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ijtimoiy-iqtisodiy, innovatsion texnik,
fan va ta'limga oid ilmiy-amaliy jurnal

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ИМЕНИ Г.В. ПЛЕХАНОВА
ТАШКЕНТСКИЙ ФИЛИАЛ



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- 05.01.00 – Axborot texnologiyalari, boshqaruv va kompyuter grafikasi
- 05.01.01 – Muhandislik geometriyasi va kompyuter grafikasi. Audio va video texnologiyalari
- 05.01.02 – Tizimli tahlil, boshqaruv va axborotni qayta ishlash
- 05.01.03 – Informatikaning nazariy asoslari
- 05.01.04 – Hisoblash mashinalari, majmualari va kompyuter tarmoqlarining matematik va dasturiy ta'minoti
- 05.01.05 – Axborotlarni himoyalash usullari va tizimlari. Axborot xavfsizligi
- 05.01.06 – Hisoblash texnikasi va boshqaruv tizimlarining elementlari va qurilmalari
- 05.01.07 – Matematik modellash
- 05.01.11 – Raqamli texnologiyalar va sun'iy intellekt
- 05.02.00 – Mashinasozlik va mashinashunoslik
- 05.02.08 – Yer usti majmualari va uchish apparatlari
- 05.03.02 – Metrologiya va metrologiya ta'minoti
- 05.04.01 – Telekommunikatsiya va kompyuter tizimlari, telekommunikatsiya tarmoqlari va qurilmalari. Axborotlarni taqsimlash
- 05.05.03 – Yorug'lik texnikasi. Maxsus yoritish texnologiyasi
- 05.05.05 – Issiqlik texnikasining nazariy asoslari
- 05.05.06 – Qayta tiklanadigan energiya turlari asosidagi energiya qurilmalari
- 05.06.01 – To'qimachilik va yengil sanoat ishlab chiqarishlari materialshunosligi
- 05.08.03 – Temir yo'l transportini ishlatish
- 05.09.01 – Qurilish konstruksiyalari, bino va inshootlar
- 05.09.04 – Suv ta'minoti. Kanalizatsiya. Suv havzalarini muhofazalovchi qurilish tizimlari
- 10.00.06 – Qiyosiy adabiyotshunoslik, chog'ishtirma tilshunoslik va tarjimashunoslik
- 10.00.04 – Yevropa, Amerika va Avstraliya xalqlari tili va adabiyoti
- 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

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MUNDARIJA

JAHONDA KREATIV IQTISODIYOTNING RIVOJLANISHINING UMUMIY GLOBAL TENDENSIYALARI.....	12
Ismailov Azizbek Ruzimaxmatovich	
CHORVACHILIK MAHSULOTLARI ISHLAB CHIQUV VA EKSPORT SALOHİYATINI OSHIRISHDA BOZOR INFRATUZILMASINI RIVOJLANTIRISHNING IQTISODIY OMILLARI	22
Soxadaliyev Abdurashid Mamadaliyevich	
XORIJIY INVESTITSİYALAR VA IQTISODIY O'SISH O'RTASIDAGI O'ZARO TA'SIR	30
Madraximova Irodaxon Sherzodbek qizi	
O'ZBEKISTON SHAROITIDA XIZMATLAR EKSPORTINING IQTISODIY O'SISHGA TA'SIRI	35
Sultonov Shodiyor Abduxalilovich, Karshiyeva Charos Mamasoliyevna	
QASHQADARYO VILOYATIDA OLIY TA'LIM VA MEHNAT BOZORI INTEGRATSIYASI ASOSIDA YUQORI MALAKALI KADRLAR TAYYORLASHNING HOZIRGI HOLATI.....	41
Haqqulov Fazliddin Faxriddinovich	
SOLIQ MA'MURCHILIGIDA XALQARO TAJRIBA ASOSIDA SAMARADORLIKNI OSHIRISH.....	48
Xodjimov Xamidullo Mamirjonovich	
TIJORAT BANKLARI KREDIT PORTFELNI SAMARALI BOSHQARISH: MUAMMO VA TAKLIFLAR.....	53
Yusupov Shaxzod Maxmatmurodovich	
KICHIK BIZNES VA TADBIRKORLIKNING RIVOJLANISHIGA TA'SIR ETUVCHI ASOSIY OMILLAR VA IQTISODI SAMARADORLIGI TAHLILI.....	59
Axatova Shahnoza	
SANOATNING "DRAYVER" SOHALARINI RIVOJLANTIRISH	63
Mamurjonova Ruxshonabegim Farxodovna	
РОЛЬ КРЕАТИВНОЙ ИНДУСТРИИ В РЕГИОНАЛЬНОМ РАЗВИТИИ КАРАКАЛПАКСТАНА.....	69
Хошимова Камилла Навфал қизи	
РОЛЬ ЧЕЛОВЕЧЕСКОГО КАПИТАЛА В ПОВЫШЕНИИ КОНКУРЕНТОСПОСОБНОСТИ ОРГАНИЗАЦИЙ В УСЛОВИЯХ ГЛОБАЛИЗАЦИИ	79
Тожиева Шахноза Бобомуратовна, Расулова Дилфуза Валиевна	
АНАЛИЗ ФИНАНСОВОГО СОСТОЯНИЯ ПРЕДПРИЯТИЯ.....	86
Файзиёв Умуркул Шухратович	
TIKUV-TRIKOTAJ KORXONALARDA MARKETING FAOLIYATIDA ISTEMOLCHILARNI MOTIVATSIYALASH MASALALARI	97
Jalilov Jamshid G'anijonovich	
СТАНДАРТЫ КАЧЕСТВА КАК ФАКТОР ПОВЫШЕНИЯ КОНКУРЕНТОСПОСОБНОСТИ ПИЩЕВОЙ ПРОМЫШЛЕННОСТИ.....	103
Ўролова Севара Бехзод қизи	
BANKLARDA KAPITAL YETARLILIGI VA LIKVIDLIKNI AUDITORLIK BAHOLASH USULLARINI TAKOMILLASHTIRISH.....	109
Narziyev Hayotjon Azamatovich	
NATIJAVIYLIKKA YO'NALTIRILGAN BudgetLASHTIRISH ORQALI FISKAL SAMARADORLIKNI OSHIRISH MASALALARI.....	115
Allakuliyev Akmal Baltayevich	
AUDITORLIK XULOSALARIDA AUDITORLARNING PROFESSIONAL MULOHAZALARNING ASOSLILIGINI ANIQLASH AHAMIYATI	120
Parpiyev Jaxongir Ilxomjonovich	
YASHIL IQTISODIYOTDA YASHIL MOLIYALASHTIRISH: NAZARIY VA AMALIYOT UYG'UNLIGI.....	126
Xalikov S. X.	



TURISTIK KORXONALARDA BREND CAPITALINI BAHOLASH	131
Zufarov Akmal Gulamiddinovich	
AYOLLAR ISH BILAN BANDLIGINI OSHIRISHDA KASANACHILIKNING AHAMIYATI	141
Eshqobulova Charos O'roq qizi	
ПРАВОВОЕ РЕГУЛИРОВАНИЕ ИНВЕСТИЦИОННОЙ ДЕЯТЕЛЬНОСТИ В РЕСПУБЛИКЕ УЗБЕКИСТАН	148
Алимова Дилафруз	
O'ZBEKISTON UZUMCHILIK KORXONALARINING EKSPORT MARKETING STRATEGIYALARINI TAKOMILLASHTIRISHDA YASHIL INNOVATSIYALAR VA TEXNOLOGIYALARNING O'RNI	153
Usmonova Diyora Mahmud qizi	
RAQAMLI MOLIVAVIY XIZMATLAR TRANSFORMATSIYASI SHAROITIDA SOLIQ BOSHQARUVI SAMARADORLIGINI OSHIRISH ISTIQBOLLARI	161
Radjabov Umurzoq Ablakulovich	
ЦИФРОВАЯ ТРАНСФОРМАЦИЯ ЭНЕРГЕТИЧЕСКОГО СЕКТОРА РЕСПУБЛИКИ УЗБЕКИСТАН: РОЛЬ ИНФОРМАЦИОННО-КОММУНИКАЦИОННЫХ ТЕХНОЛОГИЙ В ПОВЫШЕНИИ ЭФФЕКТИВНОСТИ ЭНЕРГЕТИКИ	165
Аллаева Г.Ж.	
THE IMPORTANCE OF STRESS TESTING AND ITS IMPLEMENTATION IN COMMERCIAL BANKS OF THE REPUBLIC OF UZBEKISTAN	169
Mamatova Sevara	
MINTAQADA SANOAT KORXONALARI SALOHİYATI VA RAQOBATBARDOSHLIGINI OSHIRISHNING INNOVATSION KO'RSATKICHLARI	175
Nabiyev G'ulom Abdisalomovich	
IJTIMOİY SOHA INVESTISIYA LOYIHALARINI DAVLAT–XUSUSIY SHERIKLIK ASOSIDA MOLIYALASHTIRISHDA RISKLARNI BOSHQARISHNING XORIY TAJRIBALARI	185
Ergashev Axmadjon Maxmudjon o'g'li	
YASHIL BANK MAHSULOTLARIDA RAQAMLI TEXNOLOGIYALARNI QO'LLASH ISTIQBOLLARI	189
Mahmudov Ulug'bek Davronovich	
KICHIK BIZNESDA XUSUSIY VA UMUMIY AXBOROT TIZIMLARI INTEGRATSIYASI	193
Navruz-zoda Layli Baxtiyorovna	
O'ZBEKISTON IQTISODIYOTIGA TO'G'RIDAN-TO'G'RI XORIJIY INVESTITSİYALARNI JALB QILISH MEXANIZMINI TAKOMILLASHTIRISH YO'LLARI	197
Mamatkulova Nadira Maxkamovna	
JAHON AMALIYOTIDA TASHABBUSLI BUDJETLASHTIRISHNING KONSEPTUAL YO'NALISHLARI	203
Xamidov Xabibullo Xikmatulla o'g'li	
РАЗВИТИЕ УПРАВЛЕНЧЕСКОГО УЧЁТА В УСЛОВИЯХ ЦИФРОВИЗАЦИИ МАЛОГО БИЗНЕСА КАК ФАКТОР ПЕРЕХОДА К “ЗЕЛЁНОЙ” ЭКОНОМИКЕ РЕСПУБЛИКИ УЗБЕКИСТАН	210
Бозорова Озода Рахимовна	
TEMIРBETON KO'RRIKLARDAGI BURDALANGIN BETONDAN OLINGAN CHAQIQ TOSHNI KOMPLEKS TADQIQOT QILISH	222
Salixanov Saidxon Salixanovich, Kenjayev Temurbek Olimjonovich	
KICHIK BIZNES VA XUSUSIY TADBIRKORLIKDA YASHIRIN IQTISODIYOTNI ANIQLASH USULLARI VA SOF FOYDA KO'RSATKICHIDA AKS ETISH YO'LLARI	226
Mavlyanov Muzaffar Yusupovich	
MAMLAKATIMIZ BANKLARIDA FOIZ RISKILARI MUAMMOLARI VA ILMIY-TAHLILI	230
Isakov.J.Ya	
QISHLOQ XO'JALIGI MAHSULOTLARINI EKSPORTGA YO'NALTIRISHDA IQTISODIY BARQARORLIK TUSHUNCHASINING NAZARIY ASOSLARI VA BAHOLASH MEZONLARI	238
Faxriddinov Bahriddin	



TO'QIMACHILIK SANOATIDA SUN'IY VA KIMYOVIY TOLALARNING IQTISODIY AFZALLIKLARI	243
Raximov Furqat Jalolovich	
BUXORO VILOYATIDA CHARM-POYABZAL TARMOG'I RAQOBATBARDOSHLIGINI OSHIRISH STRATEGIYASI.....	249
Rahmonov Xurshid Xayriddinovich, Atoeva Mehriyo Ilhom qizi	
KORXONALARDA BUXGALTERIYA HISOBI VA UNI YURITISH TARTIBINI TAKOMILLASHTIRISH.....	254
M.I.Murodova	
SOLIQ SIYOSATI ORQALI AHOLI DAROMADLARINI RAG'BATLANTIRISH MEXANIZMLARI.....	258
Uzoqov Suhrobjon Do'smat o'g'li	
INNOVATSION VA RAQAMLI TEXNOLOGIYALAR ASOSIDA LOGISTIK XIZMATLAR KORXONALARINING IQTISODIY SAMARADORLIGI TAHLILI.....	264
Xalimov Javlonbek Shaxriyovich	
O'ZBEKISTON RESPUBLIKASIDA SOLIQ TIZIMIDA RAQAMLASHTIRISHNI TAKOMILLASHTIRISH ORQALI SOLIQLARNI UNDIRISHNING METODOLOGIK MUAMMOLARI	271
Muxammadov Nodir Karimovich	
KICHIK BIZNES SUBYEKTLARI FAOLIYATIDA EKSPORTBOP MAHSULOTLAR ISHLAB CHIQARISH JARAYONLARINI TAKOMILLASHTIRISH ORQALI SAMARADORLIKNI OSHIRISH	277
Boymirzayev Zokirjon Mashrabboyevich	
IQTISODIYOT VA TA'LIM BOSHQARUVI: O'ZBEKISTONDA TA'LIM BRENDINGI UCHUN IQTISODIY JIHATLAR.....	282
Dilfuza Shokirova	
OLIY TA'LIM SOHASIDA DAVLAT-XUSUSIY SHERIKLIK TIZIMINI TAKOMILLASHTIRISH.....	291
Raximjonova Shohsanam Baxodirovna	
O'ZBEKISTON BANKLARIDA RAQAMLI TRANSFORMATSIYANI INSON KAPITALI RIVOJI BILAN UYG'UNLASHTIRISH: INSTITUTSIONAL YONDASHUV.....	295
Xushvaqto'v Nodirbek Nomoz o'g'li	
SUN'IY INTELLEKT ASOSIDA MOLIYAVIY STRESS-TEST TIZIMINI YARATISH METODOLOGIYASI	299
Zaynutdinov Ismoil Samariddin o'g'li	
HOZIRGI SHAROITDA BANK FAOLIYATIDA RISKLARNI BOSHQARISH TIZIMINING INSTITUTSIONAL MEXANIZMLARI	303
Malikova Dilrabo Muminovna, Shakarova Kumush Faxriddin qizi	
ENSURING SECURITY IN THE DIGITAL WORLD: HOW THE INSURANCE INDUSTRY CAN COUNTER CYBERATTACKS	308
D.D. Omonova	
JAHON SAVDO TASHKILOTIGA A'ZO BO'LISH JARAYONIDA BYUDJET-SOLIQ SIYOSATINI ISLOH QILISH MASALALARI	314
Hojiakbar Zaynabidinov	
SILINDRSIMON KAMERADA QATLAMLI CHIGITLAR AYLANMA HARAKATINING TAHLILI.....	319
No'monov Mirjalol Abdumalik o'g'li	
IPAKCHILIK KLASSTERLARI ASOSIDA TARMOQNI O'RTA MUDDATLI RIVOJLAN TIRISH STRATEGIYASI.....	325
Xudoykulov Mamarasul Radjabovich	
INNOVATSION IQTISODIYOT SHAROITIDA UZOQ MUDDATLI AKTIVLAR HISOBINI TAKOMILLASHTIRISH.....	332
Shermatov Sirojiddan Xaydarovich	
O'ZBEKISTONDA TURIZM IQTISODIYOTINING RAQAMLI MARKETING ORQALI RIVOJLANISH YO'LLARI.....	335
Egamberdiyev Muzaffar	
РОЛЬ ЦИФРОВЫХ РЕШЕНИЙ В РЕАЛИЗАЦИИ ПРОЕКТА «БЕЗОПАСНЫЙ ГОРОД»	339
Иминов Акбаржон Одилжонович	



IQTISODIY TIZIM VA INSON QADRIYATI: KAPITALIZM VA GUMANIZM O'RTASIDA	345
Raxmatullayev Sarvar Nazar o'g'li, Abdukarimova Muborak Sharaf qizi, Madrakhimova R. G.	
O'ZBEKISTONDA QULAY INVESTITSIYA MUHITINI SHAKLLANTIRISH VA INVESTITSİYALAR JALB ETISH MEXANIZMLARINI TAKOMILLASHTIRISH	350
Yusupov Muxiddin Soatovich	
KONSOLIDATSIYALASHGAN MOLİYAVIY HISOBOT MA'LUMOTLARINI TAHLIL QILISH MASALALARI	358
Avazov Ilhom Ravshanovich	
YANGI TUZILISHLI IKKI QATLAMLI TRIKOTAJ TO'QIMALARINI OLISH USULLARI	363
S. Saparova, M. Musaeva, M.Mirsadikov, M.Mukimov	
KVANT MUHITIDA AXBOROTNI HIMOYALASHGA XIZMAT QILUVCHI MULTIPLEKSER TUZILMASI	370
Safoev Nuriddin Najmiddin o'g'li	
ERKIN IQTISODIY HUDUDLAR: KO'P QATLAMLI IQTISODIY MEXANIZMLAR, INNOVATSION INFRATUZILMA VA INSTITUSIONAL UYG'UNLIKNING KONSEPTUAL TAHLILI	377
Kuziev Ravshan Ramazonovich	
SANOAT HAMKORLIGINING ILG'OR TAJRIBALARI VA ULARNI O'ZBEKISTON IQTISODIYOTIGA INTEGRATSIYA QILISH YO'LLARI	385
Boyurayev Olimjon Urayimovich	
DAVLAT-XUSUSIY SHERIKLIK ASOSIDA KICHIK BIZNESNI RIVOJLANTIRISH MASALALARI	392
Akbarov G'ayratjon Ne'madjonovich	
QORAQALPOG'ISTON RESPUBLIKASI QO'NG'IROT TUMANIDA YILQICHILIK VA TUYACHILIKNI RIVOJLANTIRISH ISTIQBOLLARINI ARIMA MODEL ASOSIDA PROGNOZLASH	396
Sabit Gabbarov Nietali'evich	
MAKTABGACHA TA'LIM MUASSALARIDA AUTSORSING FAOLIYATINI MOLİYALASHTIRISHDA ILG'OR XORIJIY TAJRIBALAR	402
Xamidov Anis Choriyevich	
NEXUS BETWEEN RENEWABLE ENERGY USE AND GDP GROWTH IN UZBEKISTAN	407
Xalimjonov Nurbek Ulug'bek o'g'li, Toxirov Shodiyor Zafar o'g'li, Jumamuratov Sultanbek Ilyasovich	



NEXUS BETWEEN RENEWABLE ENERGY USE AND GDP GROWTH IN UZBEKISTAN

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Abstract. This article will analyze the cause-and-effect relationship between renewable energy consumption and economic growth in Uzbekistan. Annual data used was from 1990 to 2022. To test the causal relationship between variables in a vector autoregressive (VAR) model, the Toda-Yamamoto causal test structure is used. The results show that there is a one-way causal relationship from EG to EEC. The results could serve as a resource for the government of Uzbekistan and other fossil fuel-derived countries to inform their communication on renewable energy policies.

Keywords: Economic Growth, Renewable Energy, Toda-Yamamoto Causality Test.

Annotatsiya. Ushbu maqolada O'zbekistonda qayta tiklanuvchi energiya iste'moli va iqtisodiy o'sish o'rtasidagi sabab-natija bog'liqligi tahlil etiladi. Tadqiqotda 1990–2022-yillar uchun yillik ma'lumotlar qo'llanilgan. O'zgaruvchilar o'rtasidagi sabab-natija aloqalarini vektor avtoregressiv (VAR) model doirasida tekshirish uchun Toda–Yamamoto sababiylik testi qo'llanildi. Natijalar iqtisodiy o'sishdan (EG) qayta tiklanuvchi energiya iste'moliga (EEC) bir yo'nalishli sababiy ta'sir mavjudligini ko'rsatadi. Ushbu natijalar O'zbekiston hukumati hamda qazilma yoqilg'iga tayanadigan boshqa mamlakatlar uchun qayta tiklanuvchi energiya siyosatini shakllantirishda foydali manba bo'lishi mumkin.

Kalit so'zlar: iqtisodiy o'sish, qayta tiklanuvchi energiya, Toda–Yamamoto sabab testi.

Аннотация. В данной статье анализируется причинно-следственная связь между потреблением возобновляемой энергии и экономическим ростом в Узбекистане. Использованы годовые данные за период 1990–2022 гг. Для проверки причинно-следственных отношений между переменными в рамках векторной авторегрессии (VAR) применяется тест каузальности Toda–Ямамото. Полученные результаты показывают наличие односторонней причинной связи от экономического роста (EG) к потреблению возобновляемой энергии (EEC). Эти выводы могут служить источником информации для правительства Узбекистана и других стран, зависящих от ископаемого топлива, при разработке стратегий коммуникации в сфере политики возобновляемой энергетики.

Ключевые слова: экономический рост, возобновляемая энергия, тест каузальности Toda–Ямамото.

INTRODUCTION

Energy is a decisive factor in determining economic development (EG). Energy is a key resource for producers. An increase in the price of this resource immediately increases the cost of this product. Energy consumption is an important component of the family budget. At the same time, there is a decrease in energy consumption and any interruptions in the supply of non-renewable energy, which is vulnerable to fluctuations in employment and households. The demand is raising serious concerns about energy costs. The use of

non-renewable energy sources is simultaneously associated with environmental problems, including climate change, rapidly escalating environmental emissions of gases such as CO₂ and methane, and global warming (Futureci, 2017). [1]

Due to its central geographic position and rich culture, especially its significance to the Silk Road, Uzbekistan played a crucial role in the economy of the Soviet Union from the time it was a part of that country. It was Uzbekistan that was in charge of managing the whole energy grid in Central Asia. Following the dissolution of the Soviet Union in 1991, Uzbekistan adopted a foreign policy that was characterized by isolationism and remained closed for a considerable amount of time. For the first time since President Shavkat Mirziyoyev took office in 2016, the nation has started the process of reform. While Uzbekistan has been successful in opening up the economy, stabilizing the currency, and bringing inflation down, the country has also been able to attract an increasing amount of international investment.

The current state of Uzbekistan's energy infrastructure, including its generation assets and transmission systems, presents significant opportunities for modernization and efficiency enhancement. As many facilities have been in operation for more than three decades, the ongoing reforms create a favorable environment for increasing investment in maintenance and technological upgrades. The continuous repair works and planned reconstruction programs indicate a gradual transition toward a more resilient and efficient power system.

Conventional power plants, which are currently operating below optimal efficiency, hold strong potential to benefit from advanced technologies, digital monitoring, and automation. As modernization progresses, these facilities are expected to improve operational reliability and contribute more effectively to the national energy balance.

Integrating renewable energy into the central power system requires sophisticated dispatching capabilities, including regular adjustments and remote-control mechanisms that enable economic dispatch. Uzbekistan's current reform agenda provides a foundation for developing such tools, allowing the system to better utilize low-cost and variable renewable resources. International experience, such as California's five-minute digital dispatching model, offers a useful benchmark that Uzbekistan may gradually approach as its digital infrastructure expands.

The increasing share of renewable energy, which naturally requires close real-time monitoring due to fluctuating output, highlights the importance of advanced grid management technologies. As Uzbekistan invests in automation, smart grid systems, and flexible generation, the country is expected to strengthen its ability to maintain a stable and continuous electricity supply under growing renewable integration.

Figure 1 and Figure 2 give the general concept of renewable energy use and economic status in Uzbekistan (Figure 1):

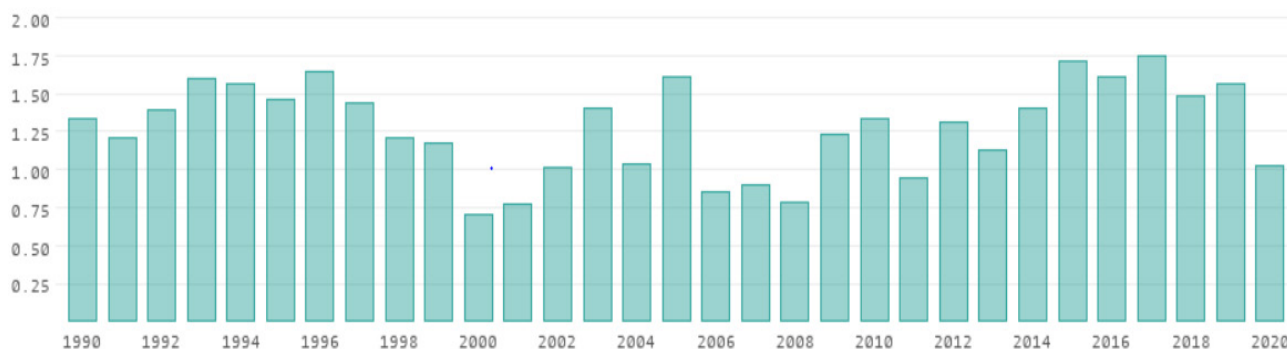


Figure 1. Renewable energy use proportion in Uzbekistan¹

Compared to Uzbekistan, which currently operates with five dispatchers, the country is expected to progressively strengthen its system management capacity in line with international best practices. California's model of using fifteen dispatchers and implementing operational adjustments every five minutes demonstrates an advanced benchmark that Uzbekistan aims to approach as digital infrastructure and dispatching technologies continue to modernize.

In Uzbekistan, energy production adjustments are presently conducted on an hourly basis; however, the ongoing reforms and the gradual introduction of automated control systems create opportunities for transitioning toward shorter operational intervals that better support renewable energy integration. As noted by Oleg Ryaskov

1 Source: from World Bank resources



from USAID's Central Asia Regional Electricity Market program, effective variability management is essential for ensuring system stability, and Uzbekistan's current modernization trajectory is expected to enhance this capability.

Operational commands at power plant sites are still delivered via telephone and implemented manually, yet the sector's transformation agenda includes the expansion of digital communication channels, remote-control solutions, and automated dispatching tools. Over time, this will enable operators to optimize responses, reduce reaction times, and improve system efficiency.

Furthermore, the existing approach where power plants are utilized according to equal distribution or predetermined schedules provides a stable operational baseline. With the development of advanced economic dispatch mechanisms and real-time monitoring technologies, Uzbekistan is well positioned to gradually shift toward cost-efficient generation planning that better aligns production with dynamic market and system conditions.

The Ministry of Energy, which was founded in February 2019, is permitted to play a major role in the execution of renewable energy policy in Uzbekistan. It is also responsible for the overall duty of developing and executing energy policies, plans, and programs. In addition to this, it is accountable for the regulation and supervision of the production, transmission, distribution, and consumption of energy resources, including electricity, as well as the operation of energy sectors, and it is also responsible for the execution of production-sharing agreements. Furthermore, the ministry is actively involved in the process of establishing public-private partnerships (PPPs) that are associated with energy and also contributes to the enhancement of tariff policy via collaboration with the inter-ministerial tariff council. This is done with the intention of facilitating the establishment of a business climate that is competitive.

The country of Uzbekistan is one of the major producers of natural gas in the world. In 2019, the quantity of energy that it produced was comparable to 54.5 million tonnes of oil as measured in Mtoe dollars. In 2008, the amount of energy that was produced hit an all-time high of 56.7 Mtoe. By the year 2015, this quantity had reduced by twenty percent, mostly as a result of the worldwide economic crisis and a reduction in natural gas reserves. As a result of the growth of gas projects in Uzbekistan, it was able to recover by 22% by the year 2019, compared to the level it had reached in 2015. In Uzbekistan, natural gas is the most important source of energy, accounting for 90.5% of total energy production (49.3 Mtoe in 2019). Other sources of energy include oil (5.8% in the same year), coal (2.6%), hydro (1.0%), and a minor quantity of biofuels. Natural gas is the dominating energy source in Uzbekistan.

The nation of Uzbekistan functions as a net exporter. When considering its energy supply, the total amount of energy that was available in 2019 was 47.1 Moe. The total energy supply saw a decline of 22% between 2011 and 2015 as a result of a downturn that occurred during the global financial crisis. However, it has had a growth of 30% during the last five years, mostly as a result of an increase in demand from the residential sector. In 2019, natural gas was responsible for 85.8% of the entire energy supply. The remaining energy came mostly from oil (8.2% in the same year), coal (4.4%), and hydro (1.2%).

According to assessments by the IEA (2009), Uzbekistan's current energy supply structure presents substantial potential for improvement across economic, ecological, and social dimensions. Ongoing modernization processes and the country's increasing attention to sustainable development provide a solid foundation for strengthening long-term stability in the energy sector.

The growing global importance of energy security highlighted by Mukhtarova et al. (2021) and Karacan et al. (2021) indicates that efficient management and wider use of renewable energy resources will play a central role in enhancing Uzbekistan's resilience and sustainability. As the country expands its technological capabilities and regulatory frameworks, the transition toward advanced renewable energy integration is expected to accelerate.

Renewable energy—including solar, wind, geothermal, tidal, wave, waste-to-energy, and biomass—offers a wide portfolio of clean and reliable alternatives. Its key advantages, such as safety, purity, and long-term availability, position these sources as strategic elements of Uzbekistan's future energy planning.

Given the steady increase in domestic energy demand, the progressive introduction of renewable technologies, supported by global trends noted by Apergis and Danulețiu (2014), suggests that the share of renewable energy in Uzbekistan's energy mix will continue to expand. This trajectory will contribute to a more diversified, efficient, and environmentally balanced national energy system (Figure 2) [4].

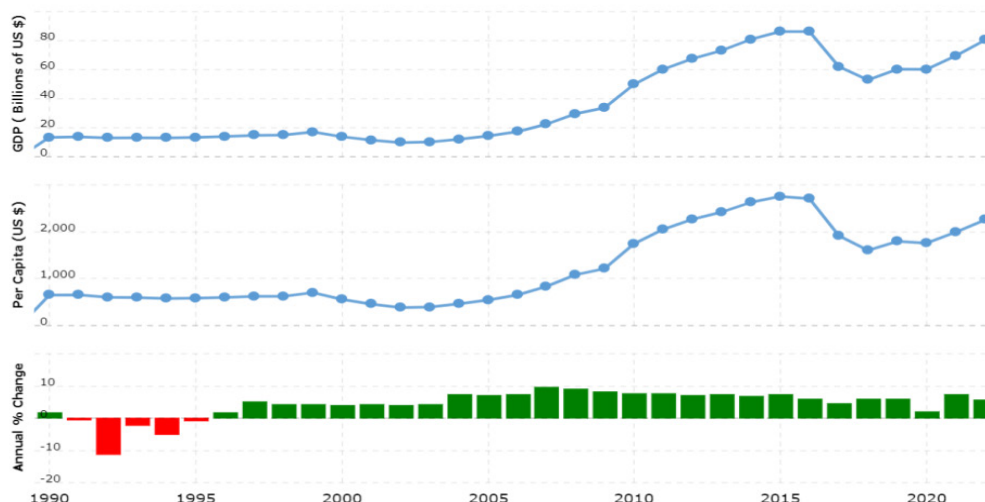


Figure 2. GDP rates in Uzbekistan²

REVIEW OF LITERATURE ON THE SUBJECT

Several researchers have conducted several studies to investigate the correlation between EG and REC within the field of research. The empirical studies that investigate the causal relationship between EEC and EG provide evidence for the existence of a bilateral or unidirectional causal relationship, or the absence of a causal relationship between the two variables. In the context of Turkey, Okal and Aslan (2013) conducted an investigation on the correlation between economic growth (G) and renewable energy consumption (REC). The researchers used data spanning from 1990 to 2010 and came to the conclusion that there exists a causal relationship that is unidirectional, emanating from EG to ECD.

It was discovered by Sadorsky (2009) that there is a one-way causality existing between EG and REC. As of 2012, Porlogea and Cicea conducted research in 18 developing countries.[7] In the country of Romania, and Salim et al. (2014) in the countries of OCD.[8]: A number of studies, including Apergis and Danuletiu (2014),[9] Brini et al. (2017), [10] Fotoureci (2017), [11] Magazinino (2017), [12] Ito (2017), [13] Hobay and Le Roux (2018), [14] and Kahn and Korkmaz (2019), [15] found evidence of a one-way causal relationship from EEC to EG. Moreover, Al-Mulali et al. (2013) demonstrated comparable results using a multivariate panel data model in a study of the Latin American economy. In addition, Shahbaz and his colleagues conducted research with the objective of examining the correlation between Gross Domestic Product (GDP), Relative Value of Capital (RVC), Capital, and Labor in the context of Pakistan. A substantial body of empirical evidence has provided confirmation of the existence of a bilateral causal relationship between GDP and REC [16]

Additionally, Payne (2009) conducted an investigation on the causal relationship that exists between EG and REC in the United States. [17] The individual came to the conclusion that there was no correlation between REC and EG. Menegaki (2011) carried out a research that included a total of 27 economies from the continent of South America, [18]. A study conducted by Smich and Papes (2014) focused on the 17 member states that make up the European Union. [19] [19] Algeria was the subject of research conducted by BelaÖd and Youssef (2017) [20], and Ozcan and Ozturk (2019) discovered that there is no causal relationship between renewable energy consumption (REC) and economic growth (EG).[21]

In the existing body of literature, there are a limited number of studies that investigate the relationship between renewable energy consumption (RÖC) and economic development (EG) in Uzbekistan. The main objective of this paper is to address the knowledge gap by using the Toda-Yamamoto causality test to analyze the causal relationship between energy consumption (REC) and economic growth (EG) in Uzbekistan. Due to Uzbekistan's dual role as a representative of former Soviet countries and in the process of developing fuel exporting countries, as well as its enormous potential for renewable energy resources, we made the decision to investigate the relationships that exist inside the country. Presented below is the contribution that the research has made:

(a) The study examined the relationship between energy use and economic growth (EG) in Uzbekistan, which has not been previously studied enough.

(b) The study used the Toda-Yamamoto test of causality, which, to our knowledge, has not been used in the analysis of the case in Uzbekistan.

² Source: from World Bank resources



RESEARCH METHODOLOGY

Using Toda and Yamamoto's (1995) causality test, we conduct an investigation of the causal relationship that exists between REC and EG in this particular work. The test conducted by Toda and Yamamoto in 1995 does not need an understanding of the concept of system integration and co-integration features. It is possible to use it even in the absence of integration or stability, and when the rank requirements are not satisfied, provided that the process integration order does not exceed the real order delay length. A quote from Toda and Yamamoto (1995, page 225).[22]

In order to determine the significance of parameters in a vector autoregressive (VAR) (k) model, the technique that is used involves the utilization of modified Wald statistics. Initially, it is necessary for you to establish the most optimal order of integration for the series, which is denoted as $d_{\max}$. Furthermore, it is essential to determine the optimal delay for the Var model within the given timeframe. It is necessary to have an estimation of the $(k+d_{\max})$ th order VAR available. In order to determine the asymptotically distributed Wald square statistic, the value of the VAR $(k+d_{\max})$ is required to be calculated. In the end, the hypothesis is evaluated by using the conventional Wald statistical test, which is a statistical test that follows an asymptotically significant chi-square distribution with m degrees of freedom. The functional characteristics may be expressed in the following manner, in accordance with the causality test that was carried out by Toda and Yamamoto (1995):

$$LY_t = \alpha_0 \sum_{i=1}^k \alpha_{1i} LY_{t-i} + \sum_{i=k+1}^{d_{\max}} \alpha_{2j} LY_{t-j} + \sum_{i=1}^k \phi_{1j} LE_{t-i} + \sum_{i=k+1}^{d_{\max}} \phi_{2j} LE_{t-j} + v_{1t} \quad (1)$$

$$LE_t = \beta_0 + \sum_{i=1}^k \beta_{1i} LE_{t-i} + \sum_{i=k+1}^{d_{\max}} \beta_{2j} LE_{t-j} + \sum_{i=1}^k \delta_{1i} LY_{t-i} + \sum_{i=k+1}^{d_{\max}} \delta_{2j} LY_{t-j} + v_{2t} \quad (2)$$

LY and L are representatives of the logarithms of the values of EG and REC, respectively. The variable k represents the actual lag order, whereas the variable d represents the maximum order when it comes to the integration of the series. Each of the error conditions is denoted by the letters v_{1t} and v_{2t} .

We are in the process of creating an annual data set that covers the period from 1990 to 2020, including both economic growth (IG) and renewable energy consumption (REC). In Uzbekistan, the term "REC" refers to the sharing of renewable energy sources, whereas "IG" refers to the gross domestic product per capita. Python libraries were used in order to get all of the results. The World Bank was the source of both sets of data that were obtained. The variable that was used underwent a transformation into a logarithmic format.

Analysis and results

It is of utmost importance to determine the order of integration of the series ($d_{\max}$) and the appropriate lag length $(k+d_{\max})$ in order to carry out the causality test. This is done in order to prevent the occurrence of false causation or the absence of causation. For the purpose of determining the magnitude of the variables, we used the Augmented Dickey-Fuller (ADF) root test, which was first proposed by Dickey and Fuller in the year 1981.

It is important to take note that the variables are not considered to be statistical at their initial values, but they become statistical when the first difference is made. As a result, the variables are included into the initial order, which is given as A (1). The results of the root tests conducted on the ADF block are shown in Table 1. Because of this, the variables in the system are able to reach the highest possible level of integration, which is denoted by the symbol $d_{\max}=1$ (Table 1).

Table 1. Augmented Dickey-Fuller test result

	REC	EG
Level	-1.997	-1.0171
	(0.194)	(0.4924)
First difference	-5.132	-3.078
	(0.000)	(0.0473)

Note: «p-values» are in parenthesis

In the process of conducting causal test analyses, the subsequent step involves examining the actual lag length (p) that is specified by the LR, AAC, FPE, SC, and HQ criteria. For the purpose of the research, a VAR model was computed, which included all variables that have an effect on each other. The selection of the lag interval, which ascertains the quantity of previous observations included in the model, was made in a spontaneous manner.

In order to determine the optimal lag interval, a particular test was carried out on the residuals of the model. Table 2 displays the panels that indicate that the ideal delay length, which is determined by all criteria, is equal to two ($k=2$) out of a maximum of three possible delay lengths possible. The VAR exhibits a number of undesirable characteristics, which are shown in Table 2, panels A to D. These characteristics include stability, a lack of serial correlation, and a lack of heat shock, residuals, and normal distribution (Table 2).

Table 2. The VAR residual diagnostics

Panel A: Serial correlation LM test ^a				Panel B: stability test ^d			
Lags	LM-Statistic	P-value		Modulus	Root		
1	2.9741	0.4659		0.4571	0.4911		
2	4.7239	0.7434		0.5174	0.223-0.392i		
3	8.9412	0.5175		0.3653	0.223+0.392i		
Panel C: Normality test ^b				Panel D: Heteroscedasticity test ^c			
Statistic	χ^2	d.f	p-value	White	χ^2	d.f.	p-value
Jarque-Bera	13.44	8	0.151	Statistic	41.33	23	0.294
Panel E: Lag interval tests							
Lag	LogL			Information criteria			
		LR	FPE	AIC	SC	HQ	
0	11.477	NA	0.0017	-0.3345	-0.0632	-0.2566	
1	40.613	48.54	0.0001	-2.9917	-2.6612	-2.6741	
2	2.968	11.88*	0.0001*	-3.399*	-2.878*	-2.997*	
3	5.137	2.961	0.0001	-3.407	-2.555	-3.4032	

In conclusion, the causality test developed by Toda and Yamamoto was used to examine the causative relationship that exists between REC and EG. According to Table 3, the results of the causality test conducted by Toda and Yamamoto are shown (Table 3).

Table 3. Toda-Yamamoto test results

Null hypothesis	Lag(k)	K+d _{max}	Chi-square test	Conclusion
EG does not Granger cause REC	2	3	6.117943 (0.0349)*	Reject
REC does not Granger cause EG	2	3	4.771974 (0.0643)*	No Reject

*Significance at the 5% level

Taking into consideration the causality test conducted by Toda and Yamamoto, it is not possible to reject the null hypothesis that "REC does not Granger cause EG." On the other hand, the null hypothesis that "REC does not cause EG" is rejected by Granger at the 5% significance level. During the course of research, it has been discovered that there exists a unique correlation between the use of renewable energy sources and environmental degradation.

With this result, it can be concluded that the implementation of EG, which is primarily associated with environmental management, has the potential to contribute to the development of REC, which is mostly associated with renewable energy capacity, in the country of Uzbekistan. In accordance with the findings of



Sadorsky for 18 developing countries, Ocal and Aslan for Turkey, and Cicea for Romania, and SalEm et al. for OECD countries, the findings of this research are consistent with others.

CONCLUSIONS AND SUGGESTIONS

The pursuit of economic expansion has been the primary purpose of countries for a very long time. This ambition has been the driving force behind improvements in technology, infrastructure, and industry on a nationwide scale. Simultaneously, this persistent push towards industrialization and economic development has brought out severe environmental consequences. The widespread reliance on fossil fuels, which is a defining characteristic of this growth, has resulted in unfavorable outcomes such as climate change and environmental degradation. The urgent need to transition to renewable energy sources has emerged as a cornerstone for achieving sustainable economic development in the midst of these escalating obstacles. This acknowledgment is expanding as the number of issues continues to climb.

In order to be successful, it is essential that this initiative need a comprehensive investigation of the challenges and roadblocks that are preventing the broad adoption of renewable energy. In order to make informed decisions, policymakers and other stakeholders need to have a better understanding of the actual difficulties, technology limitations, and infrastructure requirements that are connected with this transformation. The purpose of this study is to give policymakers and industry leaders with complete assistance in their efforts to formulate successful policies and strategies. This is accomplished by diving into the complex relationship that exists between renewable energy, economic growth, and environmental sustainability. However, earlier research efforts have often failed to meet expectations in a number of important areas.

This study examined the causal relationship between renewable energy use and economic growth (EG) in Uzbekistan using annual data from 1990 to 2022. We identified a one-way causal relationship between economic growth and renewable energy consumption using an adapted version of the Granger causality test published by Toda and Yamamoto. Unidirectional causation suggests that Uzbekistan has the opportunity to use its growing profits to expand its renewable energy sources. Based on the findings, we recommend the adoption of regulations that promote the growth of renewable energy sources in overall consumption. The results of this study will provide scientists and policymakers with an understanding of the importance of renewable energy in Uzbekistan and other developing countries with rich gas resources to achieve sustainable development goals.

List of used literature:

1. Fotourehchi, Z. (2017). Renewable energy consumption and economic growth: A case study for developing countries. *International Journal of Energy Economics and Policy*, 7(2), 61–64.
2. International Energy Agency (IEA).
3. Karacan, R., Mukhtarov, S., Barış, L., İşleyen, A., Yardımcı, M.E. (2021). The impact of oil price on transition toward renewable energy consumption: Evidence from Russia. *Energies*, 14(10), 2947.
4. Apergis, N., Payne, J.E. (2014). Renewable energy, output, CO₂ emissions, and fossil fuel prices in Central America: Evidence from a nonlinear panel smooth transition vector error correction model. *Energy Economics*, 42, 226–232.
5. Ocal, O., Aslan, A. (2013). Renewable energy consumption–economic growth nexus in Turkey. *Renewable and Sustainable Energy Reviews*, 28, 494–499.
6. Sadorsky, P. (2009). Renewable energy consumption and income in emerging economies. *Energy Policy*, 37, 4021–4028.
7. Pirlogea, S., Cicea, S. (2012). Econometric perspective of the energy consumption and economic growth relation in the European Union. *Renewable and Sustainable Energy Reviews*, 16, 5718–5726.
8. Salim, R.A., Hassan, K., Shafiei, S. (2014). Renewable and non-renewable energy consumption and economic activities: Further evidence from OECD countries. *Energy Economics*, 44, 350–360.
9. Apergis, N., Danulețiu, D.C. (2014). Renewable energy and economic growth: Evidence from the sign of panel long-run causality. *International Journal of Energy Economics and Policy*, 4(4), 578–587.
10. Apergis, N., Payne, J.E. (2010a). Renewable energy consumption and economic growth: Evidence from a panel of OECD countries. *Energy Policy*, 38(1), 656–660.
11. Brini, R., Amara, M., Jemmali, H. (2017). Renewable energy consumption, international trade, oil price and economic growth inter-linkages: The case of Tunisia. *Renewable and Sustainable Energy Reviews*, 76(Suppl C), 620–627.
12. Fotourehchi, Z. (2017). Renewable energy consumption and economic growth: A case study for developing countries. *International Journal of Energy Economics and Policy*, 7(2), 61–64.
13. Magazzino, C. (2017). Renewable energy consumption–economic growth nexus in Italy. *International Journal of Energy Economics and Policy*, 7, 119–127.
14. Ito, K. (2017). CO₂ emissions, renewable and non-renewable energy consumption, and economic growth: Evidence from panel data for developing countries. *The Journal of International Economics*, 151, 1–6.
15. Khobai, H., Le Roux, P. (2018). Does renewable energy consumption drive economic growth? Evidence from Granger-causality technique. *International Journal of Energy Economics and Policy*, 8(2), 205–212.
16. Can, H., Korkmaz, O. (2019). The relationship between renewable energy consumption and economic growth: The case of Bulgaria. *International Journal of Energy Sector Management*, 13(3), 573–589.



17. Al-Mulali, U., Fereidouni, H.G., Lee, J.Y., Sab, C.N.B. (2013). Examining the bidirectional long-run relationship between renewable energy consumption and GDP growth. *Renewable and Sustainable Energy Reviews*, 22, 209–222.
18. Apergis, N., Payne, J.E. (2010b). Renewable energy consumption and growth in Eurasia. *Energy Economics*, 32(6), 1392–1397.
19. Menegaki, A.N. (2011). Growth and renewable energy in Europe: A random effect model with evidence for neutrality hypothesis. *Energy Economics*, 33(2), 257–263.
20. Smiech, S., Papiez, M. (2014). Energy consumption and economic growth in the light of meeting the targets of energy policy in the EU: The bootstrap panel Granger causality approach. *Energy Policy*, 71, 118–129.
21. Bélaïd, F., Youssef, M. (2017). Environmental degradation, renewable and non-renewable electricity consumption, and economic growth: Assessing the evidence from Algeria. *Energy Policy*, 102, 277–287.
22. Ozcan, B., Ozturk, I. (2019). Renewable energy consumption–economic growth nexus in emerging countries: A bootstrap panel causality test. *Renewable and Sustainable Energy Reviews*, 104, 30–37.
23. Toda, H.Y., Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics*, 66, 225–250.
24. World Bank. World Development Indicators. Available at: <https://data.worldbank.org/indicator>

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