



IQTISODIYOT & TARAQQIYOT

Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

№9

Google Scholar

OPEN ACCESS

ULRICHSWEB[®]
GLOBAL SERIALS DIRECTORY

OpenAIRE

ROAD

НАУЧНАЯ ЭЛЕКТРОННАЯ
БИБЛИОТЕКА
LIBRARY.RU

Academic
Resource
Index
ResearchBib

ISSN
INTERNATIONAL
STANDARD
SERIAL
NUMBER
INTERNATIONAL CENTRE

CYBERLENINKA

BASE

INDEX COPERNICUS
INTERNATIONAL

Crossref



ISSN: 2992-8982

<https://yashil-iqtisodiyot-taraqqiyot.uz/>

2025



IQTISODIYOT&TARAQQIYOT

Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

Bosh muharrir:

Sharipov Kongiratbay Avezimbetovich

Elektron nashr. 932 sahifa.

E'lon qilishga 2025-yil 1-sentyabrda ruxsat etildi.

Bosh muharrir o'rinbosari:

Karimov Norboy G'aniyevich

Muharrir:

Qurbonov Sherzod Ismatillayevich

Tahrir hay'ati:

Salimov Oqil Umrzoqovich, O'zbekiston Fanlar akademiyasi akademigi
Abduraxmanov Kalandar Xodjayevich, O'zbekiston Fanlar akademiyasi akademigi
Sharipov Kongiratbay Avezimbetovich, texnika fanlari doktori (DSc), professor
Rae Kvon Chung, Janubiy Koreya, TDIU faxriy professori, "Nobel" mukofoti laureati
Osman Mesten, Turkiya parlamenti a'zosi, Turkiya – O'zbekiston do'stlik jamiyati rahbari
Axmedov Durbek Kudratillayevich, iqtisodiyot fanlari doktori (DSc), professor
Axmedov Sayfullo Normatovich, iqtisodiyot fanlari doktori (DSc), professor
Abduraxmanova Gulnora Kalandarovna, iqtisodiyot fanlari doktori (DSc), professor
Kalonov Muxiddin Baxritdinovich, iqtisodiyot fanlari doktori (DSc), professor
Siddiqova Sadoqat G'afforovna, pedagogika fanlari bo'yicha falsafa doktori (PhD)
Xudoyqulov Sadirdin Karimovich, iqtisodiyot fanlari doktori (DSc), professor
Maxmudov Nosir, iqtisodiyot fanlari doktori (DSc), professor
Yuldashev Mutallib Ibragimovich, iqtisodiyot fanlari doktori (DSc), professor
Samadov Asqarjon Nishonovich, iqtisodiyot fanlari nomzodi, professor
Slizovskiy Dimitriy Yegorovich, texnika fanlari doktori (DSc), professor
Mustafakulov Sherzod Igamberdiyevich, iqtisodiyot fanlari doktori (DSc), professor
Axmedov Ikrom Akramovich, iqtisodiyot fanlari doktori (DSc), professor
Eshtayev Alisher Abdug'aniyevich, iqtisodiyot fanlari doktori (DSc), professor
Xajiyev Baxtiyor Dushaboyevich, iqtisodiyot fanlari doktori (DSc), professor
Hakimov Nazar Hakimovich, falsafa fanlari doktori (DSc), professor
Musayeva Shoirazimovna, iqtisodiyot fanlari bo'yicha falsafa doktori (PhD), professor
Ali Konak (Ali Ko'nak), iqtisodiyot fanlari doktori (DSc), professor (Turkiya)
Cham Tat Huei, falsafa fanlari doktori (PhD), professor (Malayziya)
Foziljonov Ibrohimjon Sotvoldixo'ja o'g'li, iqtisodiyot fanlari bo'yicha falsafa doktori (PhD), dots.
Utayev Uktam Choriyevich, O'z.Respub. Bosh prokuraturasi boshqarma boshlig'i o'rinbosari
Ochilov Farkhod, O'zbekiston Respublikasi Bosh prokuraturasi IJQKD boshlig'i
Buzrukhonov Sarvarxon Munavvarxonovich, iqtisodiyot fanlari nomzodi, dotsent
Axmedov Javohir Jamolovich, iqtisodiyot fanlari bo'yicha falsafa doktori (PhD)
Toxirov Jaloliddin Ochil o'g'li, texnika fanlari bo'yicha falsafa doktori (PhD), katta o'qituvchi
Bobobekov Ergash Abdumalikovich, iqtisodiyot fanlari bo'yicha falsafa doktori (PhD), v.b. dots.
Djudi Smetana, pedagogika fanlari nomzodi, dotsent (AQSH)
Krissi Lyuis, pedagogika fanlari nomzodi, dotsent (AQSH)
Glazova Marina Viktorovna, Iqtisodiyot fanlari doktori (Moskva)
Nosirova Nargiza Jamoliddin qizi, iqtisodiyot fanlari bo'yicha falsafa doktori (PhD), dotsent
Sevil Piriyeva Karaman, falsafa fanlari doktori (PhD) (Turkiya)
Mirzaliyev Sanjar Makhamatjon o'g'li, TDIU ITI departamenti rahbari
Ochilov Bobur Baxtiyor o'g'li, TDIU katta o'qituvchisi
Golisheva Yelena Vyacheslavovna, Iqtisodiyot fanlari nomzodi, dotsent.



IQTISODIYOT&TARAQQIYOT

Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

Editorial board:

Salimov Okil Umrzokovich, Academician of the Academy of Sciences of Uzbekistan
Abdurakhmanov Kalandar Khodjayevich, Academician of the Academy of Sciences of Uzbekistan
Sharipov Kongiratbay Avezimbetovich, Doctor of Technical Sciences (DSc), Professor
Rae Kwon Chung, South Korea, Honorary Professor at TSUE, Nobel Prize Laureate
Osman Mesten, Member of the Turkish Parliament, Head of the Turkey–Uzbekistan Friendship Society
Akhmedov Durbek Kudratillayevich, Doctor of Economic Sciences (DSc), Professor
Akhmedov Sayfullo Normatovich, Doctor of Economic Sciences (DSc), Professor
Abdurakhmanova Gulnora Kalandarovna, Doctor of Economic Sciences (DSc), Professor
Kalonov Mukhiddin Bakhridinovich, Doctor of Economic Sciences (DSc), Professor
Siddikova Sadokat Gafforovna, Doctor of Philosophy (PhD) in Pedagogical Sciences
Khudoykulov Sadirdin Karimovich, Doctor of Economic Sciences (DSc), Professor
Makhmudov Nosir, Doctor of Economic Sciences (DSc), Professor
Yuldashev Mutallib Ibragimovich, Doctor of Economic Sciences (DSc), Professor
Samadov Askarjon Nishonovich, Candidate of Economic Sciences, Professor
Slizovskiy Dmitriy Yegorovich, Doctor of Technical Sciences (DSc), Professor
Mustafakulov Sherzod Igamberdiyevich, Doctor of Economic Sciences (DSc), Professor
Akhmedov Ikrom Akramovich, Doctor of Economic Sciences (DSc), Professor
Eshtayev Alisher Abduganiyevich, Doctor of Economic Sciences (DSc), Professor
Khajiyev Bakhtiyor Dushaboyevich, Doctor of Economic Sciences (DSc), Professor
Khakimov Nazar Khakimovich, Doctor of Philosophy (DSc), Professor
Musayeva Shoira Azimovna, Doctor of Philosophy (PhD) in Economic Sciences, Professor
Ali Konak, Doctor of Economic Sciences (DSc), Professor (Turkey)
Cham Tat Huei, Doctor of Philosophy (PhD), Professor (Malaysia)
Foziljonov Ibrokhimjon Sotvoldikhoja ugli, Doctor of Philosophy (PhD) in Economic Sciences, Associate Professor
Utayev Uktam Choriyeich, Deputy Head of Department, Prosecutor General's Office of Uzbekistan
Ochilov Farkhod, Head of DCEC, Prosecutor General's Office of Uzbekistan
Buzrukkhonov Sarvarkhon Munavvarkhonovich, Candidate of Economic Sciences, Associate Professor
Akhmedov Javokhir Jamolovich, Doctor of Philosophy (PhD) in Economic Sciences
Tokhirov Jaloliddin Ochil ugli, Doctor of Philosophy (PhD) in Technical Sciences, Senior Lecturer
Bobobekov Ergash Abdumalikovich, Doctor of Philosophy (PhD) in Economic Sciences, Acting Associate Professor
Judi Smetana, Candidate of Pedagogical Sciences, Associate Professor (USA)
Chrissy Lewis, Candidate of Pedagogical Sciences, Associate Professor (USA)
Glazova Marina Victorovna, Doctor of Sciences in Economics (Moscow)
Nosirova Nargiza Jamoliddin kizi, Doctor of Philosophy (PhD) in Economic Sciences, Associate Professor
Sevil Piriyeva Karaman, Doctor of Philosophy (PhD) (Turkey)
Mirzaliyev Sanjar Makhamatjon ugli, Head of the Department of Scientific Research and Innovations, TSUE
Ochilov Bobur Bakhtiyor ugli, Senior lecturer at TSUI
Golisheva Yelena Vyacheslavovna, Candidate of Economic Sciences, Associate Professor.

Ekspertlar kengashi:

Berkinov Bazarbay, iqtisodiyot fanlari doktori (DSc), professor
Po'latov Baxtiyor Alimovich, texnika fanlari doktori (DSc), professor
Aliyev Bekdavat Aliyevich, falsafa fanlari doktori (DSc), professor
Isakov Janabay Yakubbayevich, iqtisodiyot fanlari doktori (DSc), professor
Xalikov Suyun Ravshanovich, iqtisodiyot fanlari nomzodi, dotsent
Rustamov Ilhomiddin, iqtisodiyot fanlari nomzodi, dotsent
Hakimov Ziyodulla Ahmadovich, iqtisodiyot fanlari doktori, dotsent
Kamilova Iroda Xusniddinovna, iqtisodiyot fanlari bo'yicha falsafa doktori (PhD)
G'afurov Doniyor Orifovich, pedagogika fanlari bo'yicha falsafa doktori (PhD)
Fayziyev Oybek Raximovich, iqtisodiyot fanlari bo'yicha falsafa doktori (PhD), dotsent
Tuxtabayev Jamshid Sharafetdinovich, iqtisodiyot fanlari bo'yicha falsafa doktori (PhD), dotsent
Xamidova Faridaxon Abdulkarim qizi, iqtisodiyot fanlari doktori, dotsent
Yaxshiboyeva Laylo Abdisattorovna, katta o'qituvchi
Babayeva Zuhra Yuldashevna, mustaqil tadqiqotchi
Komilova Nilufar Karshiboyevna, Geografiya fanlari doktori, professori

Board of Experts:

Berkinov Bazarbay, Doctor of Economic Sciences (DSc), Professor
Pulatov Bakhtiyor Alimovich, Doctor of Technical Sciences (DSc), Professor
Aliyev Bekdavat Aliyevich, Doctor of Philosophy (DSc), Professor
Isakov Janabay Yakubbayevich, Doctor of Economic Sciences (DSc), Professor
Khalikov Suyun Ravshanovich, Candidate of Economic Sciences, Associate Professor
Rustamov Ilhomiddin, Candidate of Economic Sciences, Associate Professor
Khakimov Ziyodulla Akhmadovich, Doctor of Economic Sciences, Associate Professor
Kamilova Iroda Xusniddinovna, Doctor of Philosophy (PhD) in Economics
Gafurov Doniyor Orifovich, Doctor of Philosophy (PhD) in Pedagogy
Fayziyev Oybek Raximovich, Doctor of Philosophy (PhD) in Economics, Associate Professor
Tukhtabayev Jamshid Sharafetdinovich, Doctor of Philosophy (PhD) in Economics, Associate Professor
Khamidova Faridaxon Abdulkarimovna, Doctor of Economic Sciences, Associate Professor
Yakhshiboyeva Laylo Abdisattorovna, Senior Lecturer
Babayeva Zuhra Yuldashevna, Independent Researcher
Komilova Nilufar Karshiboyevna, Doctor of Geographical Sciences, Professor

- 08.00.01 Iqtisodiyot nazariyasi
- 08.00.02 Makroiqtisodiyot
- 08.00.03 Sanoat iqtisodiyoti
- 08.00.04 Qishloq xo'jaligi iqtisodiyoti
- 08.00.05 Xizmat ko'rsatish tarmoqlari iqtisodiyoti
- 08.00.06 Ekonometrika va statistika
- 08.00.07 Moliya, pul muomalasi va kredit
- 08.00.08 Buxgalteriya hisobi, iqtisodiy tahlil va audit
- 08.00.09 Jahon iqtisodiyoti
- 08.00.10 Demografiya. Mehnat iqtisodiyoti
- 08.00.11 Marketing
- 08.00.12 Mintaqaviy iqtisodiyot
- 08.00.13 Menejment
- 08.00.14 Iqtisodiyotda axborot tizimlari va texnologiyalari
- 08.00.15 Tadbirkorlik va kichik biznes iqtisodiyoti
- 08.00.16 Raqamli iqtisodiyot va xalqaro raqamli integratsiya
- 08.00.17 Turizm va mehmonxona faoliyati

Muassis: "Ma'rifat-print-media" MChJ

Hamkorlarimiz: Toshkent davlat iqtisodiyot universiteti, O'zR Tabiat resurslari vazirligi, O'zR Bosh prokuraturasi huzuridagi IJQK departamenti.

Jurnalning ilmiyligi:

“Yashil” iqtisodiyot va taraqqiyot” jurnali

O'zbekiston Respublikasi
Oliy ta'lim, fan va innovatsiyalar
vazirligi huzuridagi Oliy
attestatsiya komissiyasi
rayosatining
2023-yil 1-apreldagi 336/3-
sonli qarori bilan ro'yxatdan
o'tkazilgan.



MUNDARIJA

Postdan xaridgacha: influenser va ilg'or veb-ilova (PWA – progressive web app)ning chakana sotuvga real ta'siri	14
Abdulaziz Madjidov	
Ta'lim xizmatlari bozori samaradorligini oshirishda ta'lim klasterlarining roli	22
Imamova Nilufar Asamutdinovna	
Korxona raqobatbardoshligini oshirishda marketingning tovar strategiyasidan foydalanish holati.....	29
Xidirov Sherzod Olimovich	
O'zbekistonda moliyaviy savodxonlikni institutsionallashtirish: NFIS, Finlit.uz va ta'lim islohotlari	34
Irgashev Anvar Farxodovich	
Moslashuvchan menejment tizimlarini yashil iqtisodiyotga integratsiyalash tasnifi	39
Umarov Bexzod Batirovich	
Qishloq xo'jaligida innovatsion marketing strategiyasini ishlab chiqish.....	43
Sheraliev Axror Sodiqovich	
O'zbekiston Respublikasida moliyaviy bank xizmatlarini rivojlantirishning tendensiyalari, undan samarali foydalanish imkoniyatlari va konseptual jihatlarini	48
Roziqov Behzod Bahrom o'g'li	
Metallurgiya korxonalarida raqamli texnologiyalarni joriy etish chet el tajribasi	54
Abdullayeva Matluba Nematovna	
Исследование связи между восприятием изменения климата и внедрением устойчивых методов ведения сельского хозяйства в Узбекистане	59
Светлана Ражабова, Бахром Миркасимов	
Surxondaryo viloyati qishloq xo'jalik tarmog'ini barqaror rivojlantirishni iqtisodiy-ekologik modellari	68
Abdug'aniyev Otabek Allajonovich, Xo'jamqulov Bekzod Turdaliyevich	
Milliy iqtisodiyotda real sektor salmog'i va uning o'zgarish tendensiyalari	75
Mambetjanov Qahramon Qurbandurdiyevich, Isroilova Muhabbat Rustamjon qizi	
Qo'shilgan qiymatni soliqqa tortish uslubiyoti: xususiyatlari, vazifalari va muammolari	89
Xaitov Shuxrat Sharipboyevich	
Kognitiv yondashuv asosida tibbiyot oliy ta'lim muassasalari talabalari grammatik va diskursiv kompetensiyalarini shakllantirishning nazariy modeli va pedagogik texnologiyasi.....	94
Dadadjanova Feruza Muhammadyusupovna	
Transport tizimining rivojlanishi milliy iqtisodiy o'sishining asosi sifatida	98
Narziyev Umidjon Baxrillayevich	
Loyiha risklarini aniqlashda zamonaviy usullar va ularning samaradorligi.....	105
Marufhanov Davron Xasanovich	
Современные методы управления на железнодорожном транспорте в процессе трансформации системы.....	109
Кушакова Мамура Наримановна	
Финансовые механизмы и модели менеджмента в развитии устойчивой экономики транспортных компаний	115
Шарапова Гулчехра Рустамовна	
Kasbiy ta'limda o'quvchilarning raqamli kompetensiyasini shakllantirish va baholashning innovatsion yondashuvlari	120
Maxkamova Zuhra Tursunpulotovna	
Audit ishi sifati darajasini oshirish yo'nalishlari.....	124
Qushmatov Otaxon Qurbonaliyevich	



Erkin iqtisodiy zonalarda investitsiya loyihalarini moliyalashtirishning nazariy va amaliy asoslari.....	131
Yuldashev Baxtiyor Gayradjonovich	
Ko'chmas mulk qiymatini baholash va uning ekonometrik tahlili	135
Jaloliddinova Mohira Alisher qizi	
Современные тенденции и вызовы бюджетно-макроэкономической политики в Узбекистане	142
Хазраткулова Лола Нармуминовна	
Intellectual mulkda iqtisodiy mohiyat, mazmun hamda huquqiy jihat uyg'unligi	148
N.D.Maxmudova	
Axborot texnologiyalari asosida ta'limda loyiha boshqaruvida sun'iy intellekt va mashinali o'qitish imkoniyatlari	152
Xodjiyeva Durdona Abdurasolovna	
Концепция "Зеленого учета" и его значение для экономического развития.....	157
Умарова Зулайхо Турсуновна	
Iqtisodiyotning asosiy tarmoq va sohalariga kiritilgan investitsiyalarning joriy holati tahlili	166
Ismailova Kutlibeka Ulug'bek qizi	
O'zbekistonda yoshlar tashkiloti faoliyatini tashkil etishning o'ziga xos jihatlari va rivojlanish bosqichlari	172
Usmonov Adxamjon A'zamjonovich	
O'zbekiston Respublikasi maxsus iqtisodiy zonalarini investitsion holatini hududlar kesimida tahlili.....	178
Anvarxonov Abdulatifxon Jamshidxon o'g'li	
Kichik biznes va o'rta biznesni rivojlantirish orqali aholi farovonligini ta'minlash.....	184
Ahmedov Oybek Turgunpulatovich, Nurqulov Nurbek Sirojiddin o'g'li	
Fiskal siyosat instrumentlari orqali yashirin iqtisodiyotni qisqartirish va legallashtirish metodologiyasi.....	189
Ergasheva Malikaxon Avazxon qizi	
Fond bozorida savdo strategiyasi va uni amalga oshirishga yo'nalishlari.....	192
Soliev Istam Ixtiyorovich	
Sanoat korxonalarini innovatsion rivojlantirishning asosiy tamoyillari	197
Yuldasheva Kamola Miraliyevna	
Iqtisodiy barqarorlikni ta'minlashda davlat boshqaruvi tizimining isloh qilinishi: Tajriba va istiqbollar.....	202
Mashrabaliyev Ibroximbek Mashrabaliyevich	
Iqtisodiyotning real sektorida investitsion loyihalarni moliyalashtirish amaliyoti.....	209
Qosimova Lola Sultanovna	
Sanoat mahsulotlari eksportida logistika zanjirining uzluksizligini ta'minlash: nazariy asoslar va amaliy yondashuvlar.....	217
Kurbonova Ma'mura Abdukarim qizi	
Soliq ma'murchiligiga zamonaviy texnologiyalarini joriy etish orqali qo'shilgan qiymat soliq ma'murchiligi bazasini kengaytirish yo'llari	222
Raxmonqulov Umidjon Rustam o'g'li	
Инновационные подходы к созданию проблемно-ориентированной системы прогнозирования, оптимизации и управления отраслями региональной экономики (жилищное строительство)	231
Далиев Ахтам Шарафутдинович	
Tovar-moddiy resurslar harakati samaradorligini oshirishda UZEX faoliyatining joriy holatini baholash.....	238
Sherzod Xolmurodovich Pardayev, Mamatkulov Farrux Gulomjon o'gli	
Sog'liqni saqlash tizimida tadbirkorlik faoliyatining turlari	244
Solikhova Dildora Alisher qizi	



“O‘ztemiryo‘lyo‘lovchi” aining asisii faoliyatini samaradorligini oshirishda autsorsing xizmatini joriy etish strategik asoslari	250
Kaxarova Nilufar Yerkinjonovna	
Mintaqani kompleks rivojlantirishning metodologik asoslari va ustuvor yo‘nalishlari.....	256
Jumayeva Zulfiya Qayumovna	
Sog‘liqni saqlash tashkilotarida xarajatlar samaradorligini ta‘minlash masalalari	260
Raximova Maftuna Axmadjon qizi	
Aksiyadorlik jamiyatlarida sof foydani taqsimlash bilan bog‘liq bo‘lgan soliq solish masalalari	264
Suyunov Otabek Shuxrat o‘g‘li	
O‘zbekiston qonunchiligida raqamli transformatsiya jarayonida elektron to‘lov kartalarini soxtalashtirishni jinoyatlashtirish	276
Maxsadaliyeva Maftuna Toxir qizi	
Mamlakatimizda intellektual xizmatlar bozorini rivojlantirish masalalari.....	281
Miyassarov Davron Abdurashid o‘g‘li	
Validation of the dutch eating behaviour questionnaire (DEBQ) in a sample of uzbek women.....	285
Khursana Usmanova, Dr Muhammad Bilal, Dilafuz Qo‘chqorova	
Iqtisodiy xavfsizlik tizimlarini o‘ziga xos jihatlari	295
Nabiyev Bexzod Shavkatovich, Bayboboeva Firuza Nabijonovna	
Davlat qarz siyosatini optimallashtirishda islomiy moliya instrumentlarining qo‘llanish imkoniyatlarini kengaytirish yo‘nalishlari	299
Tilabov Nasrulla Tashmurotovich	
Роль институциональных структур фондового рынка в обеспечении финансовой стабильности.....	305
Камилова Севара Анваровна	
The Impact of Digitalization on the Management System in the Entrepreneurial Environment of Uzbekistan.....	309
Ibragimova Saida Ilkhomovna	
China’s Investment Strategy in Uzbekistan: Sectoral Trends and Strategic Implications (2013–2024).....	313
Maftuna Nuriddinova	
Qo‘shilgan qiymat solig‘i tushunchasi va uning iqtisodiy mohiyati	319
Eshkarayev Bobir Chariyevich	
Raqamli boshqaruvning afzalliklari va uni rivojlantirish istiqbollari	324
Xolbayeva Marg‘uba Qazoqboyevna	
Korporativ boshqaruvning nazariy asoslari: O‘zbekistonda qo‘llanish imkoniyatlari.....	328
Jumayeva Guzal Sherxon qizi	
Audit organizations in Uzbekistan	332
Razzaqov Jasur Xamraboevich, Yaqubov Matrasul Mavlonberdiyevich, Sabirova Nodira Komil qizi	
Xorijiy investitsiyalarning turlari va xususiyatlari	337
Gofurov Doston Boxromovich	
Mahalliy budjet mablag‘larining samaradorligini oshirishda auditning o‘rni.....	341
Primova Shaxnoza Komiljonovna	
Модели управления государственными финансами в зарубежных странах.....	345
Наимов Шохрух Шарофиддинович	
O‘zbekistonning sirkulyar iqtisodiyotga o‘tishi: yashil o‘sish indikatorlari tahlili	352
Hakimov Anvarjon Abdulloyevich	
Innovation management in the education system: practical challenges, international experience, and effective strategies based on the example of Uzbekistan.....	356
Imomov Inomiddin Abdulxamidovich, Egamberdiyev Farxod Botirovich	
Трансформация энергетического комплекса Узбекистана: текущее состояние и перспективы развития	363
Хмель Е.В., Мирджалилова Д.Ш., Дерюгина Е.А., Лозовская Н.А.	



Improving the efficiency of personnel management and optimizing labor costs in Sam Glass LLC.....	368
Musayeva Shoira Azimovna, Agzamov Avazkhon Talgatovich	
Interactive design and museum management: enhancing guided tours through IOT and virtual solutions.....	374
Ibrokhimova Aziza Abbasovna	
Hududlar investitsion jozibadorligini oshirish yo'llari.....	379
Imomova Kamola Novfal qizi	
"Innovatsion usulda baliq yetishtirishning iqtisodiy samaradorligini oshirish yo'llari (Sirdaryo tumani misolida)"	385
Bo'ltakov Sardor Oqbo'ta o'g'li	
Bank filial tarmoqlari samaradorligini baholashning xorijiy tajribasi va undan O'zbekiston banklari amaliyotida foydalanish imkoniyatlari	392
Xoshimov Og'abek Nizomjon o'g'li	
Zamonaviy iqtisodiyotda davlat xaridlarinin elektron savdolarining o'rni	398
Burxanov G'ofur Baxodirovich	
Реализация концепции развития рынка зеленой экономики в сфере экономической безопасности Республики Узбекистан.....	401
Юнусова Римма Рахманбердиевна	
Tijorat banklaridan "foyda" solig'ini undirishning bugungi holati.....	408
Ergasheva Lobar Raxmatulla qizi	
O'zbekiston oziq-ovqat sanoatini iqtisodiy rivojlantirish yo'nalishlari	415
Abasova Gulirano Rahmatullo qizi	
Xorijiy tajribalar asosida ekologik tadbirkorlikning innovatsion va investitsion yo'nalishlarini tashkil etish	419
Turg'unova Tursunoy Maratovna	
Sanoat korxonalari jozibadorligini oshirishda marketing strategiyasini amalga oshirish xususiyatlari	424
Raxmonova Feruza Musakulovna	
Turizm sohasida investitsion faoliyat: nazariy asoslar va amaliy yo'nalishlar.....	428
Ergashev Durdonaxon Aziz qizi	
Qashqadaryo viloyatida barqaror turizmning rivojlanish tendensiyalari va mavjud muammolar tahlili.....	432
Suyunova Dilnoza Mexridin qizi	
Iqtisodiy rivojlanish jarayonida investitsion resurslarning mutanosib taqsimlanishi: samaradorlik va ustuvor yo'nalishlar.....	436
Otaboyev Feruzbek Oybek o'g'li	
Xususiyl banklar faoliyatini rivojlantirishda raqamli texnologiyalarning moliya bozoriga ta'siri	441
Abduqahhorov Asilbek Ahror o'g'li	
Mehnat resurslari tushunchasi, tarkibi va uning ijtimoiy-iqtisodiy ahamiyati.....	447
Kobilova Zebo Bobokulovna	
Xorijiy davlatlar tajribasida moliyaviy siyosatning makroiqtisodiy barqarorlikni ta'minlashdagi roli.....	453
Jabborova Dilafruz	
The impact of exchange rate policy on the financial-monetary system and economic growth.....	459
Raxmanova Laylo Baxodirovna	
Современные вызовы и модельные подходы к обеспечению конкурентоспособности банковской системы Узбекистана.....	464
Юлдашева С.Ш.	
Iqtisodiyotni innovatsion rivojlantirishda soliq mexanizmidan samarali foydalanish yo'llari	470
Ishimova Mohinur Absalomovna	
Innovative pathways for advancing sustainable tourism in Uzbekistan.....	477
Feruz Karimov	



Tijorat banklarida biznes subyektlari faoliyati samaradorligini oshirishda raqamli texnologiyalardan foydalanish yo'llari.....	482
Mirpulatova Luiza Mansurovna	
O'zbekistonda sanoat zonalarining rivojlanish bosqichlari va huquqiy-me'yoriy asoslari	488
Vafoyev Akmal Ikromovich	
Qayta tiklanuvchi energiya manbalaridan samarali foydalanishda Germaniya tajribasi	493
Pardayeva Maftuna Ulug'bek qizi	
Korxonalar moliyaviy faoliyati bo'yicha auditorlik risklarini xalqaro standartlar asosida baholash	497
Shirinov Uchqun Abduxalilovich, Abduxalil-zoda Ra'no Muzaffar qizi	
Ishlab chiqarish xarajatlarining tarkibi va ularni pasaytirish usullari	501
Sodiqov Mirahror Abbos o'g'li	
O'zbekiston Respublikasi hududlarini ijtimoiy-iqtisodiy rivojlantirishda mahalliy budjetlarning ahamiyati.....	509
Sharopov Dilshodjon Raxmatullayevich	
The role of small business enterprises in enhancing the well-being of the population in Uzbekistan	513
Djalilova Shaxlo Ismoiljon kizi	
O'zbekistonda IPOlarni tashkil etish jarayonlari tahlili	518
Alikulov Azamat Tuygunovich	
Kichik sanoat zonalarini faoliyatining iqtisodiy-statistik tahlili (Surxondaryo viloyati misolida).....	522
Ozoda Batirovna Sakiyeva	
Hududlarning innovatsion turistik salohiyatini rivojlantirishning tashkiliy-iqtisodiy mexanizmini takomillashtirish	528
Xaitov Oxunjon Nomoz o'g'li	
Integrating circular economy principles in marketing and operations of grape export companies for green transition.....	534
Usmonova Diyora Mahmud kizi	
Foreign experiences of improving the quality of services in the field of tourism.....	541
Raxmonov Siyovush Turob ugli	
Z avlodining iste'dodli vakillari uchun raqobat: davlat boshqaruvi sektorining maqsadga yo'naltirilgan raqamli avlodni jalb etish strategiyalari.....	546
Nosirova Shaxzoda Bohodir qizi	
O'zbekiston Respublikasida uglerod solig'ini joriy etish orqali soliq ma'muriyatchiligini takomillashtirish va yashil iqtisodiyotga o'tishni jadallashtirish imkoniyatlari: ekologik, iqtisodiy va institutsional yondashuv	560
Jo'rayev Ahmad Saitnazar o'g'li	
Tijorat banklari reytingiga ta'sir qiluvchi asosiy moliyaviy ko'rsatkichlar tahlili.....	566
Karabayev Nodir Abduhamidovich	
Budjet tashkilotlarida tuziladigan moliyaviy hisobotlarning ahamiyati.....	578
Norqulova Qutlug'nigor Oloviddinovna	
Методы и критерии оценки эффективности конкурентоспособности предприятия	582
Хусейнов Рахим Али оглы	
Zamonaviy HR texnologiyalarining korxonalar samaradorligiga ta'siri: "O'zbekiston temir yo'llari" AJ tajribasi.....	589
Xursanova Gulshan Ravshan qizi	
Oliy ta'lim muassasalarida innovatsion menejment strategiyalarining samaradorligini oshirish yo'llari	593
Pulatova Dildora Abdushukurovna	
Oliy ta'lim tizimida raqamli texnologiyalarni qo'llashning bugungi kunda o'rni va ahamiyati.....	600
Xolmirzayeva Gulruxsor Maxammetovna	
Интеграция информационно-коммуникационных технологий в зеленую экономику: цифровые технологии для устойчивого развития.....	604
Бозорова Ирина Жуманазаровна	



Xorijiy mamlakatlarda tadbirkorlik subyektlari tomonidan mahallilashtirish asosida mahsulot ishlab chiqarishning o'ziga xos jihatlari	608
Mirzabaev Xusniddin Muxamadjonovich	
Цифровизация зеленой экономики: синергия технологий для устойчивого будущего	616
Мухамадиева Кибриё Баходировна, Умарова Надира Рахмановна, Шарипова Зулфия Шокиржоновна, Эшпулатова Хусния Мирғолиб кизи	
O'zbekistonda to'qimachilik mahsulotlari bozori va rivojlanishi	621
Alimxodjayeva Nargiza Elshodovna	
Samarqand viloyatida tikuv-to'qimachilik sanoatining rivojlanish holati va ishlab chiqarish hajmining prognozi.....	629
Ikramova Taxmina Latifovna	
Повышение эффективности управления рисками в проектах государственно-частного партнерства в сфере услуг	639
Айтбаева Гульзада Куанышбаевна	
Surxondaryo viloyati iqtisodiy o'sish darajalarini ekonometrik modellashtrish	645
Pardayeva Ma'rifat Muzaffarovna	
Зарубежный опыт развития экономики ресурсно-сырьевых регионов: модели диверсификации и возможности адаптации.....	654
Севара Кахрамоновна Хакбердиева	
Xizmat ko'rsatish sohasida raqobatbardoshlikni oshirishning ahamiyati	658
Abduvoxidova Mohinur Akmalovna	
O'zbekiston sug'urta bozorida esg va yashil moliya instrumentlaridan foydalanish holati va imkoniyatlari.....	662
Zoyirov Laziz Subxonovich	
Xorazm viloyatida transport xizmatlari ko'rsatishning amaldagi holati tahlili va uni rivojlantirishning ustuvor yo'nalishlari	668
Sharipova Bibijon Baxtiyorovna	
Ulgurji savdo qoidalari va chakana savdodan farqli tomonlari	678
Batirova Raxima Abdujabbarovna, Xolmirzayev Ulug'bek Abdulazizovich	
Xalqaro integratsiya jarayonlarida raqamli iqtisodiyotning o'rni.....	684
Zaripov Xurshid Zakir o'g'li	
Mahalliy budjetlar daromadlari va xarajatlarining hozirgi holati	690
Himmatov Abdisamat Xalilovich	
Raqamli iqtisodiyot sharoitida aholining moliyaviy madaniyatini rivojlantirish muammolari va istiqbollari.....	696
Abdurazakova Nargiza Rixsibayevna	
Цели устойчивого развития и роль цифровых платформ в сфере трудовой миграции	702
Газиёва Сулхия Саидмашрафовна	
Onlayn savdo maydonchalarida mijoz sodiqligini shakllantirishda marketing strategiyalarining o'rni	706
Baxromov Xudoyor Xabibullo o'g'li	
Методологические основы оценки эффективности «зеленых» технологий в строительном секторе.....	710
Тожиева Дилфуза Бабамуратовна	
Korxonalarda moliyaviy instrumentlar auditi masalalarini rivojlantirish.....	715
Mahmudov Saidjamol Kadirjanovich	
O'zbekiston Respublikasi soliq ma'murchiligini takomillashtirish jarayonlari	722
Mahmudova Sevara Rahmat qizi, Almardonov Muxammadali Ibragimovich	
Improving the efficiency of modern housing fund management system	726
D.A. Berdiyeva, Aminova Naima Umar qizi	
Kichik va o'rta biznes subyektlari eksport salohiyatini rivojlantirish mexanizmini takomillashtirish	731
Abduqahhorov Azizbek Abdullo o'g'li	



From Science to Business: How Universities Stimulate Innovation.....	735
A. Bobozhonov, A.M. Shatre, V. Kirilova Vladimirova, R.Kh. Karlibaeva	
Tashkilotlarda risklarni boshqarish strategiyalarining samaradorligini baholash: nazariy va amaliy yondashuvlar	740
Husanova Dilnura Mamrajab qizi	
Turli mulkchilik shakllaridagi xo'jalik yurituvchi subyektlar faoliyatining ekologik auditing nazariy jihatlarini	744
Abdullayev Xurshidjon Nazrullo o'g'li	
Sanoat korxonalarida innovatsion boshqaruv samaradorligini oshirish omillari.....	749
Ne'matullayev Abdurasulxon Ximaydulla o'g'li	
Bozor iqtisodiyotiga o'tish sharoitida innovatsion korxonalar boshqaruvi tashkiliy-iqtisodiy mexanizmi amal qilish xususiyatlari	755
Naimov Azamat Xikmatovich	
Mamlakatimizda chet el investitsiyasi ishtirokidagi korxonalarda faoliyatini rivojlantirish.....	758
Qurbanov Javlonbek Jurabekovich, Shuxratov Azizbek A'zamjon o'g'li	
Qurilgan organik mevalar eksportini rivojlantirishda yashil marketing strategiyalaridan foydalanish.....	764
Xidirov Shohrux Bobir o'g'li	
O'zbekiston Respublikasida xizmatlar sohasining asosiy ko'rsatkichlari.....	769
Ernazarov Gulam Bekbayevich	
Kichik biznes subyektlarida innovatsion faoliyatni baholash va rivojlantirish mexanizmlari.....	774
Mavrolov Ravshan Nematjonovich	
Barqaror rivojlanish va korxonalarda barqarorlikni ta'minlash zaruriyati.....	780
Yakubova Dilfuza	
Yashil iqtisodiyot sharoitlarida barqaror rivojlanish, yashil texnologiyalar va ekologik menejmentning o'rni	785
Dilmurodov Abbas Anvar o'g'li	
Qishloq xo'jaligi sohasi faoliyatini davlat tomonidan muvofiqlashtirish va boshqarish mexanizmlarini takomillashtirish	788
Tuxtamishev Shodimurod Qurbonboyevich	
Tijorat banklarida chakana bank xizmatlarini rivojlantirish.....	795
Axmedov G'ofurjon G'ulomjonovich	
Turizm sohasini ekonometrik modellashda qo'llaniladigan ekonometrik usullar va amaliy imkoniyatlar	801
Shukurov Ikrom Abdurashitovich	
Sanoat tarmoqlarida investitsiyalar strukturasining iqtisodiy samaradorligi va innovatsiyalarni rag'batlantirish.....	807
Xikmatillayeva Dildora Shavkat qizi	
Mintaqa ziyorat turizmi samaradorligini oshirishda ekonometrik modellardan foydalanish.....	812
O'rinova Durdona Botir qizi	
Kichik biznes rivojlanishiga ta'sir etuvchi omillarni pest (siyosiy, iqtisodiy, ijtimoiy-demografik, texnologik omillar) tahlili.....	816
Israilov Rustam Ibragimovich	
Qazib olish sanoati korxonalarini moliyaviy sog'lomlashtirishda muammolar va salbiy omillar: tahlil va zamonaviy yondashuvlar	825
Abduraxmanov Davron Burxanjonovich	
O'zbekistonning milliy merosi boyliklaridan turizmga foydalanish yo'llari	830
Samarov Xonqul Qahhorovich	
Iqtisodiy rivojlanish jarayonida investision resurslarning mutanosib taqsimlanishi: samaradorlik va ustuvor yo'nalishlar	835
Otaboyev Feruzbek Oybek o'g'li	
Iqtisodiyotning ekologik transformatsiyasi sharoitida ijtimoiy o'sishni indikativ baholash metodologiyasi.....	841
Ibrogimov Sherzodbek Xalimjon o'g'li	



Bojxona xizmati fiskal faoliyatini takomillashtirish istiqbollari.....	847
Pardayev To'liqin Nasirovich, Farxodov Farrux Furqatovich, Nomozov Abduvoxid bdurazzoq o'g'li	
Механизмы устойчивого управления малым и средним бизнесом в условиях цифровизации и внедрения искусственного интеллекта.....	852
Зокирова Фарангиз Тулкиновна	
Yashil bank xizmatlari va uni joriy etish bilan bog'liq muammolar.....	862
Makhmudova Mukhlisa Kodirjon kizi	
Barqaror qishloq xo'jaligi ta'minot zanjirlarida transport tizimlarini optimallashtirish	867
Turdiyeva Irodaxon Ismoil qizi	
Moliyaviy rejalashtirishning ijtimoiy-iqtisodiy mazmuni	874
Pardayev Jamshid Muzaffarovich	
Mintaqa sanoatida kichik biznesni qo'llab-quvvatlash va infratuzilmasini tashkil etish	881
Salayev Jasurbek Komilovich	
Surxondaryo viloyatida 2010–2024-yillardagi yalpi hududiy mahsulotining iqtisodiy statistik tahlili.....	888
Ismoilov Davronbek Ilxomjon o'g'li	
Yashil obligatsiyalar va barqaror moliyalashtirishning davlat qarzi siyosatiga ta'siri.....	893
Tilabov Nasrulla Tashmurotovich	
Модели Альтмана и Таффлера как инструмент диагностики финансовой устойчивости предприятий.....	897
Утемуратова Бибихон Даниловна	
Individual tadbirkorlik va mustaqil bandlik asosida olinadigan daromadlarni soliqqa tortishning fundamental asoslari	903
Yakubov San'abek Ravshanbekovich	
China's trade relations with Central Asia: an empirical analysis based on the trade gravity model.....	912
Ye Maoqing	
O'zbekistonda turizm sohasida smart texnologiyalar joriy etishning holati va yo'nalishlari.....	920
Qutbiddinov Shamsiddin Kamoliddin o'g'li	
Application of modern information systems in the assessment of the technical condition of the equipment of electrical energy networks.....	924
Sobirov Muzaffar Azatovich	



APPLICATION OF MODERN INFORMATION SYSTEMS IN THE ASSESSMENT OF THE TECHNICAL CONDITION OF THE EQUIPMENT OF ELECTRICAL ENERGY NETWORKS

Sobirov Muzaffar Azatovich

Associate professor of the Department of
Information Technology, University of
Renaissance education

E-mail: m.sobirov@renessans-edu.uz

ORCID: [0009-0000-4719-9481](https://orcid.org/0009-0000-4719-9481)

Abstract: This article presents the task of assessing the technical condition of electrical network equipment in power plants and substations based on the analysis of the life cycle of electrical network equipment performed. The task of determining the state of electrical network equipment as well as technical diagnostics and condition assessment has been considered as the initial minimum set of various data that ensures sufficient reliability. The use of new technologies is necessary in order to qualitatively and quantitatively assess the technical condition of electrical network equipment based on the analysis of the type of situation that occurs in electrical energy. To assess the state of the equipment of power plants and substations of electrical networks, a monitoring system of the Bayesian method was used using a complex of hardware and software.

Key words: power plants, substation, power supply system, insulation, transformer, diagnostics, expert system, automation, transformer, monitoring system, mobile portable motor, dielectric.

Annotatsiya: Ushbu maqolada elektr stansiyalari va podstantsiyalardagi elektr tarmoqlari uskunalarining texnik holatini bajarilgan elektr tarmog'i uskunalarining hayot aylanishini tahlil qilish asosida baholash vazifasi ko'rsatilgan. Elektr tarmog'i uskunasi holatini aniqlash, shuningdek, texnik diagnostika va holatni baholash vazifasi etarlicha ishonchlilikni ta'minlaydigan turli xil ma'lumotlarning dastlabki minimal to'plami sifatida ko'rib chiqildi. Yangi texnologiyalardan foydalanish elektr energiyasida yuzaga keladigan vaziyatning turini tahlil qilish asosida elektr tarmog'i uskunasi holatini sifat va miqdoriy jihatdan baholash uchun zarurdir. Elektr stansiyalari va elektr tarmoqlari podstantsiyalari jihozlarning holatini baholash uchun apparat va dasturiy ta'minot majmuasidan foydalangan holda Bayes usulidagi monitoring tizimi qo'llanildi.

Kalit so'zlar: elektr stansiyalari, podstantsiya, elektr ta'minoti tizimi, izolyatsiya, transformator, diagnostika, ekspert tizimi, avtomatlashtirish, transformator, monitoring tizimi, mobil ko'chma dvigatel, dielektrik.

Аннотация: В данной статье представлена задача оценки технического состояния электросетевого оборудования электростанций и подстанций на основе анализа жизненного цикла выполненного электросетевого оборудования. Задача определения состояния электросетевого оборудования, а также техническая диагностика и оценка состояния рассматриваются как исходный минимальный набор различных данных, обеспечивающий достаточную достоверность. Использование новых технологий необходимо для качественной и количественной оценки технического состояния электросетевого оборудования на основе анализа типа ситуации, возникающей в электроэнергетике. Для оценки состояния оборудования электростанций и подстанций электрических сетей использована система мониторинга байесовского метода с использованием комплекса аппаратно-программных средств.

Ключевые слова: электростанции, подстанция, система электроснабжения, изоляция, трансформатор, диагностика, экспертная система, автоматизация, трансформатор, система мониторинга, мобильный переносной двигатель, диэлектрик.



INTRODUCTION

Today, issues of assessing the state of electrical equipment in power plants and substations are becoming more relevant. This, in turn, is due to the fact that a significant part of the basic electrical network equipment has developed a specified Park resource or a service life established by regulatory documents and is used within its capabilities [1] ..., [2].

The power supply system is a set of electrical installations designed to supply electricity to consumers [3]. It contains voltage networks above 1 kV and 1 kV connected by transformer substations.

Monitoring is used using a complex of hardware and software to assess the state of the equipment of power plants and substations of electrical networks. Such a complex is designed to register various information about the parameters of equipment and its structural elements, the conditions of their operation, etc., as well as to analyze the condition of the equipment based on the data obtained.

It should be noted that the cost of the basic equipment monitoring system is about 5-8% of the cost of the electrical network object. Given the decrease in costs associated with planned and emergency equipment repairs, the payment period of such systems does not exceed five years [4].

However, even with such a payment period and an average average average cost, the economic possibility of installing a monitoring system on each substation facility is often absent (substations in small towns or villages). A good alternative to the monitoring subsystem associated with assessing the condition of electrical network equipment in such cases can be any information available about the technical diagnostics and test data analysis system and/or electrical network equipment received during its operation.

In the diagnostic process, there are different definitions for monitoring electrical equipment.

In this article, it is advisable to use the definition of diagnostics as an intellectual group of consistent data, which includes statistics of values and trends (changes) that are then processed by the expert system in order to provide accurate information about the state of the equipment and the recommended measures. Monitoring can be defined as the accumulation of basic information.

The main purpose of technical diagnostics is, first of all, to recognize the state of the object in conditions of limited information and, as a result, to assess the residual resources of the system (equipment) and increase its reliability [5]. Different technical systems have different structures and goals, so the same technical diagnostics cannot be applied to all systems.

LITERATURE REVIEW ON THE TOPIC

J. Wang et al.[6] study analyzes the evolution of intelligent algorithms for transformer condition assessment. The study covers DGA, sulfur gases and other online monitoring signal sources, as well as information fusion methods for data integration and error reduction. The authors show the strengths and weaknesses of the algorithms using statistical analysis, classifiers, data fusion and uncertainty model; as a result, big-data and AI-based assessment schemes make transformer CBM (condition-based maintenance) more effective.

H. Zhi et al.[7] paper proposes a real-time digital-twin system for distribution networks: this system includes a robust state-estimation and a deep learning-based bad-data identification module. The authors demonstrate the accuracy and latency of the proposed approach in detecting and correcting incorrect/missing data by testing scenarios through a simulation platform. Conclusion: Digital twin and advanced state estimation are reliable tools for assessing the condition of network equipment.

A systematic review by J. Heluany and V. Gkioulos[8] provides a comprehensive overview of the application of digital twin technology in the power sector (generation and distribution). The authors consider the issues of DT architecture, two-way communication, virtual models and services, and security and stakeholders. As a result, the highest potential of DT is identified mainly for control and fault diagnosis in the distribution process, but the lack of specific security studies for DT itself is noted.

In the study by J. Garcia et al.[9], a review of the NLP-assisted literature analyzes signal-processing, hybrid models, and practical challenges in the field of condition-monitoring and predictive maintenance of industrial equipment. The authors show in which cases ML/DL methods work best, the possibilities of IoT and big-data integration, and the need for XAI (explainable AI). Conclusion: Combined signal-based approaches and interpretable models are effective in assessing power grid equipment.

M.Ismaeil[10] proposes an asset information model (AIMM) based on the integration of GIS and BIM, demonstrating the possibilities of combining infrastructure and equipment data into a centralized repo (spatial+non-spatial). The study shows through a practical example — asset management in campus facilities — that GIS/BIM/SCADA integration creates the necessary information base for assessing the technical condition of equipment and optimizing maintenance processes. This approach is an important infrastructure for assessing the condition in power grid asset management.



RESEARCH METHODOLOGY

In carrying out this research work, methods widely used in scientific research methodology were used. In the process of scientific analysis, these scientific research methods were widely used, in particular, observation, generalization, grouping, comparison, and in analysis, synthesis and analysis methods were widely used.

ANALYSIS AND RESULTS

In this work, the monitoring system is understood as an assessment of the technical condition of the main electrical equipment, without taking into account the subsystems of system-wide controls (relay protection and anti-accident automation, emergency recording and electrical quality control processes, etc.).

Of course, the monitoring system has a number of technical advantages over the technical Diagnostic Data Analysis System:

- the ability to diagnose electrical appliances under the voltage of the circuit;
- control of the actual state of the equipment at the speed of the process of the circuit;
- high reliability of outputs;
- the ability to store output data (parameters and characteristics of equipment), which allows you to determine the relationship and relationship between events [11].

For example, in terms of assessing the state of electrical equipment to determine the integral assessment of the state of substations, the monitoring system has a number of disadvantages:

- very rarely does a monitoring system contain a comprehensive set of data on all electrical equipment of an existing object. It is aimed at monitoring the main components-power transformers, switching (less often – auxiliary) equipment;
- output data is a set of data on which analysis and processing form a separate problem, the solution of which requires an appropriate mathematical apparatus with the implementation of software.
- In addition, there must be certain conditions for the installation of a monitoring system in power plants and substations:
 - the equipment should have a relatively high price;
 - in the event of a failure of such equipment, the approximate damage caused by low discharge of electricity should be noticeable;
 - diagnostic testing of such equipment under load is not carried out quickly and reliably using mobile portable devices and requires significantly more expensive diagnostic equipment [12]. For example, analyzing the state of hydraulic units when it is necessary to ensure simultaneous control of temperature, electrical, mechanical and other parameters.

It follows from the above that the use of monitoring systems for each unit of electrical network equipment is not technically and economically justified, for example, in transitions carried out using simplified schemes, and even more so in grid and dead substations. But since it is necessary to analyze the technical condition of all objects of the electrical network complex, this work proposes a system based on the analysis of technical diagnostic data as a system for assessing the technical condition of electrical network equipment of power plants and substations and any available information about electrical network equipment obtained during the operation of this equipment.

Today, technical diagnostic methods (based on non-destructive testing methods) and tests are actively used to assess the condition of electrical equipment in power plants and substations.

The frequency and size of equipment diagnostics and testing are regulated. The number, type, meaning and methods of data collection are different and depend on the diagnostic method and the purpose of the equipment [13].

For almost any type of equipment, there is at least one non-destructive testing method, with which it is possible to obtain information about the condition of the equipment with a frequency of control at least once a year. According to the general classification, all methods of diagnostics of electrical equipment and its control can be divided into two groups:

- non-destructive testing methods that do not require the destruction of samples of test materials (products) of the circuit;
- destructive control methods that require the destruction of samples of test materials (products).

All methods of non-destructive control can be distinguished on the basis of the physical phenomena on which they are based. The following non-destructive testing methods are most commonly used for electrical equipment:

- magnetic of the moment;
- electric in the wind;



- circuit current;
- radio waves of the moment;
- heat of the moment;
- optical;
- radiation;
- solo acoustic;
- penetrating substances (capillary and leakage).

Within each species, methods are also classified according to additional characteristics.

Consider the definitions for each unbreakable testing method used in regulatory documents.

Definitions for each non-perturbative test method used in regulatory documents include based on the determination of magnetic properties.

Magnetic control methods are based on recording the magnetic scattering fields that occur on defects or determining the magnetic properties of the controlled products.

Electrical control methods, in accordance, are based on recording the parameters of the electric field that interact with the control object, or the area that appears on the controlled object as a result of external influence.

The method of radio wave control is based on the analysis of the interaction of the radio wave range with the control object of electromagnetic radiation.

Thermal control methods, in accordance, are based on recording the thermal fields of the control object.

Visually, optical control methods are based on the interaction of optical radiation with the control object.

Radiation control methods are based on recording and analyzing penetrating ionizing radiation after interacting with a controlled object.

Acoustic control methods are based on the application of excited elastic vibrations at the control object.

Capillary control methods are based, accordingly, on the capillary penetration of indicator fluids into the surface and continuous spaces of the material of the object of observation and registration of indicator traces formed visually or using a transducer.

It should be noted that according to the regulatory framework for analyzing the state of electrical network equipment, all these methods are not mandatory, some of them are recommended.

Mandatory includes the following test methods:

measuring the DC resistance and suction coefficient of insulation;

measurement of insulation properties: dielectric loss angle tangent, insulation capacity;

high voltage insulation test;

oil Test (physico-chemical analysis);

assessment of the moisture content of solid insulation, etc.

Assessment of the application and effectiveness of modern information systems.

The system developed in this article is positioned as an expert system for assessing the oil-filled state of equipment of various electrical networks. Therefore, the greatest interest of the existing expert systems is the diagnostic+ system, which is designed to analyze the state of almost any substation equipment.

The method of Bayes' theorem is to calculate the conditional probability. The traditional method of calculating conditional probability (the probability that an event will occur when another event occurs) is to use the conditional probability formula, calculate the probability that the first and second event will occur simultaneously, and divide it by the probability that the second event will occur.

When calculating the conditional probability by Bayes' theorem, you use the following steps:

Considering condition A to be true, one can determine the probability that condition B is true.

To determine the probability that a phenomenon is true.

Multiply two probabilities together.

To be in the probability of event B occurring.

This means that the formula of Bayes' theorem can be expressed as follows:

$$P\left(\frac{A}{B}\right) = P\left(\frac{B}{A}\right) \times \frac{P(A)}{P(B)} \quad (1)$$

Calculating a conditional probability like this is especially useful when the inverse conditional probability can be easily calculated, or when calculating the joint probability is very difficult.

In this process, the state of the power transformer was analyzed based on technical diagnostic data to assess the possibility of implementing the system using the Bayesian method, such as the "Diagnostic+" System [14].

Using the Bayesian method, the state of the D_i object associated with this state and the k_i factor can be expressed as the probability of the manifestation of the factor and the probability of the state:

$$P\left(\frac{D_i}{k_i}\right) = P(D_i) \frac{P\left(\frac{k_i}{D_i}\right)}{P(k_i)}, \quad (2)$$

here is the D_i probability of manifestation of the k_i factor in an object in the $P\left(\frac{k_i}{D_i}\right)$ state;
 $P(D_i)$ – D_i aprior probability of State;

$P(k_i)$ – k_i the aprior probability of the manifestation of the factor in any object;

$P\left(\frac{D_i}{k_i}\right)$ – k_i the posterior probability of the D_i state in the manifestation of the factor.

The basic idea of the Bayesian method is to evaluate the probabilistic properties of determining the state of $P\left(\frac{D_i}{k_i}\right)$ based on the factors available for analysis.

In sequential consideration of different combinations of factors, an increase in the value of $P\left(\frac{D_i}{k_i}\right)$ indicates a high probability of the D_i event, while a decrease indicates its practical impossibility.

To determine the state of an oil transformer with a voltage of 110 kv, it is advisable to include a classification of electrical equipment States. Table 1 included four positions depending on whether the indicator's condition is consistent with its condition, or whether there is a defect (Table 1) [15], ..., [16].

Table 1. Possible cases of equipment

Position	The indicator is in the normal range	The presence of a flaw
D_1	Yes	No
D_2	Yes	Yes
D_3	No	Yes
D_4	No	No

Next, with the help of expert assessments, the Apriori probabilities of the initial cases are determined.

We believe that the characters are independent. In this case, the state of the power transformer K is characterized by a set of independent characters, each of which has two outputs:

$$K = (k_1, k_2), \quad (3)$$

where k_1 is a manifestation of the K Property, and k_2 is an invisibility.

Below (Figure 1), the probability of manifestation and/or invisibility can be expressed in terms of distribution functions. The figure shows the functions of manifestation of status symbols: $D_1 - \mu_1(x), D_2 - \mu_2(x), D_3 - \mu_3(x)$ va $D_4 - \mu_4(x)$, they can be defined in the range $X = \{0 \dots 3\}$.

The value of an independent variable describes the level of the state of the object of study.

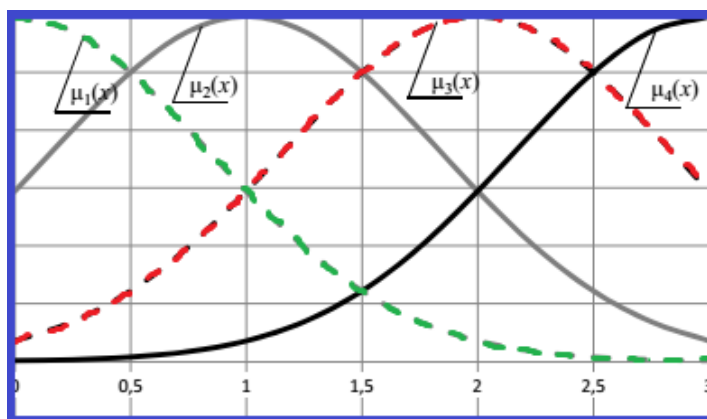


Figure 1. Functions of distribution of manifestations of state signs.

Generalized linear representations of strong $\mu_1(x)$ and normal $\mu_2(x)$ properties give probabilistic properties of the manifestation of some character of $\mu_p(x)$, while generalized linear representations of weak manifestation functions of $\mu_2(x)$ and its absence give the probabilistic properties of $\mu_4(x)$ non-representation $\mu_N(x)$ symbols.

The characteristic functions of $\mu_p(x)$ and $\mu_N(x)$ allow determining the distribution of the probability of manifestation of signs for a given D_i diagnosis (Fig. 2). For each case of the object of study described in table 2, similar functions should be identified in all signs of diagnosis.

The probability of any state that can occur with different combinations of symbols can be determined by the Bayesian formula:

$$P\left(\frac{D_i}{K}\right) = \frac{P(D_i)P\left(\frac{K}{D_i}\right)}{\sum_{s=1}^n P(D_s)P\left(\frac{K}{D_s}\right)}, \quad (4)$$

where, $K = \{k_1, k_2, k_3, \dots, k_n\}$ is a set of two-level characters in;
n-number of case diagnoses;

Initial probability of diagnosis of $P(D_i)$ point D_i ;

$P\left(\frac{K}{D_i}\right)$ is the probability of the manifestation of signs determined according to the expression in the diagnosis of D_i :

$$P\left(\frac{K}{D_i}\right) = P\left(\frac{k_1}{D_i}\right)P\left(\frac{k_2}{D_i}\right) \dots P\left(\frac{k_v}{D_i}\right), \quad (5)$$

where, $K = \{k_1, k_2, k_3, \dots, k_v\}$ a set of two-level characters in the composition.

Such an analysis makes it possible to obtain a quantitative description of the combination of symptoms of a diagnosed condition depending on a particular case.

For analysis of dissolved gas analysis in the garden of fat is carried out for gas xromatografik seven (3-table): meta (CH_4), carbon dioxide (CO_2), etilen (C_2H_4), acetyl (C_2H_2), back etan (C_2H_6), hydrogen (H_2), carbon oxide (CO).

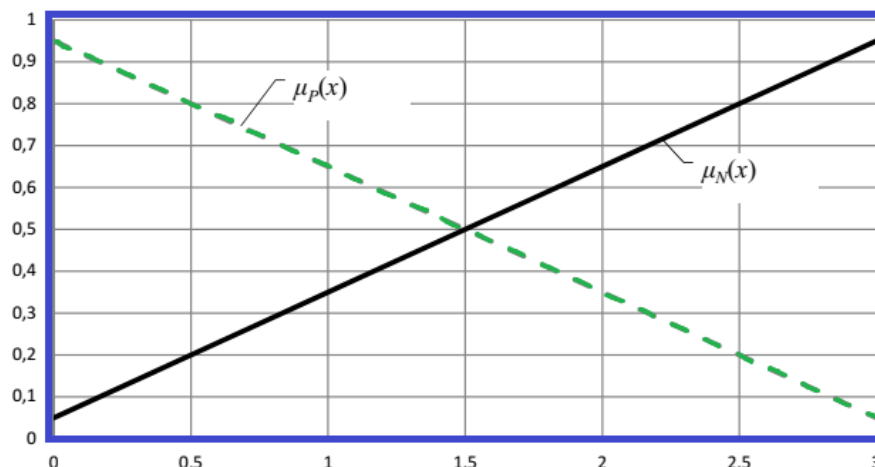


Figure 2. Characteristic functions of the manifestation of probability of properties.

To confirm the studies carried out, a data-based calculation of the probability of cases was carried out. Chromatographic analysis using the appropriate functions, the dissolved gases of the power transformer, as well as the probability of the manifestation and invisibility of the signs for each gas, are calculated separately.

CONCLUSION AND RECOMMENDATIONS

This article presents multi-criterion tasks of decision-making in conditions of limited information, the task of assessing the technical condition of power plants and electrical network equipment in the substation, based on the analysis of the life cycle of electrical network equipment performed. As an initial minimum set of data that ensures sufficient reliability, it will be necessary to determine the state of electrical network equipment as well as perform technical diagnostics.

It is necessary to create new tools for a qualitative and quantitative assessment of the technical condition of electrical network equipment based on the analysis of the situation that has arisen in electricity. It carries out a state analysis based on any collected data on the object of research, taking into account operational experience, and on this basis consists in determining decisions on the further operation of the equipment [17], ..., [19].

LIST OF USED LITERATURES:

1. МРСК Урала. Годовой отчет 2012 [Электронный ресурс]: офиц. сайт. – Режим доступа: <http://report2012.mrsk-ural.ru/reports/mrskural/annual/2012/gb/Russian/9030.html>. – Загл. с экрана (дата обращения 05.01.2015).
2. Россети. Годовой отчет 2009 год [Электронный ресурс]: офиц. сайт. – Режим доступа: <http://www.rosseti.ru/investors/info/year/>. – Загл. с экрана (дата обращения 05.01.2015).
3. Черноусова, Л.В., Электрические станции и подстанции: учебнометодические рекомендации по выполнению курсового проекта для обучающихся по направлению подготовки 13.03.02 «Электроэнергетика и электротехника»/ Л.В.Черноусова. - Черкесск: БИЦ СевКавГГТА, 2017. -40 с.
4. Галкин В. С. Вопросы проектирования автоматизированных систем мониторинга электрооборудования на подстанциях 500–220 кВ с учетом обеспечения надежности электрических сетей / В. С. Галкин, Т. М. Лангборт, В. А. Липаткин, В. А. Смирнов // Электрические станции. – 2006. – № 7. – С. 66–67
5. Спарлинг Б. Д. Повышение уровня мониторинга и диагностики для оптимизации передачи и распределения электроэнергии в целях улучшения финансовых показателей / Б. Д. Спарлинг // Методы и средства оценки состояния энергетического оборудования / под ред. А. И. Таджибаева, В. Н. Осотова. – СПб., 2005. – Вып. 28. – С. 178–202.
6. Wang, J., Zhang, X., Zhang, F., Wan, J., Kou, L., & Ke, W. (2022). Review on Evolution of Intelligent Algorithms for Transformer Condition Assessment. *Frontiers in Energy Research*, 10.
7. Zhi, H., Mao, R., Hao, L., Chang, X., Guo, X., & Ji, L. (2024). Digital Twin for Modern Distribution Networks by Improved State Estimation with Consideration of Bad Date Identification. *Electronics*, 13(18), 3613.
8. Heluany, J. B., & Gkioulos, V. (2023). A review on digital twins for power generation and distribution. *International Journal of Information Security*, 23, 1171–1195.
9. Garcia, J., Rios-Colque, L., Peña, A., & Rojas, L. (2025). Condition Monitoring and Predictive Maintenance in Industrial Equipment: An NLP-Assisted Review of Signal Processing, Hybrid Models, and Implementation Challenges. *Applied Sciences*, 15(10), 5465.
10. Ismaeil, E. M. H. (2024). Asset Information Model Management-Based GIS/BIM Integration in Facility Management Contract. *Sustainability*, 16(6), 2495.



11. Давиденко И. В. Структура экспертно-диагностической и информационной системы оценки состояния высоковольтного оборудования / И. В. Давиденко, В. П. Голубев, В. И. Комаров, В. Н. Осотов // Электрические станции: ежемесячный производственно-технический журнал. - 1997. - N 6. - С. 25-27.
12. Давиденко И. В. Структура экспертно-диагностической и информационной системы оценки состояния высоковольтного оборудования / И. В. Давиденко, В. П. Голубев, В. И. Комаров, В. Н. Осотов // Электрические станции: ежемесячный производственно-технический журнал. - 1997. - N 6. - С. 25-27.
13. Россети. Годовой отчет 2009 год [Электронный ресурс]: офиц. сайт. – Режим доступа: <http://www.rosseti.ru/investors/info/year/>. – Загл. С экрана (дата обращения 05.01.2015).
14. Хальясмаа А. И. Оценка состояния силовых трансформаторов на основе анализа данных технической диагностики / А. И. Хальясмаа, С. А. Дмитриев, С. Е. Кокин, М. В. Осотова // Вестник ЮУрГУ. – 2013. – Том 13. – №2. – С. 114–12.
15. M. A. Sobirov, I. S. Kurbanova, S. I. Hamrayeva and Z. O. Sabirova, "Analysis of Mathematical Modeling Model in Power Supply Systems," 2023 IEEE XVI International Scientific and Technical Conference Actual Problems of Electronic Instrument Engineering (APEIE), Novosibirsk, Russian Federation, 2023, pp. 1570-1573, doi: 10.1109/APEIE59731.2023.10347687.
16. M. A. Sobirov, I. S. Kurbanova and Z. O. Sabirova, "Multi-Level Approach in Organizing the Energy Supply System in Telecommunication Networks," 2023 IEEE XVI International Scientific and Technical Conference Actual Problems of Electronic Instrument Engineering (APEIE), Novosibirsk, Russian Federation, 2023, pp. 1830-1834, doi: 10.1109/APEIE59731.2023.10347846.
17. Ertem G., Çelik B. and Yeşilyurt S., 2008. Endüstriyel tav fırınlarında ısı dengliği hesaplamaları ve enerji verimliliğinin belirlenmesi. IV. Ege Enerji Sempozyumu, İzmir, Turkey, pp. 1–8.
18. Manatura K. and Tangtrakul M., 2010. A study of specific energy consumption in reheating furnace using regenerative burners combined with recuperator. Silpakorn U Science & Tech J 4(2), 7–13.
19. Terzi Ü.K. and Baykal R., 2011. Efficient and effective use of energy: A case study of Tofas. Environmental Research, Engineering and Management 1(55), 29–33.



IQTISODIYOT & TARAQQIYOT

Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

Ingliz tili muharriri: Feruz Hakimov

Musahhih: Zokir ALIBEKOV

Sahifalovchi va dizayner: Oloviddin Sobir o'g'li

2025. № 9

© Materiallar ko'chirib bosilganda "Yashil" iqtisodiyot va taraqqiyot" jurnali manba sifatida ko'rsatilishi shart. Jurnalda bosilgan material va reklamalardagi dalillarning aniqligiga mualliflar ma'sul. Tahririyat fikri har vaqt ham mualliflar fikriga mos kelamasligi mumkin. Tahririyatga yuborilgan materiallar qaytarilmaydi.

Mazkur jurnalda maqolalar chop etish uchun quyidagi havolalarga maqola, reklama, hikoya va boshqa ijodiy materiallar yuborishingiz mumkin.
Materiallar va reklamalar pullik asosda chop etiladi.

El.Pochta: sq143235@gmail.com

Bot: @iqtisodiyot_77

Tel.: 93 718 40 07

Jurnalga istalgan payt quyidagi rekvizitlar orqali obuna bo'lishingiz mumkin. Obuna bo'lgach, @iqtisodiyot_77 telegram sahifamizga to'lov haqidagi ma'lumotni skrinshot yoki foto shaklida jo'natishingizni so'raymiz. Shu asosda har oygi jurnal yangi sonini manzilingizga jo'natamiz.

"Yashil" iqtisodiyot va taraqqiyot" jurnali 03.11.2022-yildan O'zbekiston Respublikasi Prezidenti Adminstratsiyasi huzuridagi Axborot va ommaviy kommunikatsiyalar agentligi tomonidan №566955 reyestr raqami tartibi bo'yicha ro'yxatdan o'tkazilgan.

Litsenziya raqami: №046523. PNFL: 30407832680027

Manzilimiz: Toshkent shahar, Mirzo Ulug'bek tumani
Kumushkon ko'chasi, 26-uy.



Jurnal sayti: <https://yashil-iqtisodiyot-taraqqiyot.uz>