receptor, FAK, and PI3K-Akt signaling pathways have been found to synergistically contribute to the initiation and progression of tongue cancer and may serve as potential diagnostic and therapeutic targets for this type of cancer.

Malignant neoplasms of the oropharynx - a malignant tumor affecting the middle part of the pharynx; the border is a line drawn along the anterior palatal arches, roller-shaped papillae of the tongue, along the border of the soft and hard palate. The upper boundary of the oropharynx is a horizontal plane passing at the level of the hard palate, the lower is a horizontal plane located at the level of the highest point of the free edge of the epiglottis. Risk factors for oropharyngeal cancer: the presence of untreated inflammatory and precancerous diseases of the oropharynx (chronic ulcers from dentures, leukoplakia, erythroplakia); bad habits (smoking, alcohol abuse); genetic predisposition (presence of malignant diseases in relatives); carriage of human papillomavirus (HPV) (type 16,18) [11].

HPV is an important risk factor for oropharyngeal cancer and is associated with better treatment responses compared with non-HPV oropharyngeal cancer. Regardless of location, there are no clinically available biomarkers for the early detection of these cancers, and many are detected at advanced stages and have poor 5-year survival rates [12].

As noted by Poelman M.R. et al. [13], worldwide, as well as in the Netherlands, there has been an increase in the incidence of oropharyngeal cancer caused by HPV. This type of cancer occurs more often at a younger age than classic oropharyngeal cancer, which is usually caused by smoking and excessive alcohol consumption. Most often, the tumor occurs in the tonsils and at the base of the tongue. This study examined dentists' knowledge of oropharyngeal cancer, its association with HPV, and their willingness to play a role in prevention. 7,364 digital questionnaires were sent to dental providers and data from 607 dentists were analyzed. More than half of the respondents answered 48% of knowledge questions correctly. Significantly more female caregivers were aware of the relationship between HPV and oropharyngeal cancer and the availability of the HPV vaccine. Respondents felt it was important to discuss the relationship between HPV and oropharyngeal cancer with patients and to develop a protocol that would be useful in screening for oral and throat cancer.

Menezes F.D.S. et al. [14] note that HPV is responsible for the increased incidence of cancer in the oropharynx, tonsils, and base of the tongue (i.e., sites associated with HPV). HPV has caused changes in the epidemiology of oropharyngeal and oral cavity cancer (OPC/OCC) in Asia, Europe, North America and Oceania. Thus, cancer incidence in HPV-associated regions increases while in other non-HPV-associated regions decreases. In South America, although the incidence of HPV-positive tumors is gradually increasing, there is an atypically low prevalence of HPV in people with OPC/OCC. To examine whether this dramatic shift in incidence trends also occurred in this population, the authors assessed the burden of HPV on OPC/OCC incidence trends in the city of São Paulo in Brazil. In this population-based study, we classified OPC/OCC into HPV-related and non-HPV-related subsites. Brazilian colleagues used Poisson regression to estimate age-

standardized incidence rates (ASRs) stratified by gender and age group and to examine age cohort effects. There were 15,391 cases of OPC/OCC diagnosed in HPV-related ( $n = 5898$ ; 38.3%) and non-HPV-related ( $n = 9493$ ; 61.7%) subdistricts. Overall, ASRs decreased for most sites, for both sexes, and for all age groups, with the exception of HPV-related OPC/OCC in young men and women, which increased by 3.8% and 8.6% per year, respectively. When analyzing the effect by birth cohort, the authors found an increased risk of HPV-related OPC/OCC in both sexes in recent birth cohorts; however, this risk was sharply reduced in non-HPV sites. Our data demonstrate an increasing risk of developing HPV-associated OPC/OCC in young adults, supporting the need for prophylactic HPV vaccination in this group.

According to Fan K.M. et al. [15] the incidence of oropharyngeal cancer is rapidly increasing throughout Australia, particularly among men. Although the proportion of cases in the country caused by HPV is unknown, it is clear that vaccination has not yet had any impact. The aim was to analyze trends in oropharyngeal cancer incidence in Australia from 1982 to 2017, with implications for prevention. Data were obtained from the Australian Cancer Database, compiled by the Australian Institute of Health and Welfare. An analysis of connection points is presented. There was a striking increase in the age-standardized incidence rate by more than 1.5 times; the most significant increase occurred between 2007 and 2017 with an annual percentage change (APC) of +5.24% ( $p < 0.001$ ). A slow but gradual increase in age-standardized incidence rate was observed in women with a statistically significant APC of +1.02% ( $p < 0.001$ ). Statistically significant bimodal trends of increasing APC were also observed in overall age-standardized incidence rate. These growing trends are largely due to the increase in the practice of oral sex. The largest number of cases of the disease were detected in patients aged 55-69 years, which is associated with ongoing exposure to alcohol and tobacco. Between 1982 and 2017, the most common areas affected were the base of the tongue and the oropharynx.

Sharma D. et al. [16] studied treatment outcomes for oral and oropharyngeal cancer in young adults. As the authors note, the incidence of oral squamous cell carcinoma (young age  $< 40$  years) ranges from 0.4% to 3.9%. As many studies show, there is a growing trend in the younger age group across the world as well as in India. The aim of the study was to compare the clinicopathological profile, treatment and outcome of squamous cell carcinoma of the oral cavity and oropharynx in a young age group  $< 40$  years. This retrospective observational study was conducted by obtaining data from a selected cohort from 2013 to 2015. Patients were divided into 2 groups: group 1 (10-30 years) and group 2 (31-40 years) for comparison. SPSS software version 16 was used for statistical analysis. A cohort of 217 patients was analyzed. The male to female ratio was 11:1. The most common areas of primary tumor were the tongue and buccal mucosa. The primary location of oropharyngeal cancer was present in 3 (5.17%) and 22 (13.83%) patients, respectively, in the two groups. The mean overall survival in the two groups was 22.53 and 25.14 months, respectively ( $P = 0.119$ ). The median disease-free survival in the two groups was 7 and 8 months, respectively. The present study showed that the incidence of oropharyngeal cancer increases with age; however, the course of the tumor process is more aggressive in the younger age group under 30 years of age.

Mäkinen L.K. et al. in their work [17], concerning the neglect and survival of patients with cancer of the tongue, oral cavity and oropharynx, provide the following data: approximately 30 to 40% of all patients with tongue cancer still die from this disease within five years. Early diagnosis of the disease is vital because treatment in this case will cause much less harm. The diagnosis is confirmed by a histological sample, which should be taken from each suspicious lesion and easily collected under local anesthesia using a punch. Already when seeking treatment, 25% of patients with tongue cancer are found to have metastases in the neck, which affect the prognosis. Heavy tobacco and alcohol use are the most important risk factors for tongue cancer.

Bai X.X. et al. [18] in a 10-year continuous single-center study and analysis of primary

squamous cell carcinoma of the oral cavity and oropharynx found that among Beijing inhabitants who were diagnosed with cancer of the oral cavity and oropharynx, more than half were at an advanced stage, and the stage of cancer was the main prognostic factor oral cancer. The authors note that it is therefore necessary to strengthen recognition of oral cancer, as well as ensure its early detection and treatment to improve survival. This study aimed to describe some of the characteristics of the inhabitants of Beijing with oral and oropharyngeal squamous cell carcinoma who had received treatment at the Stomatology Hospital of Peking University and to analyze the survival rate and the prognostic factors of patients following surgical treatment. Data for 603 consecutive cases of primary oral cavity and oropharyngeal cancer between 2004 and 2013 were obtained from the Stomatology Hospital of Peking University. Clinical data including age, gender, living district, localization of the primary tumor, TNM stage, history of drinking and smoking, pathological differentiation, treatment, and survival were retrospectively analyzed. The male to female ratio was 1.1:1. The following results were obtained. The frequency of localization lesions in descending order: tongue (34.3%), gums (25.0%), buccal mucosa (13.8%), floor of the mouth (9.0%), oropharynx (8.5%), lip (6.3%) and palate (3.2%). Female patients with cancer of the oral cavity and oropharynx were significantly older than males ( $p < 0.05$ ). The proportion of patients with TNM stage III-IV cancer of the oral cavity and oropharynx was 52.4%. The results revealed that 65.3% of male patients and only 6.3% of female patients smoked or drank. The overall 5-year survival rate was 64%. Female patients had a worse prognosis than male patients. Among the patients who received surgery, tumor size and lymph node involvement were independent prognostic factors. Smoking and drinking were not prognostic factors.

Su W.W. et al. [19] assessed the effect of different anatomical areas on the late stage and survival of oral cancer (a 9-year prospective cohort of 27,717 cases in a population-based imaging program in Taiwan from 2004 to 2009) and analyzed the effect of different anatomical areas on the advanced stage and survival of oral cancer mortality from oral cancer found that, using lip cancer as the reference, the OR (95% CI) for advanced cancer was 2.20 (1.92-2.51) for the tongue, 2.60 (2.28-2.97) for the buccal area, 2.68 (2.20-3.28) for the floor of the mouth, 2.96 (2.52-3.47) for the hard palate, 6.04 (5.17-7.05) for the gums and 10.83 (9.20-12.74) for the oropharynx. Estimated hazard ratios (95% CI) for oral cancer mortality increased from 1.48 (1.31-1.67) in buccal area, 1.61 (1.43-1.82) in tongue, 1.68 (1.41-1.99) in the floor of the mouth, 1.79 (1.57-2.05) in the gum, 1.97 (1.71-2.26) in the hard palate and 2.15 (1.89-2.45) in the oropharynx. The conclusions are that differences in advanced stage and mortality from oral cancer were observed across anatomical areas and vigilant surveillance is required.

Jehn P. et al. [20] studied survival depending on tumor location in patients undergoing surgical treatment for cancer of the oral cavity and oropharynx. In a retrospective study, tumor lesions in 1486 patients were divided into 6 groups depending on tumor location. Patient age, gender, classification of tumor nodes and metastases, resection status, 5-year and disease-specific survival were statistically analyzed between groups. The results showed significantly lower disease-specific and lower 5-year survival rates for tumors located at the base of the tongue, oropharynx, due to higher disease stage and incomplete resection status. Metastases to the cervical lymph nodes and distant spread of metastases were more often observed when the base of the tongue and oropharynx were affected. In conclusion, the authors indicate that careful examination and precise clinical examination of specific areas of the oral cavity and oropharynx are critical for early diagnosis and treatment. The location of tumors in the oral cavity and oropharynx plays an important role in the prognosis of the disease.

Dhanireddy B. et al. [21] indicate that optimal treatment strategies for oropharyngeal squamous cell carcinoma remain unclear. When evaluating the results of treatment of surgically resectable oropharyngeal cancer with transoral robotic surgery (TORS) compared with radical chemoradiotherapy, researchers found that although there were no significant differences in

survival between treatment groups, they persisted despite an increased coincidence index in surgical patients. Given the potential for de-escalation and/or withdrawal of adjuvant therapy, especially in a less healthy population, TORS may prove to be the viable treatment option that it has become. The purpose of this study was to examine the effect of TORS on functional and long-term outcomes. A retrospective review of patients with tonsil and base of tongue cancer who underwent TORS with neck dissection  $\pm$  adjuvant therapy between January 2011 and December 2016 was used and compared with a matched cohort of patients receiving primary chemoradiotherapy. Demographic, treatment, and outcome data were collected. Fifty-four patients received primary chemoradiotherapy, and 65 patients (surgical group) received TORS  $\pm$  adjuvant therapy for clinical stage disease meeting study criteria. 25% (n=17) were treated with surgery alone. The remainder of the surgical group received postoperative radiation therapy (n=48), half of whom received adjuvant chemotherapy in addition to radiation therapy (n=24). 63% (n=41) of patients had no risk factors for chemotherapy. No differences in overall or disease-free survival were observed with TORS compared with chemoradiotherapy (p=0.9), although the Charlson coincidence index was higher in the surgical group (p=0.01). The strongest predictor of long-term gastrostomy tube use was found to be comorbidities rather than treatment (p=0.03), with no significant differences beyond 12 months.

Now, as for this pathology in our country. The incidence of cancer of the oral cavity and oropharynx (including cancer of the tongue and Kaposi's sarcoma of the palate) in the Republic of Kazakhstan in 2022 was 2.5 (3.0 - men; 2.0 - women) per 100 thousand population, which in absolute numbers amounted to 483 people, taking 18th rank place, just like the year before. The share of cases diagnosed for the first time in life, recorded by oncology organizations, was 1.4%. At the same time, 283 men fell ill (specific gravity - 1.9%, rank 14), women - 200 (specific gravity - 1.0%, rank 18) [22].

The incidence of cancer of the oral cavity and oropharynx is higher than the national average in 10 regions of the country: North Kazakhstan – 5.8 (maximum rate); East Kazakhstan – 4.4; Karaganda and Pavlodar - 4.1; Kostanay - 3.9; Akmola - 3.7; Abay - 3.4; West Kazakhstan - 2.8; Atyrau and Aktobe - 2.6. The indicator is less than the national average in 9 regions: in Turkestan - 0.8 (the lowest level); Astana city – 1.5; Zhambyl - 1.6; Almaty and Shymkent city - 1.7; Kyzylorda - 1.8; Almaty city – 1.9; Zhetysu and Mangistau regions - 2.4 per 100 thousand population.

The mortality rate from this pathology was 1.3 (men - 1.8; women - 0.8) per 100 thousand population. In the structure of causes of mortality for both sexes in 2022, it ranks 15th, amounting to 1.9%, and in absolute numbers - 253 people (173 men and 80 women).

The regions where the mortality rate from cancer of the oral cavity and oropharynx is higher than the national average (1.3 per 100 thousand population) include: North Kazakhstan – 3.3 (maximum level); Abay - 3.1; West Kazakhstan – 2.3; East Kazakhstan - 2.2; Almaty city – 1.9; Kostanay - 1.7; Pavlodar - 1.6 and Akmola - 1.5. The lowest indicators were noted in Shymkent city - 0.5 (minimum level); Turkestan - 0.7; Almaty and Mangistau – 0.8; Atyrau, Karaganda, Kyzylorda and Astana city - 0.9; Aktobe – 1.0; Zhetysu - 1.1 and Zhambyl - 1.2 regions per 100 thousand population [22].

At the same time, the one-year mortality rate was 26.9%, occupying a high 7th ranking place for this indicator. The ratio between one-year mortality and neglect (stage IV) was 1.9 in 2022. Let us recall that the furthest distance from “1” is the worst ratio between the indicators of one-year mortality and neglect. This localization of malignant neoplasms took 12th rank after esophageal cancer - 5.2; lips – 4.0; cervix – 3.5; malignant lymphomas, malignant neoplasms of the skin, laryngopharynx – 2.8; malignant tumors of connective and soft tissues, liver, bladder – 2.4; larynx – 2.3; uterine body – 2.1; ovaries – 2.1.

It should also be noted that during preventive examinations in 2022, cancer of the oral cavity and oropharynx (including cancer of the tongue and Kaposi's sarcoma of the palate) can be

classified as actively detected tumors with a significant increase compared to the level of 2021: the proportion of patients identified during medical examinations was 73.7% (59.2% in 2021).

At the same time, the proportion of patients identified during preventive examinations in the early stages in 2022 was 65.5%, while a year earlier it was 2.7% more (68.2%).

The regions where the proportion of patients with stages I-II of the pathology in question is above the national average (56.3%) include the following regions: Aktobe - 83.3% (maximum figure); Mangistau – 82.4%, Kyzylorda – 80.0%; Zhambyl - 78.9%; Almaty – 76.0%; Pavlodar - 71.0%; Zhetysu – 70.6%; Atyrau – 66.7%; North Kazakhstan - 63.3% and Almaty city - 63.2%.

The lowest rates of early diagnosis were found in Abay - 19.0%; Kostanay - 27.3%; Astana city – 31.6%; Akmola - 39.3%; West Kazakhstan - 42.1%; Turkestan - 47.1%; Karaganda - 49.1%; Shymkent city - 50.0% and East Kazakhstan - 53.1% regions of the country [22].

Of course, it is necessary to take into account migration processes and other factors influencing early diagnosis rates, but nevertheless, the results speak for themselves.

For cancer of the oral cavity and pharynx, the level of morphological verification in the country was 97.4%; at the same time, in 9 regions a 100% result was achieved; in the Kyzylorda region - the fourth year the worst result in the country - 80.8%, below the average level in the Mangistau - 85.7%, Pavlodar - 94.5%, Akmola - 95.1% and Turkestan - 95.2% regions.

The share of stage IV cancer of the oral cavity and oropharynx among all nosological forms of malignant neoplasms was 16.8%, occupying, together with kidney cancer, a fairly high 8th rank place in this indicator.

The share of stage IV above the national average was noted in 5 regions of the country: Akmola - 39.3% (maximum level); Abay - 38.1%; Karaganda - 35.8%; Astana city - 26.3% and East Kazakhstan - 21.9%.

The proportion of stage IV is less than the national average in 14 regions of the country: Zhambyl and Aktobe - 0.0% (not a single patient); Pavlodar - 3.2%; Atyrau – 5.6%; Almaty - 8.0%; Almaty city – 10.5%; Zhetysu, Mangistau and Turkestan – 11.8%; Kostanay - 12.1%; Kyzylorda and North Kazakhstan – 13.3%; Shymkent city - 15.0% and West Kazakhstan - 15.8% [22].

Statistical data on patients diagnosed with malignant neoplasms, being under observation for five years or more, and continuing to be observed in 2022, showed that the number of patients under the supervision of oncological organizations in Kazakhstan for more than five years continued to grow and at the end of the reporting year amounted to 110,790 people, with an increase of 6.6% (2021 year – 103,935 people, +4.4%) (form No. 7). The share of this category of patients or five-year survival rate for malignant neoplasms with a growing trend is 55.3% (55.0% in 2021).

We cannot ignore such an important clinical aspect as the coverage in the Republic of Kazakhstan of special treatment for patients diagnosed for the first time in their lives with cancer of the oral cavity and oropharynx. At the end of 2022, the absolute number of people who completed specialized treatment was 244 people, and 152 patients were continuing treatment. The following results were obtained in percentage terms by methods and types of treatment. 17.6% of patients received surgical treatment only, 11.5% only radiation treatment, 18.4% only drug treatment, 16.4% combined treatment, 24.2% complex treatment, and 8.6% chemo-radiation treatment.

Next, with regard to five-year survival rate of patients. As for cancer of the oral cavity and oropharynx, at the end of 2022, 1,858 people or 9.5 per 100 thousand people were registered at the dispensary. At the end of 2021, there were 1,780 patients or 9.3 per 100 thousand population, respectively.

At the same time, the mortality rate of the observed contingents in 2022 decreased compared to the previous year and amounted to 13.6% in 2022 (15.2% in 2021).

The five-year survival rate of patients with cancer of the oral cavity and oropharynx was

44.2% in 2022 and 42.5% in 2021 [22].

Summarizing the above, we can conclude that cancer of the oral cavity and oropharynx occupies a significant place among all malignant neoplasms, ahead of the “grands” of oncological pathology in some indicators. At the same time, despite the fact that oral cancer and, of course, tongue cancer are among visually accessible localizations, this pathology continues to be a serious problem in modern clinical oncology. Great variability of symptoms, its similarity with inflammatory and other processes, leads to neglect of the disease. All this requires both oncologists and, first of all, primary health care workers, ENT doctors and dentists to increase the level of cancer alertness, inform the population about early symptoms that may indicate this pathology or the onset of proliferative changes and carrying out other high-tech preventive and diagnostic measures and, as a result, timely treatment.

An epidemiological assessment of the situation with cancer of the oral cavity and oropharynx in our country suggests that there are sometimes significant differences across regions not only in incidence rates, but also in the parameters of early diagnosis and mortality from this pathology. At the same time, it should be noted that a significant percentage of patients are actively detected during preventive examinations, which makes these activities indispensable in the general algorithm for early diagnosis and prevention of this pathology.

## LITERATURE

1 Klinicheskij protokol diagnostiki lechenija «Zlokachestvennye novoobrazovanija polosti rta» - Odobren Ob#edinennoj komissiej po kachestvu medicinskih uslug Ministerstva zdavoohranenija Respubliki Kazahstan ot «07» marta 2019 goda, Protokol №57 – 38 s (In Russ.).

2 Inchingolo F., Santacroce L., Ballini A. et al. Oral Cancer: A Historical Review. *Int J Environ Res Public Health*. 2020 May 2;17(9):3168. doi: 10.3390/ijerph17093168.

3 Paré A, Joly A. Oral cancer: Risk factors and management *Presse Med*. 2017 Mar;46(3):320-330. doi: 10.1016/j.lpm.2017.01.004.

4 Montero P.H., Patel S.G. Cancer of the oral cavity. *Surg Oncol Clin N Am*. 2015 Jul;24(3):491-508. doi: 10.1016/j.soc.2015.03.006.

5 Wong T., Wiesenfeld D. Oral Cancer. *Aust Dent J*. 2018 Mar;63 Suppl 1:S91-S99. doi: 10.1111/adj.12594.

6 D'souza S., Addepalli V. Preventive measures in oral cancer: An overview. *Biomed Pharmacother*. 2018 Nov;107:72-80. doi: 10.1016/j.biopha.2018.07.114.

7 Bron G., Scemama U., Villes V. et al. A new CT dynamic maneuver "Mouth Opened with Tongue Extended" can improve the clinical TNM staging of oral cavity and oropharynx squamous cell carcinomas. *Oral Oncol*. 2019 Jul;94:41-46. doi: 10.1016/j.oraloncology.2019.04.023.

8 Bae Y.J., Kim T.E., Choi B.S. et al. Comprehensive assessments of the open mouth dynamic maneuver and metal artifact reduction algorithm on computed tomography images of the oral cavity and oropharynx. *PLoS One*. 2021 Mar 18;16(3):e0248696. doi: 10.1371/journal.pone.0248696.

9 Tota J.E., Engels E.A., Lingen M.W. et al. Inflammatory Tongue Conditions and Risk of Oral Tongue Cancer Among the US Elderly Individuals. *J Clin Oncol*. 2023 Nov 30;JCO2300729. doi: 10.1200/JCO.23.00729.

10 Tang M., Dai W., Wu H. et al. Transcriptome analysis of tongue cancer based on high-throughput sequencing. *Oncol Rep*. 2020 Jun;43(6):2004-2016. doi: 10.3892/or.2020.7560. Epub 2020 Mar 23.

11 Klinicheskij protokol diagnostiki lechenija «Zlokachestvennye novoobrazovanija rotoglotki» - Odobren Ob#edinennoj komissiej po kachestvu medicinskih uslug Ministerstva zdavoohranenija Respubliki Kazahstan ot «07» marta 2019 goda, Protokol №57 – 40 s (In Russ.).

12 Leung L.L., Riaz M.K., Qu X. et al. Profiling of extracellular vesicles in oral cancer, from transcriptomics to proteomics. *Semin Cancer Biol.* 2021 Sep;74:3-23. doi: 10.1016/j.semcancer.2021.01.002.

13 Poelman M.R., Brand H.S., de Visscher J.G.A.M. et al. Knowledge of Dutch dentists regarding HPV associated cancer of the oropharynx. *Ned Tijdschr Tandheelkd.* 2021 Nov;128(11):557-563. doi: 10.5177/ntvt.2021.11.21073.

14 Menezes F.D.S., Latorre M.D.R.D.O., Conceição G.M.S. et al. The emerging risk of oropharyngeal and oral cavity cancer in HPV-related subsites in young people in Brazil. *PLoS One.* 2020 May 14;15(5):e0232871. doi: 10.1371/journal.pone.0232871.

15 Fan K.M., Sprague S., Zhang P. et al. Rates of oropharyngeal cancer continue to rise steeply amongst Australian men. *Oral Dis.* 2023 Jul;29(5):1959-1966. doi: 10.1111/odi.14202.

16 Sharma D, Singh G. Squamous cell carcinoma of the oral cavity and oropharynx in young adults. *Indian J Cancer.* 2016 Jul-Sep;53(3):399-401. doi: 10.4103/0019-509X.200681.

17 Mäkinen L.K., Hagström J., Mäkitie A. et al. Cancer of the tongue - early detection improves the prognosis. *Duodecim.* 2016;132(22):2063-70.

18 Bai X.X., Zhang J., Wei L. Analysis of primary oral and oropharyngeal squamous cell carcinoma in inhabitants of Beijing, China - a 10-year continuous single-center study. *BMC Oral Health.* 2020 Jul 17;20(1):208. doi: 10.1186/s12903-020-01192-6.

19 Su W.W., Su C.W., Chang D.C. et al. Impact of varying anatomic sites on advanced stage and survival of oral cancer: 9-year prospective cohort of 27717 cases. *Head Neck.* 2019 May;41(5):1475-1483. doi: 10.1002/hed.25579.

20 Jehn P., Dittmann J., Zimmerer R. et al. Survival Rates According to Tumour Location in Patients With Surgically Treated Oral and Oropharyngeal Squamous Cell Carcinoma. *Anticancer Res.* 2019 May;39(5):2527-2533. doi: 10.21873/anticancer.13374.

21 Dhanireddy B., Burnett N.P., Sanampudi S. et al. Outcomes in surgically resectable oropharynx cancer treated with transoral robotic surgery versus definitive chemoradiation. *Am J Otolaryngol.* 2019 Sep-Oct;40(5):673-677. doi: 10.1016/j.amjoto.2019.06.001.

22 Kaidarova D.R., Shatkovskaya O.V., Ongarbayev B.T., Seisenbayeva G.T., Azhmagambetova A.E., Zhylkaidarova A.Zh., Lavrentieva I.K., Sagi M.S. Indicators of the oncology service of the Republic of Kazakhstan, 2022: statistical and analytical materials – Almaty, 2023. – 430 p.

# ВОЗРАСТНЫЕ АСПЕКТЫ НЕСПЕЦИФИЧЕСКИХ СИСТЕМ ГОЛОВНОГО МОЗГА ЖЕНЩИН В ДНИ С РАЗЛИЧНОЙ ГЕОМАГНИТНОЙ ОБСТАНОВКОЙ ЗЕМЛИ

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Воздействие внешней среды на физиологические системы человека является мультидисциплинарной проблемой, находящейся под пристальным вниманием ученых разных специальностей. Среди значимых компонентов внешней среды особого внимания заслуживает воздействие магнитной обстановки Земли на организм человека, зависящей от Солнечной активности. Головной мозг человека с его суммарной нейрональной активностью наиболее подвержен воздействию внешних электромагнитных колебаний. Вопросы, связанные с влиянием магнитной обстановки на структуру биоэлектрической активности головного мозга, отражающей состояние неспецифических систем, недостаточно изучены и крайне скудны возрастно-половые, межвозрастные аспекты проблемы.

В настоящей работе представлен сравнительный анализ структуры биоэлектрической активности головного мозга (ЭЭГ) здоровых женщин зрелого (30-35 лет) и пожилого (60-65 лет) возрастов в спокойные дни -Кр-1 и в дни возмущения геомагнитной обстановки-Кр-4 Земли. Программами «Нейрон-Спектр-NET» анализировались лишённые артефактов 10-секундные участки ЭЭГ обоих полушарий лобных, центральных, теменных, затылочных и височных областей, записанных на энцефалографе «Нейрон-Спектр-5» по Международной схеме 10-20. Анализу подвергались индексные и частотно-амплитудные характеристики всего массива данных.

В обеих возрастных группах женщин характерными изменениями, при смене гелиогеомагнитной ситуации, было снижение процентной представленности ритмов (индексов) и изменения в частотных показателях. Межгрупповые различия в индексах альфа-дельта-тета-ритмов при активации геомагнитной обстановки (Кр-4), касались особенностей расположения изменений. У молодых женщин увеличение индекса носило локальный характер, преимущественно в темпоральных отделах, в пожилой же возрастной группе увеличение процентной выраженности ритмов прослеживалось диффузно. В обеих группах при смене геомагнитной ситуации также наблюдалась противоположная динамика бета-низко (бета-1) и высоко- (бета-2) частотных диапазонов. В группе молодых женщин активация геомагнитной ситуации вызывало повышение индекса бета-высокой

частоты, не затрагивая процентную представленность бета-ритма низкой частоты. В группе пожилых же женщин смена геомагнитной ситуации сопровождалась снижением индексов обоих диапазонов бета-ритма. В исследуемых группах частота альфа-диапазона в периоды усиления геомагнитной активности урежалась, а частота дельта-ритма увеличивалась. Межвозрастные различия наблюдались и в показателях частоты бета - диапазонов. У молодых женщин в геомагнитно активные дни наблюдалось урежение частоты бета-1 и повышение частоты бета-2 диапазона, в то время как для пожилых женщин особенностью являлось снижение частоты бета-2 ритма.

Полученные результаты свидетельствуют о том, что активация геомагнитной обстановки до уровня Кр-4 и у молодых и у пожилых женщин сопровождается усилением деятельности септо-гиппокампальной синхронизирующей системы и ее воздействием на корковые отделы головного мозга. При этом ее влияния в корковом направлении у женщин молодого возраста носят локальный, а у пожилых женщин - диффузный характер. У женщин пожилого возраста, в отличие от молодых, активация геомагнитной ситуации, также сопровождается снижением активности всего спектра десинхронизирующего звена восходящей неспецифической системы, в то время как у молодых женщин на этом фоне активируется восходящее десинхронизирующее звено, ее высокочастотный компонент. Что по-видимому, отражает включение защитных регулирующих механизмов, в ответ на усиление в корковом направлении влияний синхронизирующего звена неспецифических систем мозга.

## Literature

# Functionality of mythical memory in Movlud Suleymanli's novel «Nomad»

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Any reality in life is experienced once, an attempt to repeat it is nothing but imitation, and in itself such behavior has an archetypal and sacral function. The category of memory is aimed at restoring reality and, of course, cannot fully accomplish this function. National character has the process of transformation of the problem from any individual to society, nation and its archetype and transformation into sacred memory. The historical situation to a greater or lesser extent affects the functionalization of mythical memory in prose.

As we know, the functionalization of mythological memory in the novel acts as the main plot and compositional element in Movlud Suleymanli's novel *Nomad*. Starting from 1970, the mythological content and archetypal layer begins to function in Movlud Suleymanli's stories and narratives. Movlud Suleymanli, who began his work with short stories and narratives, in 1980 moved to the genre of novel with the work *Nomad*. The mythological content in the work, which is a reaction to the oblivion of national memory by the Soviet authorities, is multifaceted in terms of the expression of sacred memory.

In the novel, mythical memory is directly related to geographical space. In *Nomad* Ayririgar is mystified and becomes a factor expressing the past and historical memory of the people. From this point of view, Movlud Suleymanli's novel can be compared with Chingiz Aitmatov's work «*The Day Lasts More Than a Hundred Years*». In Chingiz Aitmatov's novel, Yedigey knows that he is a descendant of Naiman and considers Anabeit, where Naiman's mother is buried, as holy and wants to bury his faithful friend Gazangap there. The writer compares the iron wires around Anabeit to the pitch put on Jolaman to make him mangurt by Juanjuans. *"The writer unites vast contours in time and space, from the legend of the Juanjuans turning Naiman's son Jolaman into a mangurt, to the planet Torch, entering the utopian Sun of Gravity in his novel commencing by Boranli. All these lines are united within a day by Boranli Yedigey. Although Yedigey works as a laborer at the Boranli station, he has such a rich mind that he can think about a century in one day. Yedigey's memory chain stretches from Mother Naiman to Gazangap, from Boranli to space."* (Hasanli, 2020, p.128)

There are a number of similarities between Mevlud Suleymanli's novel and Yusif Samedoglu's novel *The Day of the Murder*, written at the same time, in terms of the concept of memory. In this novel, through the image of Kirlikir, the author summarizes the memory layer of several centuries. In Yusif Samadoglu's novel, there is a symbolic image of Kirlikir that connects three eras. The struggle of the rat, considered an unclean creature, with ugliness and evil in the garbage dump seems fair to the ruler and his descendants Salahov and Mukhtar Kerimli. During the period in question, the situation is so bad and dangerous that the rat, the king of uncleanness, is pure in comparison, and his attitude towards them seems natural. Kirlikir is a witness to the legacy of evil. The naming of Salahov as a descendant of the ruler defines the struggle derived from the content of the work. *«Salahov,» he said, «was the scourge of this world. It was the greatest scourge of this world.»* (Yusif, 2005, p. 74)

In *Nomad*, Qarakelle's roots travel the world and return to the original beginning, to Eyrigar. In the work, memory resides in the form of several generations, passed from father to son. The struggle with the neighboring Qanig tribe represents the existence of the people in a mythological model of the world. «*For more than three hundred years, blood flowed between the root of Qarakelle and the tribe of Qanig. For three hundred years the two roots fought. For three hundred years they walked side by side, breaking after breaking and sprouting again*» (Suleymanli, 2004, p. 35).

The time factor, which is the second element of the chronotope, also serves to restore memory and disclose the plot in both novels. Aitmatov's Yedigey recalls a century in a single day; the time factor plays an important role in the fates of several centuries-old tribes described in *Nomad*. The element of time, which personifies the past and future of the two tribes, plays a key role in the novel.

As in Movlud Suleymanli's short stories and narratives, the leading factor in his novels is the deep verbal artistic line and mythological content. The mythological memory, seeped over thousands of years, is spread in every sentence of the novel. Therefore, *Nomad* can be read as both a novel and an epic. Sometimes the author incorporates these texts into the novel as an illusion, referring to the characters of the epic. «*The villager remembered Deli Domrul. It was said that Bakili had possessed by the spirit of Deli Domrul.. Because Domrul was killed by Bakil*» (Suleymanli, 2004, p. 48).

In the novel, one of the concepts to which the author most often refers is the concept of memory. The notion of memory, which expresses resistance to the forgetfulness of national identity, is symbolized by Movlud Suleymanli with old woman Huru. The century-old grandmother Huru epitomizes the life and existence of Qarakelle's generation through the ages with her presence. «*Hundred-year-old Huru had an ancient past that was older than what she knew and remembered. In other words, Huru did not know where the root of Qarakelle was, beyond what she knew and her memory*» (Suleymanli, 2004, p. 49).

The novel with elements of magic realism has certain parallels with the great representative of this direction Gabriel Garcia Marquez and his novel «*One Hundred Years of Solitude*». The question of the fate of the generations of Buendia and Eyrigar, the functionality of the «tree of generations» in both novels manifests itself in both novels as elements of the magic realist tendency.

The novel treats the fact that the Qarakelles return to their homeland, get off the horse and lead a sedentary life as a national erosion. Even in the ancient Orkhon-Yenisey scripts, it is mentioned that they might have suffered and disappeared because they are few in number compared to the Chinese. «*Our fate is riding, our land is riding, we go riding. We have been abandoned, worldly idleness has followed us*» (Suleimanli, 2004, p. 86).

It is pointed out that nomadic life is the main means of protecting the Qarakelle people themselves and their existence. After the arrival and reaching of Eyrigar, the world consisted of the geographical boundaries where they lived. The writer presents a model of the world against the backdrop of the struggles of the two tribes and where they lived. «*What the house of Qanig, the house of Goshgar and the hearth of Qarakelle understood was as far as the eyes of the world could see. From there, the world was saved. The city news also came from the rest of the world. Therefore, they could not believe the news...*» (Suleimanli, 2004, p. 164).

In the Azerbaijani novel of the 1980s, mythologizing begins to appear with its clear contours. The events in Mevlud Suleymanli's novels «*Nomad*», «*Peanut worm*», «*Voice*», Yusif Samedoglu's «*The Day of Murder*», Elchin's «*Mahmud and Maryam*» attract attention as samples of oral artistic thought and prose presented in intertwining with the mythological layer. In Movlud

Suleymanli's novel *Nomad*, the mythical memory layer expressed the socio-political thinking of the people in the 1980s, when the work was written, and the national struggle for freedom.

## Philological Sciences

# XARİCİ DİL ÖYRƏNMƏNİN PSIXOLOJİ ASPEKTLƏRİ

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**Abstract.** People who speak many languages are called Polyglots. Which means they can use a lot of languages at a good level. People have used many ways to learn any language, but this does not give the same result in every person because the ability to comprehend a foreign language depends on the structure of the human brain and other basic parameters. Knowing many languages gives us information about the cultures of the countries where we first learn the language. In general, there is no age for learning a language. Because learning a language is something that depends on a number of factors. This shows the difference from person to person. Be brave when learning a language, do not hesitate to express wrong ideas, try to speak. In the end you will achieve what you want.

**Açar sözlər:** Dilçilik, dilin psixologiya ilə əlaqəsi, psixolinqvistika, bir dil öyrənmə yolları, zehni və emosional inkişaf, neyro dilçilik, yaddaşın gücləndirilməsi.

**Key words:** linguistics, the relationship of language with psychology, psycholinguistics, ways of learning a language, mental and emotional development, neuro linguistics, strengthens memory

Şəxsiyyətin fizioloji, əqli və emosional inkişafı, onun cəmiyyətlə əlaqəsi, özünü dərk, psixologiyanın bir sıra sahələrə bölünməsinə gətirib çıxarır. Beləliklə, psixologiya bir neçə yerə bölünür: davranış psixologiyası, sosial psixologiya, klinik psixologiya, dil psixologiyası, inkişaf və yaş psixologiyası. Linqvistik psixologiya dilin köməyi ilə inkişaf etdirilən bir elmdir, Dilin yaranması, formalaşması və istifadəsi ilə maraqlanan dilçilik psixologiya vasitəsilə insan davranışını izah etməyə çalışır. Onu "Psixolinqvistika" da adlandırırlar. Bu elm dilin necə qavranıldığını və istifadə olunduğunu öyrənmək üçün dil və ağıl arasındakı əlaqəni həm bioloji, həm də psixoloji cəhətdən öyrənir. Linqvistik psixologiya fərdin dildən istifadə etdiyi qədər onun dinləyici kimi qavrayış prosesini necə davam etdirməsi ilə bağlıdır. Neyrolinqvistika sahəsində aparılan təcrübələr göstərmişdir ki, beyin dilin təfsiri səviyyəsində nitq zamanı sözlərin şəkilçiləri və köklərini ayrıca formalaşdırır. Bu təcrübələrə görə, insan beyini sözü dərk etmə prosesində onu təşkil edən elementləri qiymətləndirir və yadda saxlayır. Azərbaycan və türk dillərinin formaları söz kökünün sonuna əlavə olunan şəkilçilərdən əmələ gəlir. Lakin sözü düzəldərkən sözün kökündəki bütün dəyişikliklər fərqləndirilir. Bu səbəbdən Azərbaycan və türk dillərində beynin fəaliyyətinə paralel dil sistemi mövcuddur. Bu dillərin kök və şəkilçi əlaqəsi ilə birlikdə yazıldığı kimi oxunması bu dilləri öyrənən insanların həm ana dili, həm də ikinci dil kimi anlamalarını və istifadə etmələrini asanlaşdırır. Dilimizdə oxuma prosesində gözün qəbul etdiyi morfoloji quruluşla qulağın qəbul etdiyi fonoloji quruluş eyni anda beyinə göndərilir. Beləliklə, ingilis, fransız və alman kimi dillərdə vizual və eşitmə quruluşu arasında fərq var. Dilin strukturu anlama, kodlaşdırma, emal və axtarış proseslərini əhatə edən 4 əsas dil bacarığından ibarətdir.

- Oxumaq
- Yazmaq
- Dinləmək
- Danışmaq

Dilimizin ana dili kimi tədrisinin iki səviyyəsi var, o cümlədən anlama və tədris. Oxuma və dinləmə anlama səviyyəsini, danışmaq və yazmaq öyrətmə səviyyəsini təşkil edir. Beynin qavrayış, kodlaşdırma, kodlaşdırma prosesləri ilə formalaşan dinləmə və oxu bacarıqları.

emal, axtarış, dili anlama səviyyəsini göstərir. Xarici dil öyrənməyin bir neçə psixoloji faydası: beyni inkişaf etdirir, demansdan xilas olunur, Alzheimer xəstəliyinə meyilli insanlarda xəstəlik gecikir, dil eşitmə qabiliyyətini yaxşılaşdırır,

İkidilli olmaq daha yüksək səviyyədə dinləmə qabiliyyətinə sahib olmaq deməkdir. Çünki beyin daha çox işləməlidir və daha çox dildə müxtəlif səs növlərini seçmək üçündür. İkidilli evlərdə böyüyən kiçik uşaqlar heç vaxt bilmədikləri dilləri belə seçə bilirlər. Əvvəl eşidirlər sonra danışırlar. Hətta, məsələn, müxtəlif səslərə məruz qalmaq belə, 2 dil arasındakı fərqi seçməyə imkan verir. Dil həmçinin yaddaşı gücləndirir. İkidilli ailələrdə böyüyən körpələr bir dilli ailədə böyüyənlərə nisbətən daha güclü yaddaşına malikdir. Bu o deməkdir ki, onlar zehni hesablamada, oxumaqda və daha çox həyat bacarıqlarında daha yaxşıdırlar, eyni anda bir çox işi həll edə bilər. İkidilli insanlar bir işdən digərinə daha tez keçə bilirlər. Onlar daha çox zehni çeviklik və gözlənilməz vəziyyətlərə tez uyğunlaşa bilər.

Diqqəti gücləndirir- ikidilli insanlar diqqətləri üzərində daha güclü nəzarətə malikdirlər..

Aktivləşdirmə iqtidar artır - ikidilli və çoxdilli insanlar diqqətin artması kimi ciddi zehni inkişaf nümayiş etdirirlər, və ya eyni zamanda bir çox işi həll etmək bacarığına malikdirlər. Bunun səbəbi ikidilli insanların aktivləşməsidir və bunda ağıl üçün böyük faydaları var.

Yeni görmə üsullarını inkişaf etdirir- yeni dil öyrənmək dünyagörüşünüzü dəyişir, ana dilinizi inkişaf etdirir.

İkinci dil öyrənmək bizə dilin qaydalarına və strukturuna diqqət yetirməyə kömək edəcək, Geoffrey Willans dediyi kimi, "Bir dili yaxşı başa düşmək üçün, ən azı iki dil başa düşməlisiniz. Dili tez öyrənməyin aşağıdakı yolları var.

Əvvəlcə nəyi öyrənməli olduğunuzu müəyyənləşdirmək.

Bu işin sirrini belə izah etmək olar ki, dil öyrənərkən ilk növbədə bunu etməlisən

sizin üçün işləyəcək söhbətlər növünə diqqət yetirmək və soruşula biləcək suallara cavab verməkdir. Başlanğıcda ən çox istifadə edilən sözlər, ifadələr, kitablar və onlayn dərslər də faydalı ola bilər.

Özünü güvənmək- İlk olaraq özünə inamın olmasıdır, danışdıqca, özünü inamınız artacaqdır. Dilçilər həmin dildə danışmaq üçün cəsarət göstərmək lazım olduğunu vurğulayırlar, "Ağzını açmasan, inkişaf olmaz" deyirlər.. Bu səhv etməkdən qorxmamaq deməkdir. Dünyanın harasına getsən, insanlar yeni dil öyrənənləri dinləyərkən səbr edirlər. Bir dildə nə qədər çox oxusan, dinləsən və danışsan o qədər nailiyyət əldə etmək və daha sürətli inkişaf etmək olacaqdır. Amma danışarkən qrammatikaya çox fikir vermədən cəhd etmək lazımdır. İstifadə edərkən əvvəlcə dilə, sonra qrammatikaya diqqət yetirmək lazımdır..

Psixoloqlar deyirlər ki, danışdığımız sözlər şəxsiyyətimizlə iç-içədir və davranışınıza təsir edir. Dil öyrənməyə başlayanda qarşınıza o dildə danışmaq kimi yüksək məqsədlər qoyulmalıdır. Beləliklə, xarici dilləri öyrənmək üçün:

- Cəsarətli olmaq;
- Özünə inanmaq;
- Səhv etməkdən qorxmamaq; (əvvəlcə hər şey çətin olur və bu çətinlik səbrimiz sayəsində sınaqdan keçir)
- Əvvəlcə dildən istifadə etmək, sonra qrammatikaya diqqət yetirmək;
- Çox dinləmək, çox oxumaq, çox danışmaq;
- Ağzını açmasan, inkişaf olmayacaq;
- Ana dilini sevmək və qorumaq, başqa dilləri öyrənməyə cəsarət etmək

### Ədəbiyyat siyahısı

1. Vendryes, J.V. (2001). Dil və Düşüncə. Çev., Berke Vardar. – İstanbul: Çoxdilli Nəşriyyat.
2. Vıqotski, L.S. (1985). Düşüncə və Dil. Çev. S.Koray. – İstanbul: Sosial Transformasiya Nəşrlər.
3. Bargiel, K., Bargiel, A. (2009). Tələbələrin Öyrənmə Prosesi zamanı üstünlük verdiyi korreksiya üsulları  
Xarici dil. Dil və Ünsiyyət Psixologiyası.
4. Bor, İ. (2011). Analitik dil fəlsəfəsində linqvistik düşüncə və məna. – Ankara: Alisa Nəşriyyat.



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