Bilim
Innovatsiya
Barqaror rivojlanish

Noyabr
№ 11, 2026

AGROBIZNES, FAN VA TEXNOLOGIYALAR

ILMIY-AMALIY
ELEKTRON
JURNAL

Агробизнес, наука и технологии

Agribusiness, science and technology



№ 083688

ISSN:
3060-5245

Toshkent-2026

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Jurnalning telegram manzili:
t.me/agrobiznes_elektronjurnal
E-mail: licht-1989@mail.ru
Jurnalning rasmiy sayti:
https://www.agrobiznesjournal.uz
Tel: +(998) 93 439 30 00

JURNALNING ILMIYLIGI:

Ma'lumot uchun, OAK Rayosatining 30.11.2024-yildagi №364/5-sonli qarori bilan 08.00.00-Iqtisodiyot fanlari bo'yicha, 08.05.2025-yildagi №370/5-sonli qarori bilan 06.00.00-Qishloq xo'jaligi fanlari bo'yicha "Dissertatsiyalar asosiy ilmiy natijalarini chop etish tavsiya etilgan milliy ilmiy nashrlar ro'yxati"ga kiritilgan.

Elektron nashr, 166-sahifa.
2026-yil, №11. noyabr.

Jurnal har oyda bir marotaba elektron shaklda jurnalning rasmiy sayti orqali nashr etiladi.

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ECONOMIC SECURITY CHALLENGES IN CENTRAL ASIA: TRADE INTEGRATION, WATER RESOURCE RISKS AND INTERSTATE COOPERATION

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Abstract. This study employs systemic, comparative, institutional, and descriptive statistical approaches to analyze Uzbekistan's regional trade relations, the availability of internal renewable freshwater resources in Central Asian countries, and the specific challenges of water resource management in the Amu Darya and Syr Darya river basins. The findings indicate that the expansion of intraregional trade creates additional opportunities for economic diversification, while the spatial mismatch between areas of water runoff formation and major water withdrawal zones generates cross-sectoral risks. The study highlights the need to coordinate water, energy, agricultural, and transport policies, enhance data exchange, and develop mechanisms for preventing transboundary threats. The findings may be used to formulate regional policies and measures aimed at strengthening economic and environmental security.
Keywords: economic security, Central Asia, regional integration, transboundary water resources, water security, trade, water–energy nexus, sustainable development.

Annotatsiya. Mazkur ilmiy maqolada tizimli, qiyosiy, institutsional va statistik-tavsifiy yondashuvlar asosida O‘zbekistonning mintaqaviy savdo aloqalari, Markaziy Osiyo mamlakatlarining ichki qayta tiklanuvchi chuchuk suv resurslari bilan ta’minlanganlik darajasi hamda Amudaryo va Sirdaryo havzalarini boshqarishning o‘ziga xos xususiyatlari tahlil qilingan. Tadqiqot natijalariga ko‘ra, mintaqalararo savdo hajmining o‘sishi iqtisodiy diversifikatsiya uchun qo‘shimcha imkoniyatlar yaratishi, ayni paytda suv oqimi shakllanadigan hududlar bilan suvdan asosiy foydalanish zonalarining geografik jihatdan nomuvofiqligi tarmoqlararo xavf-xatarlarni yuzaga keltirishi aniqlangan. Shuningdek, suv xo‘jaligi, energetika, qishloq xo‘jaligi va transport siyosatini o‘zaro muvofiqlashtirish, axborot almashinuvi tizimini rivojlantirish hamda transchegaraviy tahdidlarning oldini olish mexanizmlarini takomillashtirish zarurati asoslab berilgan. Tadqiqot natijalaridan mintaqaviy iqtisodiy va ekologik xavfsizlikni mustahkamlashga qaratilgan chora-tadbirlarni ishlab chiqishda foydalanish mumkin.
Kalit so‘zlar: iqtisodiy xavfsizlik, Markaziy Osiyo, mintaqaviy integratsiya, transchegaraviy suv resurslari, suv xavfsizligi, savdo, suv-energetika majmuasi, barqaror rivojlanish.

Аннотация. В научной работе на основе системного, сравнительного, институционального и статистико-описательного подходов проанализированы региональные торговые связи Узбекистана, обеспеченность стран внутренними возобновляемыми пресноводными ресурсами и особенности управления бассейнами Амударьи и Сырдарьи. Выявлено, что рост взаимной торговли создает дополнительные возможности диверсификации, тогда как пространственное несовпадение районов формирования стока и основных зон водозабора формирует межотраслевые риски. Показана необходимость согласования водной, энергетической, аграрной и транспортной политики, развития обмена данными и механизмов предупреждения трансграничных угроз. Полученные результаты могут использоваться при разработке региональных мер экономической и экологической безопасности.
Ключевые слова: экономическая безопасность, Центральная Азия, региональная интеграция, трансграничные водные ресурсы, водная безопасность, торговля, водно-энергетический комплекс, устойчивое развитие.

INTRODUCTION

Amid the globalization of the world economy, growing international economic interdependence and changing climatic conditions, ensuring regional

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№11-son.
ISSN: 3060-5245

economic security is becoming increasingly important. For Central Asian countries, this issue is of strategic significance, since sustainable socioeconomic development is directly linked to expanding trade and economic cooperation, the rational use of natural resources, the development of transport and logistics infrastructure, and effective interstate interaction.

Central Asia is characterized by substantial differences in natural-resource endowments, levels of economic development and national economic structures. At the same time, the countries of the region are connected by historically established trade relations, shared transport infrastructure and transboundary water systems. Expanding regional trade promotes the diversification of economic ties and strengthens industrial cooperation, but it also increases national economies' dependence on the reliability of transport routes and external economic conditions.

The rational use of transboundary water resources occupies a special place in regional economic security. The uneven distribution of water potential between upstream and downstream countries of the Amu Darya and Syr Darya creates interconnected risks for agriculture, energy, food security and environmental sustainability. Climate change, rising demand for water resources and the need to modernize water-management infrastructure exert additional pressure.

For Uzbekistan, regional economic security is particularly important because of expanding trade relations with neighboring countries and the high dependence of certain economic sectors on transboundary water resources. These circumstances increase the need for a comprehensive analysis of the trade, water, energy and institutional factors that determine the resilience of the national economy.

The aim of the study is to comprehensively assess the effects of regional trade integration, the distribution of transboundary water resources and mechanisms of interstate cooperation on the economic security of Central Asian countries, and to substantiate priority measures for strengthening it, taking into account the interests of the Republic of Uzbekistan.

The scientific and practical significance of the study lies in identifying relationships among trade, water, energy and institutional risks and developing proposals to improve regional economic cooperation and mechanisms for preventing transboundary threats.

LITERATURE REVIEW

The theoretical foundation of the study is a systemic understanding of economic security as an economy's ability to maintain sustainable reproduction and protect society's key interests against internal and external threats. Six principal components of regional economic security are distinguished: financial, production, investment and innovation, information, environmental, and socioeconomic security (M. Karimjanova and M. Abulkasimov, 2026). This classification determines the structure of the present analysis: trade is considered

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a factor of production and external economic resilience; water resources, an element of environmental and food security; and institutional cooperation, a mechanism for reducing systemic risks.

To explain the relationship between water resources and economic development, the study draws on the Water–Energy–Food–Ecosystems (WEFE) Nexus concept presented in the United Nations Economic Commission for Europe assessment of the Syr Darya basin (UNECE, 2017). Its methodological significance lies in moving beyond the isolated consideration of water-management decisions: reservoir operating regimes affect electricity generation, seasonal irrigation, ecosystem conditions and household incomes.

The rational use of transboundary water resources and the improvement of institutional mechanisms for interstate cooperation are particularly important for the economic security of Central Asian countries. In this context, the research by D. Ziganshina (Ziganshina D, 2023), devoted to legal and institutional aspects of managing transboundary water resources and shared water infrastructure, deserves attention. The author examines existing mechanisms of interstate interaction, features of treaty-based regulation and difficulties in reconciling national interests in water use. The findings make it possible to view effective interstate water cooperation as a factor in regional economic security, since reliable water supply directly affects agriculture, energy, industry and socioeconomic stability. The present study uses these findings to analyze institutional threats to Central Asian economic security and substantiate the need to improve joint management mechanisms for transboundary water resources.

World Bank materials under the Central Asia Water and Energy Program (World Bank, 2026) link transboundary water risks to climate change, agricultural demand and national energy interests. Unlike a narrowly sectoral approach, the program treats water and energy security as interdependent objectives. Its materials are used to interpret qualitatively the dependence of irrigated agriculture on interstate flow management.

The FAO AQUASTAT statistical database, also disseminated through World Bank indicators (World Bank, 2026), is used for cross-country comparisons of internal renewable freshwater resources and their per capita availability. Crucially, the indicator of internal resources is not equivalent to the total amount of water available when transboundary inflows are included. The UNECE report on progress in transboundary water cooperation (UNECE, 2024) is used to assess the limitations of existing agreements and the need for stronger basin-level coordination. World Bank analytical materials (World Bank, 2023) provide an additional basis for interpreting the socioeconomic benefits of integration and water–energy cooperation.

METHODOLOGY AND DATA SOURCES

The object of the study is the economic security of five Central Asian states (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) under conditions of regional interdependence. Its subject is the economic and

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ISSN: 3060-5245

institutional mechanisms through which trade integration, the distribution of water resources and transboundary interaction affect the sustainability of regional development. The trade analysis also considers Afghanistan as a neighboring foreign-trade partner of Uzbekistan; it is not included among the five Central Asian states.

The study of theoretical and practical aspects of economic security in Central Asia employs a combination of general scientific and specialized research methods, including systemic and integrated approaches, the dialectical method, comparative and statistical analysis, analysis and synthesis, induction and deduction, institutional analysis, economic generalization and logical analysis.

The systemic approach makes it possible to examine Central Asian economic security as a complex, multilevel system combining economic, social, environmental, energy and institutional components. Particular attention is given to the relationships among national economic resilience, regional cooperation and internal and external threats.

The integrated approach is applied to comprehensively examine the factors determining regional economic security. It covers trade and economic relations, natural-resource endowments, transport and logistics infrastructure, environmental problems and regional economic integration.

The dialectical method is used to examine economic security amid ongoing socioeconomic change, increasing globalization, the transformation of international economic relations and emerging threats. It helps identify contradictions between individual countries' economic interests and the need for mutually beneficial regional cooperation.

Comparative analysis is used to compare socioeconomic indicators across Central Asian countries and identify differences in water-resource availability, the development of foreign-trade relations and national economies' dependence on external factors.

Statistical analysis is used to examine changes in Uzbekistan's foreign-trade turnover with neighboring countries, assess the distribution of water resources among regional states and identify major trends in regional economic development.

Institutional analysis is used to study the roles of government agencies, international organizations and interstate mechanisms in ensuring economic security, regulating transboundary water use and advancing economic integration.

Economic generalization and logical analysis are used to systematize research findings, identify key challenges to Central Asian economic security and formulate evidence-based proposals for improving regional economic cooperation.

The information base comprises statistical materials of the National Statistics Committee of the Republic of Uzbekistan, data from the World Bank, the Food and Agriculture Organization of the United Nations (FAO) and the European Environment Agency (EEA), as well as publications by domestic and international

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scholars on economic security, regional integration and the rational use of natural resources.

The combined use of these methods enables a comprehensive assessment of the current economic security of Central Asian countries, identification of the principal risk factors and substantiation of priority measures to strengthen the sustainability of regional socioeconomic development.

ANALYSIS AND RESEARCH FINDINGS

Mutual trade expands sales markets, diversifies suppliers and develops cross-border production links. At the same time, stronger economic interdependence increases the importance of coordinated transport, customs and infrastructure policies. This balance is especially important for Central Asian countries because of their landlocked position and the high cost of accessing distant markets.

According to the data, Uzbekistan's trade turnover with the listed neighboring countries increased from USD 2,994.2 million in 2016 to USD 9,963.3 million in 2025, a 3.33-fold rise. This growth reflects expanding economic contacts but does not, by itself, demonstrate a reduction in all economic-security risks: dependence on particular routes, infrastructure constraints and the concentration of trade flows may increase simultaneously. Kazakhstan remains the largest partner among these countries, with bilateral turnover rising from USD 1,898.9 million to USD 4,969.6 million. Particularly strong relative growth is observed in trade with Kyrgyzstan and Tajikistan. These changes create opportunities for industrial cooperation, logistics and trade in finished goods, but require diversification of the export structure (Table 1).

Table 1

Uzbekistan's Trade Turnover with Neighboring Countries (National Statistics Committee of the Republic of Uzbekistan, 2026)

Partner	2016, USD million	2025, USD million	Growth, times
Kazakhstan	1 898,9	4 969,6	2,62
Kyrgyzstan	167,4	1 199,2	7,16
Tajikistan	197,1	912,3	4,63
Turkmenistan	209,1	1 203,7	5,76
Afghanistan	519,7	1 678,5	3,23
Total trade turnover	2 994,2	9 963,3	3,33

Afghanistan occupies a distinct position as a potential transit hub between Central and South Asia. During the period under review, Uzbekistan's trade turnover with Afghanistan increased from USD 519.7 million to USD 1,678.5 million. Further development of this route depends not only on demand for goods but also on transport-corridor security, infrastructure reliability and stable institutional conditions for trade.

The strategic implication is the need to move from quantitative growth in turnover toward greater resilience, a broader range of partners and product

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ISSN: 3060-5245

groups, reduced logistics losses, harmonized customs procedures and alternative transport routes.

Water resources are among the principal natural constraints on the development of agriculture, energy and industry. The geographical distribution of internal renewable resources differs substantially from the spatial distribution of water demand. It is particularly important to distinguish water generated within national borders from overall water availability, including transboundary inflows.

According to comparable indicators of internal resources, Kazakhstan and Tajikistan have approximately equal volumes, at 64.35 and 63.46 billion m³ per year, respectively. Kyrgyzstan has 48.93 billion m³, Uzbekistan 16.34 billion m³ and Turkmenistan 1.41 billion m³. These differences characterize the territorial formation of water resources but do not justify directly ranking countries by the actual volume of water available for consumption.

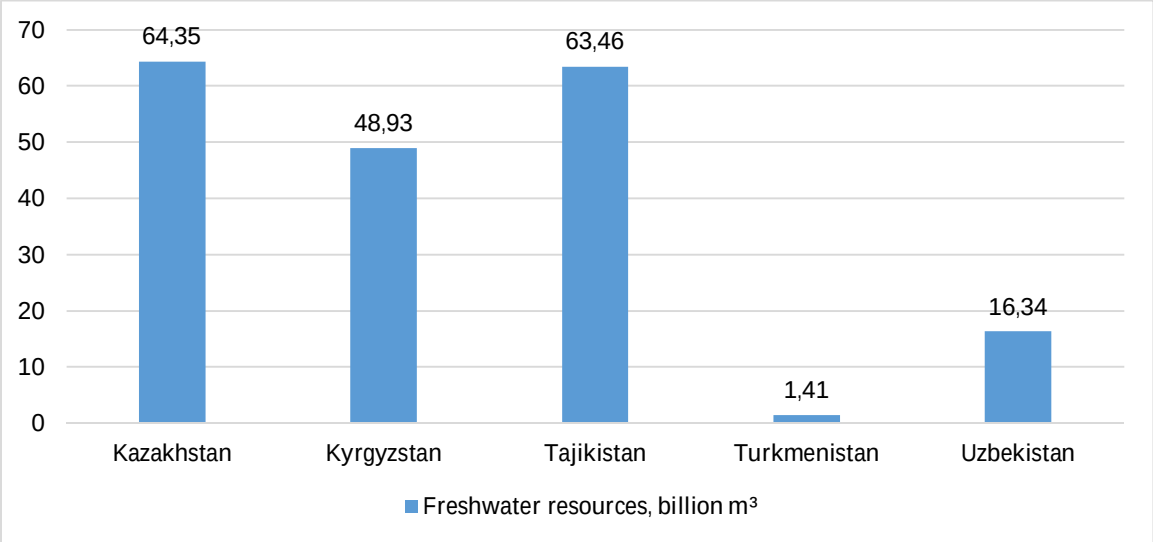

Figure 1. Comparison of Internal Renewable Freshwater Resources (World Bank, 2024)

An analysis of internal renewable freshwater resources per capita reveals substantial geographical differences among Central Asian countries. The highest value is recorded in the Kyrgyz Republic, at 7,015 m³ per person per year, followed by Tajikistan at 6,232 m³ and Kazakhstan at 3,212 m³. Considerably lower values are found in Uzbekistan (468 m³) and Turkmenistan (194 m³). Thus, per capita internal renewable water resources in Kyrgyzstan exceed those in Uzbekistan by approximately 15 times and those in Turkmenistan by more than 36 times, indicating a pronounced unevenness in the spatial distribution of the region's water potential.

It should be emphasized that this indicator measures the potential availability of water resources generated within a country's territory. It does not reflect actual water consumption, access to water by households and economic entities, or the development of water-management infrastructure. In particular, the relatively low figures for Uzbekistan and Turkmenistan reflect their geographical conditions and the limited formation of river runoff within their

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ISSN: 3060-5245

territories. A significant share of their water needs is met through transboundary water resources arriving from neighboring countries, primarily via the Amu Darya and Syr Darya basins.

Consequently, assessing Central Asian countries' water availability solely on the basis of internal renewable resources does not provide an objective picture of their total water potential and existing water-management risks. A comprehensive assessment must consider transboundary river flows, seasonal variability, the sectoral structure of water withdrawals, irrigation-system efficiency and climate change. Downstream countries' dependence on interstate flow regulation is particularly important because changes in water-use regimes can directly affect agricultural production, energy supply, food security and regional socioeconomic development. The uneven distribution of water resources should therefore be viewed not only as a natural geographical feature of Central Asia but also as a major source of transboundary risks requiring stronger regional cooperation and coordinated water management. For Uzbekistan and Turkmenistan, the central risk is not only limited domestic resources but also the dependence of irrigated areas on river flows generated beyond national borders. For Kyrgyzstan and Tajikistan, by contrast, major challenges include utilizing hydropower potential, regulating seasonal flows and maintaining the safety of hydraulic structures.

Agriculture remains the region's largest consumer of freshwater. According to World Bank materials, the agricultural sector accounts for about 90% of freshwater withdrawals in Central Asia (World Bank, 2024), while separate project documentation estimates that irrigated agriculture accounts for more than 80% (World Bank, 2025). Both estimates demonstrate food security's high dependence on water regimes. Drought or reduced seasonal inflows can trigger a chain reaction:

- reduced water supply limits yields and irrigated areas, raises agricultural production costs, reduces farmers' incomes and may increase food-price inflation. At a sufficiently large scale, the effects spread to employment, consumer demand and regional budgets. Farms with poorly diversified income sources and limited access to water-saving technologies are especially vulnerable;

- for upstream countries, water storage and release regimes must correspond to seasonal electricity demand. For downstream countries, water demand usually peaks during the growing season. These conflicting seasonal priorities necessitate negotiated water–energy exchanges, compensation mechanisms and joint forecasting;

- inadequate drainage, salinization of irrigated soils, pollution of water bodies and deteriorating canals can reduce economically useful water supply even when natural flows remain unchanged. Therefore, increasing withdrawals without infrastructure modernization does not necessarily improve agricultural productivity. Priority should be given to water productivity, measured as output or value added per unit of water consumed.

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ISSN: 3060-5245

Managing the transboundary Amu Darya and Syr Darya basins requires simultaneous consideration of the interests of several countries and sectors. UNECE emphasizes the need to coordinate basin-level decisions concerning water supply, energy, food and ecosystems. The region's institutional architecture includes interstate mechanisms and specialized basin organizations, although operating conditions differ among individual facilities (Ziganshina D. 2023).

Climate change increases uncertainty in seasonal water regimes. More frequent extreme weather events, changes in snow and glacier melt and rising temperatures can simultaneously affect water demand, water availability and infrastructure resilience. Risk reduction requires transparent hydrometeorological data exchange, coordinated reservoir operation scenarios, joint planning of water-saving investments and rapid-response procedures for emergencies. Water policy must also be linked to regional trade agreements: lower transport barriers and expanded food trade can partially mitigate local product shortages following poor harvests.

Table 3

Proposed System for Diagnosing Threats to Regional Economic Security

Risk category	Diagnostic indicator	Preventive measure
Water	Internal resources per capita; seasonal inflows	Data exchange and joint forecasts
Agricultural	Irrigation withdrawals; output per m³ of water	Drip irrigation and water accounting
Energy	Seasonal demand for water and electricity	Coordination of reservoir operations
Trade	Concentration of partners and transport corridors	Diversification of markets and routes
Institutional	Agreement coverage; timeliness of data exchange	Basin-level mechanisms and implementation audits

The proposed system combines indicators of natural-resource availability, water-use efficiency, economic interdependence and institutional preparedness. Its advantage lies in moving beyond individual sectoral indicators to monitoring the channels through which risks spread across sectors. For example, a projected decline in water inflows should be accompanied by an assessment of the expected pressures on agriculture, electricity generation and regional food markets.

Regional economic security requires a combination of national reforms and collective measures. At the national level, priorities include irrigation modernization, improved water accounting, loss reduction and economic diversification. At the regional level, they include coordinated water–energy regimes, investment in shared infrastructure, agreements on operating costs and expanded information exchange. Integrating these measures strengthens countries' ability to adapt to climate, trade and infrastructure shocks.

CONCLUSION

The study confirms the complex nature of Central Asian economic security: the development of mutual trade, the reliability of transport links, the availability of water resources and the quality of interstate governance form an

interdependent system. Comparison of FAO AQUASTAT data reveals substantial differences in the formation of internal renewable freshwater resources. To assess water security correctly, these data must be supplemented by information on transboundary inflows, seasonal availability, water quality and the structure of withdrawals.

The scientific and practical contribution of the article is the proposal of an integrated diagnostic framework linking water, agricultural, energy, trade and institutional risks. Priority measures include joint basin management, data exchange, improved irrigation efficiency, trade diversification and the development of mechanisms for preventing cross-sectoral threats.

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2026-yil, noyabr. №11-son.

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Litsenziya raqami: №083688

Manzilimiz: Toshkent viloyati, Qibray tumani, Universitet ko‘chasi, 2-uy