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Digitalization of the Caspian Region: Current Trends and New Opportunities

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Abstract. Digitalization is becoming a crucial factor in shaping the development of the Caspian region today. In recent years, the Caspian littoral states have adopted strategic and policy documents aimed at advancing the digital sphere. This process is intensifying, transforming political and socio-economic relations within the subregion and creating new opportunities for interaction. The relevance of the study is driven by the need for a comprehensive analysis of digitalization in the Caspian region and a critical assessment of its implications. The aim of the research is to identify the key factors, directions, and consequences of the digital transformation of the subregional system of international relations. The methodological framework of the study includes historical-analytical and comparative methods, the method of socio-political analogies, and political analysis. Theoretically, the research is grounded in rational choice theory, which makes it possible to identify the factors influencing the decisions of the Caspian states to prioritize digitalization as a reflection of the region's deeper transformations. Within the systems approach, the Caspian region is considered as an integral structure in which new linkages between states are being formed. The study also examines the impact of external environment, including the activities of extra-regional actors and the participation of the Caspian states in international organizations, as well as national regulatory frameworks in the field of digitalization and the role of international legal mechanisms governing the digital sphere. The object of the study is the processes of digitalization and its impact on the development of the Caspian region. It is demonstrated that the emerging subregional system of international relations is characterized by multiple development scenarios, presenting both new opportunities and risks. The conclusion provides an assessment of current trends in digitalization in the Caspian region and identifies the key factors determining its future trajectory. It is argued that digitalization represents a long-term trend that is already transforming the region and will continue to have a significant impact on its future development.

Key words: Caspian states, extra-regional actors, geopolitical situation, subregional system, digital transformation, rational choice theory

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Цифровизация Каспийского региона: современные тенденции и новые возможности

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Аннотация. Важным фактором, определяющим современное развитие Каспийского региона, становится цифровизация. В последние годы прикаспийские государства приняли стратегические и программные документы, направленные на развитие цифровой сферы. Этот процесс усиливается, трансформируя политические и социально-экономические отношения в субрегионе и открывая новые возможности для взаимодействия. Актуальность исследования обусловлена необходимостью комплексного анализа цифровизации в Каспийском регионе и критического осмысления ее последствий. Цель состоит в выявлении ключевых факторов, направлений и последствий цифровой трансформации субрегиональной системы международных отношений. Методологическую основу исследования составляют историко-аналитический и сравнительный методы, метод социально-политических аналогий, а также политический анализ. В теоретическом плане исследование опирается на теорию рационального выбора, позволившую выявить факторы, влияющие на решения прикаспийских государств по усилению внимания к цифровизации как отражению глубинных трансформаций региона. В рамках системного подхода Каспийский регион рассматривается как целостная структура, в которой формируются новые связи между государствами. В исследовании также уделено внимание влиянию внешней среды, включая деятельность внерегиональных акторов и участие прикаспийских стран в международных организациях, нормативно-правовым документам в сфере цифровизации, принятым в государствах региона, а также роли международно-правовых механизмов регулирования цифровой сферы. Предметом исследования являются процессы цифровизации и их влияние на развитие Каспийского региона. Показано, что формирующаяся субрегиональная система международных отношений характеризуется множественностью сценариев развития, что создает как новые возможности, так и риски. В заключение дана оценка современных тенденций цифровизации в Каспийском регионе и выделены ключевые факторы, определяющие ее дальнейшую динамику. Обоснован вывод о том, что цифровизация выступает долгосрочным трендом, уже трансформирующим регион и оказывающим существенное влияние на его будущее развитие.

Ключевые слова: прикаспийские государства, внерегиональные акторы, геополитическая ситуация, субрегиональная система, цифровая трансформация, теория рационального выбора

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Introduction

The purpose of this study is to identify the fundamental factors that have led to the development of digitalization in the Caspian region, as well as to determine the current status and potential changes in the subregion. To achieve this, a number of research questions regarding the current state of digitalization in the Caspian region and its future development directions will need to be addressed. Digitalization is understood as a comprehensive

process of introducing digital technologies into all spheres of society and the economy of the Caspian states, aimed at increasing efficiency, creating new business models, improving the quality of life for citizens, and fostering human capital development. This process is not merely about infrastructure, but also about transforming the mentality of the population living in the Caspian countries, shaping a new digital culture, and implementing a regulatory framework consistent with modern political and economic realities. Based on this, the author of the study

has set the ambitious goal of answering the fundamental question of why digitalization has started to develop rapidly in the countries of the Caspian region and identifying long-term trends in these changes.

The terms “digital transformation” and “digital economy” are often used in conjunction with the term “digitalization.” However, these concepts are different. Digitalization primarily refers to the active implementation of modern technologies and their use within the digital economy. Digital transformation, on the other hand, is a more comprehensive and multi-layered process that includes not only technological changes, but also a rethinking of the state’s institutional structure and operating principles, as well as an assessment of existing resources and mechanisms that ensure the sustainability of transformations (Savzikhanova & Buchaev, 2021, p. 808).

The relevance of this study is determined by the new processes taking place in the Caspian region. Historically, established and persistent trends in cooperation between countries and the existing subregional system of international relations are being increasingly influenced by new factors, one of which is digitalization. Accordingly, the subject matter of this study is digitalization, which has been gaining momentum and developing in recent years.

The primary methods used in the study are historical analysis, comparative analysis, sociopolitical analogies, and political analysis. Drawing on a systems approach, the author examines the Caspian region as a structure in which new connections are being established between its individual components—the Caspian states. The value of this approach lies in the opportunity not only to study the historical factors behind the development of digitalization but also to gain a holistic understanding of how this will impact the future development of the Caspian region.

The methodological approach utilizes rational choice theory to identify the factors that influenced the decisions of Caspian states to increase their focus on digitalization, reflecting fundamental changes occurring in the Caspian region.

The issue of digitalization is being actively studied by researchers in the Caspian states. It is worth noting the works that assess the fundamental changes in societal life, including international relations, due to technological advancements. American researchers, such as M. Roco and W. Bainbridge (Roco & Bainbridge, 2002), emphasized this issue as early as the early 21st century. In turn, Russian researcher N.I. Bystritskiy notes the fundamental changes associated with the introduction of information technologies, which will ultimately impact international relations (Bystritskiy, 2023).

Also of interest is the work of Russian researchers M.R. Ilyasov and M.V. Kogan, who identified the role of digitalization in implementing international transport projects in the Caspian region (Ilyasov & Kogan, 2024).

Most works related to digitalization in the Caspian region are distinguished by a narrow focus. Russian researchers such as S.V. Agafonova, N.G. Bryukhova, B.V. Kaigorodov, and Yu.V. Kuznetsova focus on issues related to the digital transformation of education in the Caspian region (Agafonova et al., 2022).

Other Russian studies emphasize the importance of digitalization for youth development. For example, S.V. Teterskiy, A.I. Izmailov, E.R. Dakhina, and S.V. Ilyasova highlight this aspect of digitalization in the Caspian region (Teterskiy et al., 2022).

Russian scholar V.V. Ovsyannikova examined digitalization issues through the lens of agricultural development, identifying current trends in the formation and impact of digitalization on this sector in the context of economic security (Ovsyannikova, 2023).

Researchers N.A. Shutov and A.A. Volkov examine the digitalization of the Caspian region through the lens of the transport and logistics sector, changes in which will impact the efficiency of freight transportation (Shutov & Volkov, 2025). Some Russian scholars focused on digitalization issues, examining the legislative framework and economic aspects of this process (Aitpaeva, Petelina & Bisaliev, 2021).

Some Russian researchers are examining the issue of digitalization in the political sphere. In particular, E.V. Kudryashova's work presents an analysis of the multifaceted impact of artificial intelligence on electoral processes and public administration (Kudryashova, 2025).

Unlike Russian researchers, who have attempted to examine the issue of digitalization in relation to the Caspian region in their works, scholars from the Caspian states focus more on the developmental characteristics of their national economies. For example, Turkmen scholars devote considerable attention to the issue of digitalization. In particular, Ch. Khodjammedov identifies the impact of digitalization on various sectors of the Turkmen economy (Khodjammedov, 2025). The role of digitalization is emphasized by Turkmen researchers Sh. Italmazova, S. Mukhanova, and B. Gurdova, noting that it has acquired particular significance for the country's economy. Emphasis is placed on the digitalization of education and the creation of new opportunities for young people (Italmazova, Mukhanova & Gurdova, 2025, p. 518).

Azerbaijani researcher Z.F. Mamedov considers digital technologies as an important strategic vector in national economic diversification policy (Mamedov, 2024).

Iranian researcher R. Mahdavi, noting the significance of digitalization, emphasizes the importance of resolving financial issues (Mahdavi, 2022, p. 17), while other researchers

note the key implications of digital transformation in the offshore oil and gas industry at the organizational level (Noadoust & Ranjbar, 2024). The Russian author O.I. Reshchikov reached similar conclusions, emphasizing that the Iranian government views digital transformation as a factor in the future economic well-being of the country's population (Reshchikov, 2022, p. 32).

The works of Kazakhstani researchers are noteworthy. In particular, K.O. Shayakhmetova and I.M. Kabdulin examine economic development in the context of digitalization through the prism of the financial sector (Shayakhmetova & Kabdulin, 2021). Researchers T.I. Kakizhanova, S.Y. Umirzakov, and Y.A. Bolatbek emphasize the interdependence of economic development on the level of digitalization (Kakizhanova, Umirzakov & Bolatbek, 2025). Similar assessments are given by A.A. Luchaninova, A.M. Baimukhamedova, M.F. Baimukhamedov, and N.N. Isaeva, who conclude that the key factor in the development of the Kazakh economy is the digital transformation of manufacturing enterprises and the use of digital information and communication technologies to restructure business (Luchaninova et al., 2023, p. 119). This thesis is also revealed in other studies by Kazakh authors. Thus, S.T. Kargabayeva, S. Bolatkyzy, K.M. Kamali, and K.I. Akhmetova draw attention to the assessment of the level of influence of digitalization on the development of e-commerce in Kazakhstan and its relationship with macroeconomic indicators (Kargabayeva et al., 2025, p. 58). Thus, despite the significant number of studies on digitalization in the Caspian region, it must be concluded that this issue remains relatively understudied and fragmented. Research is country-specific, focusing primarily on priority economic sectors.

The Current State of Digitalization in the Caspian Region

The current stage of digitalization in the Caspian region is characterized by significant heterogeneity. This is due to structural factors, including differences in the level of socio-economic development of states and their investment attractiveness. Despite the general trend toward the adoption of digital technologies, the degree of their penetration, the nature of their impact, and the effectiveness of their use vary significantly among the Caspian countries.

Rational choice theory provides an answer to the key question: why has digitalization recently begun to rapidly develop in the Caspian region? Through digitalization, the Caspian states hope to significantly enhance the efficiency of their economies, thereby strengthening their position in the region.

Russia occupies a leading position in the Caspian region in terms of digital technology development. The country is implementing national programs, such as the “Digital Economy of the Russian Federation,”¹ aimed at developing digital infrastructure, training personnel, and integrating digital technologies into key economic sectors and public administration. Smart city² and electronic document management technologies are being implemented. Digitalization is rapidly advancing in the financial sector (fintech), retail, industry (Industry 4.0), and logistics. In some industries, companies are in the transition phase to the next

stage of development—“Industry 5.0”³ Cloud technologies, big data, and artificial intelligence (AI) are advancing, and technology parks and venture funds supporting IT startups are being established.

The Republic of Kazakhstan is also demonstrating rapid digitalization. Significant attention is being paid to the development of e-government and the digital transformation of business.⁴ Mobile networks and projects to implement digital technologies in public administration are being developed. Particular attention is being paid to the digitalization of the extractive industries, agriculture, transport, and logistics, and FinTech services are being developed.⁵

Azerbaijan is placing increased emphasis on developing digital infrastructure and implementing e-services, viewing digitalization as a driver of economic growth, particularly as it diversifies its economy and moves away from oil and gas dependence. In recent years, “the innovation sector has come to be perceived as an integral component of the country’s long-term socioeconomic development goals.”⁶ A significant portion of new investment projects in the country are concentrated in sectors such as

³ Sukhikh E. Revolutionary Keep Step // *Vedomosti*. June 2, 2025. (In Russian). URL: <https://www.vedomosti.ru/partner/articles/2025/06/02/1112459-revolutsionnii-derzhite> (accessed: 21.12.2025).

⁴ Presidential Address 2024: How Kazakhstan is Shaping a Digital Ecosystem // Official Information Resource of the Prime Minister of the Republic of Kazakhstan. September 4, 2025. (In Russian). URL: <https://primeminister.kz/ru/news/poslanie-prezidenta-2024-kak-kazakhstan-formiruet-cifrovuiu-ekosistemu-30474> (accessed: 22.12.2025).

⁵ Akhmetova Ya. Fintech in Kazakhstan: Industry Dynamics and Companies Shaping the Future // *Forbes*. October 15, 2024. (In Russian). URL: <https://forbes.kz/articles/fintech-v-kazahstane-dinamika-industrii-i-kompanii-formiruyushie-budushee-1f6312?ysclid=mioysf89jg394291549> (accessed: 26.12.2025).

⁶ Azerbaijan Is One Step Away from Digital Transformation // CIS Internet Portal “Commonwealth of Integrations”. June 15, 2024. (In Russian). URL: <https://web.archive.org/web/20240712100241/https://e-cis.info/news/567/118958/> (accessed: 29.12.2025).

¹ National Program “Digital Economy of the Russian Federation” // Ministry of Digital Development. (In Russian). URL: <https://digital.gov.ru/target/nacionalnaya-programma-cifrovaya-ekonomika-rossijskoj-federaczii> (accessed: 21.12.2025).

² Digitalization and AI Implementation Ranking in Russian Regions (January–April 2025) // *Regions of Russia*. May 19, 2025. (In Russian). URL: <https://rrmag.ru/2025/05/19/rejting-cifrovizaczii-i-vnedreniya-ii-v-regionah-rossii-yanvar-aprel-2025-goda/> (accessed: 27.12.2025).

financial/business services, software and IT services, and industrial equipment manufacturing.⁷ Digitalization is focused on the oil and gas sector and transport, and the Port of Baku is being developed as a digital hub.

The regional specificity of digitalization lies in the fact that, unlike Russia, Kazakhstan, and Azerbaijan, digitalization in Iran is taking place within a “specific political and economic context, including sanctions restrictions” (Andreev, 2025). Nevertheless, the country is actively developing national IT resources and striving for self-sufficiency in this area. However, it is important to note that internet speed and access to some foreign resources may be limited in Iran. Furthermore, Iran has one of the strictest internet censorship systems in the world.

Of all the Caspian states, Turkmenistan regulates digitalization most strictly. The state oversees the development of the IT sector, focusing primarily on ensuring national security and stability. Although national communications networks are developing and modern digitalization standards are being implemented, “access to the global internet for the general public is limited and controlled.”⁸ Digitalization is primarily focused on strategic sectors such as hydrocarbon production, energy, and transportation.

Thus, despite significant differences in approaches, all Caspian states view digitalization through the prism of future national development. Digital technologies are gradually being

implemented, although the speed and depth of this implementation depend on internal factors and external conditions.

Legal Aspects of Digitalization in the Caspian Region

Digital regulation in the Caspian region is still in its infancy and faces a number of challenges. Each of the five Caspian states—Azerbaijan, Iran, Kazakhstan, Russia, and Turkmenistan—is developing its own approaches to digitalization based on its national priorities and economic capabilities. The countries of the region are united by a shared understanding of the need to transition to a digital economy and information society. However, each state has its own unique challenges.

In Kazakhstan, one of the main documents is the State Program “Digital Kazakhstan.”⁹ The document aims to accelerate the development of the digital economy, create a favorable digital ecosystem, and foster a “smart” society. The program notes that “digitalization is a powerful impetus for increasing the competitiveness of the economy, creating new jobs, and improving the quality of life.”¹⁰

The Russian Federation is implementing the national program “Digital Economy of the Russian Federation,”¹¹ which has evolved into a national project covering a wide range of areas—from regulatory frameworks and information infrastructure development to digital education and cybersecurity. The document envisions a significant increase in the share of the digital economy in the country’s

⁷ The Regulation on the Electronic Government Information System has been approved. What’s next? // Ministry of Digital Development and Transport of the Republic of Azerbaijan. August 18, 2025. (In Russian). URL: <https://mincom.gov.az/ru/media-ru/novosti/utverzdeno-polozenie-ob-informacionnoisisteme-elektronnogo-pravitelstva-cto-ozidaetsia> (accessed: 28.12.2025).

⁸ Volmamedova G., Soni A., Ivanov L.P. Digital Transformation in Turkmenistan: From Strategy to Action // News Central Asia. November 25, 2024. (In Russian). URL: <https://www.newscentralasia.net/2024/11/25/tsifrovaya-transformatsiya-v-turkmenistane-ot-strategii-k-deystviyu/> (accessed: 30.12.2025).

⁹ Digital Kazakhstan // Ministry of Artificial Intelligence and Digital Development of the Republic of Kazakhstan. (In Russian). URL: <https://www.gov.kz/memleket/entities/maidd/activities/14764> (accessed: 31.12.2025).

¹⁰ Ibid.

¹¹ Order of the Government of Russia dated July 28, 2017 No. 1632-r // Information and Legal Portal Garant. August 3, 2017. (In Russian). URL: <https://www.garant.ru/products/ipo/prime/doc/71634878/?ysclid=mj1vc7z1b8242606980> (accessed: 28.12.2025).

gross domestic product (GDP) and the widespread adoption of digital technologies across all sectors. The “Digital Economy” national project’s data sheet states that its goal is to “ensure the accelerated implementation of digital technologies in the economy and social sphere.”¹² Emphasis is placed on the development of domestic technologies and platforms, which is a response to geopolitical challenges and the desire for technological sovereignty.

In turn, digital initiatives in Azerbaijan are integrated into strategic documents, among which the “Strategic Roadmap for the Development of Telecommunications and Information Technologies in the Republic of Azerbaijan” stands out.¹³ Digitalization is supported within the framework of the “Azerbaijan 2030: National Priorities of Socioeconomic Development” concept. These documents aim to create a developed information and communications technology (ICT) infrastructure, enhance e-government, promote innovation, and develop human capital. In particular, the “Strategic Roadmap” emphasizes the need to “transform Azerbaijan into a regional digital hub” and increase export potential in the ICT sector.¹⁴ In late 2025,

President Ilham Aliyev approved the “Digital Economy Development Strategy for 2026–2029,” which aims to develop mechanisms to support the digital transformation of private sector economic activity.¹⁵

Despite sanctions, the Islamic Republic of Iran is developing its digital infrastructure and e-government through the National Information Network (NIN)¹⁶ and Iran’s 20-Year ICT Vision.¹⁷ The NIN allows for selective resource shutdowns: the state can block international platforms (such as WhatsApp and Instagram¹⁸), while maintaining the full functionality of local services (state media, banking apps). In addition to this system, the Iranian Great Firewall (IRGFW) project has been implemented. It is similar to China’s Great Firewall (GFW), but with “stricter enforcement and centralized control, this screen filters, blocks, and monitors traffic nationwide.”¹⁹ The Iranian authorities have repeatedly stated their desire for “digital self-reliance,” which is reflected in numerous government documents regulating the ICT sector.

Turkmenistan is also keeping pace with global trends. The “Concept for the Development of the Digital Economy in Turkmenistan for

¹² Passport of the National Project National Program Digital Economy of the Russian Federation (Approved by the Presidium of the Council under the President of the Russian Federation for Strategic Development and National Projects, protocol of June 4, 2019 No. 7) // Judicial and Regulatory Acts of the Russian Federation. (In Russian). URL: <https://sudact.ru/law/pasport-natsionalnogo-proekta-natsionalnaia-programma-tsifrovaia-ekonomika/pasport/6/?ysclid=mj1vf7ar9969567453> (accessed: 22.12.2025).

¹³ Azerbaijan Declares Strategic Road Map for Development of Telecommunication and Information Technologies // Report. December 30, 2016. URL: <https://report.az/en/ict/azerbaijan-revealed-strategic-road-map-for-development-of-telecommunication-and-information-technolo?ysclid=mj1vyti96j775328249> (accessed: 26.12.2025).

¹⁴ President Ilham Aliyev Approved Azerbaijan’s Development Priorities until 2030 // Federal National-Cultural Autonomy of Azerbaijanis of Russia. February 5, 2021. (In Russian). URL: <https://fnkaa.ru/prezident-ilham-aliev-utverdil-prioritety-razvitiya-azerbajdzhana-do-2030-goda/?ysclid=mj1w0licuul88155511> (accessed: 27.12.2025).

¹⁵ Sadygov K. Azerbaijan Will Develop a “Digital Economy Development Support Program” // Report. December 10, 2025. (In Russian). URL: <https://report.az/ru/ikt/v-azerbajdzhane-budet-razrabotana-programma-podderzhki-razvitiya-tsifrovoj-ekonomiki?ysclid=mj1w38xf46759230467> (accessed: 30.12.2025).

¹⁶ A Technical Look at Iran’s Internet Outages // Habr. July 18, 2025. (In Russian). URL: <https://habr.com/ru/companies/ruvds/articles/928124/> (accessed: 28.12.2025).

¹⁷ Lavrova D. Cyber Threat Landscape in Iran: H2 2024—H1 2025 // PT Cyber Analytics International Analytics Group. September 25, 2025. (In Russian). URL: <https://ptsecurity.com/research/analytics/cybersecurity-threats-iran-h2-2024-h1-2025/> (accessed: 19.12.2025).

¹⁸ Social networks *WhatsApp* and *Instagram* (part of the *Meta* group of companies) are banned in the Russian Federation. *Meta* is designated as an extremist organization in the Russian Federation (*Editor’s note*).

¹⁹ Hetagurov A. Iran’s Cyber Power: Cyber Guards of the Islamic Revolution // Russian International Affairs Council. (In Russian). URL: <https://russiancouncil.ru/cyberiran/?ysclid=mj1whkigrp431303967> (accessed: 22.12.2025).

2019–2025,”²⁰ approved by the decree of the President of Turkmenistan on September 3, 2019, is the main document defining the strategic directions of digitalization. The document sets objectives for the development of digital infrastructure, the implementation of electronic document management, and e-government, as “digitalization is intended to become one of the key drivers of sustainable economic growth and social progress in the country” (Ataeva, 2024, p. 266).

Turkmenistan is actively implementing digital technologies in various sectors of the economy. Their application across various fields allows for more effective solutions to the country’s challenges. The country has already implemented e-government: the legal basis for this is the Law of Turkmenistan “On Electronic Government,”²¹ adopted in 2022, which establishes the procedures for e-government operations and regulates relations arising in this area. In 2025, the “Concept for the Development of the Digital Economy in Turkmenistan for 2026–2028” was also approved.²²

Common Features and Differences in Digitalization in the Caspian States

Information technology development programs in the Caspian region countries exhibit both similarities and unique features. Kazakhstan

is investing in the creation of data centers, the development of electronic payment systems, and the digitalization of government services through the eGov.kz portal, which is one of the most advanced in the CIS. Russia, in turn, is placing significant emphasis on the development of domestic software, the creation of its own ecosystem of digital platforms, and the advancement of artificial intelligence technologies. Azerbaijan is focusing on expanding broadband internet access, particularly through the Azerbaijan Digital Hub project,²³ which aims to transform the country into a regional hub for data and internet transit. Furthermore, e-government (*ASAN Xidmət*) is actively developing, providing citizens with integrated government services through a single-window system. Iran is investing in the construction of fiber-optic networks throughout the country, the development of local internet services, and the creation of national cloud platforms.

However, alongside the ambitious plans and projects of individual countries in the region, there are also significant areas of digitalization that require further regulation. One of the key challenges is digital inequality. Despite government efforts, access to high-speed internet and digital devices remains uneven, especially between urban and rural areas. This also affects the population’s level of digital literacy.

Cooperation between the Caspian states in the field of digitalization is evolving in various ways. One of the most striking examples of bilateral cooperation in the development of cross-border infrastructure and data exchange is the Trans-Caspian Fiber Optic Cable (TCFOC) project between Kazakhstan and Azerbaijan.²⁴

²⁰ Concept for the Development of the Digital Economy in Turkmenistan for 2019–2025 // Ministry of Health and Medical Industry of Turkmenistan. (In Russian). URL: <https://www.saglykhm.gov.tm/ru/dowlet-maksatnamalary-we-strategiyalary/turkmenistanda-2019-2025-nji-yyllardasanly-ykdysadyeti-osdurmegin-konsepsiyasy> (accessed: 19.12.2025).

²¹ “On Electronic Government.” Law of Turkmenistan (Bulletin of the Milli Gengesh of Turkmenistan, 2022, No. 3, Article 71) // Mejlis of Turkmenistan. (In Russian). URL: <https://mejlis.gov.tm/single-law/17?lang=ru> (accessed: 23.12.2025).

²² The Concept for the Development of the Digital Economy in Turkmenistan for 2026–2028 Has Been Approved // State News Agency of Turkmenistan “Turkmenistan Today.” October 8, 2025. (In Russian). URL: <https://tdh.gov.tm/ru/post/46454/utverzhdena-koncepciya-razvitiya-cifrovoj-ekonomiki-v-turkmenistane-na-2026-2028-gody> (accessed: 22.12.2025).

²³ AzerTelecom Presents the Azerbaijan Digital Hub Program at the Baku Tel Exhibition // ABC.az. December 4, 2019. (In Russian). URL: <https://abc.az/az/news/37321> (accessed: 12.12.2025).

²⁴ Azerbaijan, Kazakhstan to Start Laying Trans-Caspian Fiber-Optic Cable Line // Report. July 25, 2024. URL: <https://report.az/en/infrastructure/azerbaijan->

This ambitious project, which has received high-level intergovernmental support, is part of the Digital Silk Road initiative connecting Europe and Asia via the Caspian Sea. A Memorandum of Understanding between *Kazakhtelecom* and *AzerTelecom*, signed in 2019, confirmed the parties' commitment to jointly implement the project.²⁵

In addition to bilateral efforts, regional integration associations play a significant role in shaping the Caspian region's digital agenda. These include the Eurasian Economic Union (EAEU), which includes Russia and Kazakhstan, among the Caspian littoral states. Although digitalization issues within the EAEU are not regulated by a separate bilateral agreement between Russia and Kazakhstan, decisions of the Eurasian Economic Commission "lay the foundation for the harmonization of legislation in the field of the digital economy."²⁶ A similar situation is observed within another regional platform, the Shanghai Cooperation Organization (SCO), of which Russia and Kazakhstan are also members. Here, digital issues are primarily focused on international information security.

Instead of a Conclusion: Promising Areas for Digitalization in the Caspian Region

In the context of digitalization development in the Caspian region, both general trends and specific features should be highlighted. Conceptually, digitalization in the Caspian states

is viewed primarily as a tool for implementing national policies. At the same time, differences in the level of information technology development and diverging priorities hinder the creation of conditions for multilateral cooperation in digitalization.

In all Caspian countries, the state plays a dominant or extremely significant role in financing and coordinating the digitalization process. This is due to the strategic nature of digital transformation, the need for large-scale infrastructure investments that the private sector is not always prepared to fully undertake, and the desire of states to maintain control over critical digital infrastructure.

For Caspian countries, which have historically relied on hydrocarbon production and export, digitalization offers a unique opportunity to diversify their economies, reduce their carbon footprint, and transition to more sustainable development models.

In this context, digitalization opens up new opportunities for the Caspian states. The green agenda could become a promising area of digitalization. This primarily concerns improving energy efficiency and integrating renewable energy sources (RES). Smart grid technologies will optimize production, distribute energy consumption, reduce losses, and improve the reliability of the power supply.

Digitalization can play a crucial role in the sustainable management of regional natural resources. In agriculture, particularly in the vast agricultural regions of Russia and Kazakhstan, technologically advanced farming, coupled with the introduction of digitalization, will optimize the use of water, fertilizers, and pesticides, which is particularly relevant in the context of increasing water shortages. Soil moisture sensors, drones for crop monitoring, and AI algorithms for data analysis will help optimize resource use, reduce waste, and minimize negative environmental impacts.

kazakhstan-to-start-laying-trans-caspian-fiber-optic-cable-line?ysclid=mj2hq5hmwh998822277 (accessed: 23.12.2025).

²⁵ Kazakhstan and Azerbaijan To Lay a Communication Line along the Bottom of the Caspian Sea // *Tengrinews.kz*. December 31, 2022. (In Russian). URL: <https://tengrinews.kz/internet/kazakhstan-azerbaydjan-prolojat-liniyu-svyazi-dnu-kaspiyskogo-478996/> (accessed: 24.12.2025).

²⁶ "Treaty on the Eurasian Economic Union" (Signed in Astana on May 29, 2014) (as amended on May 25, 2023) (as amended and supplemented, entered into force on June 24, 2024) // *ConsultantPlus*. (In Russian). URL: https://www.consultant.ru/document/cons_doc_LAW_163855/ (accessed: 25.12.2025).

For Iran and Turkmenistan, which are facing severe water shortages, digital solutions in water resource management will be critical. Water level monitoring systems for reservoirs, leak sensors in irrigation systems, and smart irrigation systems controlled by AI will significantly improve water efficiency. Iran is already developing its own digital platforms for managing water resources during droughts.

Climate change mitigation and adaptation in the Caspian region will gain new tools thanks to digital technologies. Big data and AI will enable the creation of more accurate climate models, forecasting extreme weather events (droughts, floods, hurricanes), and assessing their impact on various economic sectors and infrastructure. This is crucial for the Caspian countries, which are vulnerable to phenomena like desertification, especially in Kazakhstan, Turkmenistan, and Iran, as well as fluctuations in the level of the Caspian Sea.

Nevertheless, it is impossible to ignore the fact that certain challenges stand in the way of digitalization in the region's countries. Caspian states, rich in hydrocarbon resources, are already facing a dilemma: while striving to develop a digital economy, they are still struggling to overcome the problem of fossil fuel-based energy generation. In Russia, for example, many large data centers use electricity from traditional sources. Kazakhstan is actively developing green energy for its own needs, including digital centers. Iran, with its highly energy-intensive economy and fuel subsidies, also faces the need to power its data centers with cleaner energy.

One of the most significant challenges is the significant digital divide both between countries in the region and within individual states. High-speed internet and modern digital services are typically concentrated in large cities and

industrial centers, while rural and remote areas remain underserved (Kiramov, 2025). This exacerbates social and economic inequality. The high cost of internet access and digital devices for some segments of the population, particularly in lower-income countries, limits the participation of a significant portion of society in the region's states in the digital economy. A shortage of qualified IT specialists and the low levels of digital literacy among the population as a whole slow down the adoption and effective use of new technologies.

Despite all the difficulties, digitalization offers significant prospects for economic growth in the Caspian region, enhancing governance efficiency, improving the quality of life of the population, and strengthening regional cooperation. Russia, as one of the largest and most technologically advanced countries in the region, plays a key role in this process, acting as a driver, partner, and center of gravity for the implementation of joint digital projects.

The digitalization of the Caspian region presents a multifaceted challenge with the potential to transform economies, social spheres, and governance systems of the states in the region. This primarily concerns the need to bridge the digital divide, ensure reliable cybersecurity, modernize infrastructure, improve the regulatory framework, and strengthen trust between partners. Digitalization of the Caspian region is not only a technological, but also a geopolitical project, requiring political will, strategic vision, and the joint efforts of all Caspian states. Russia, as a key player in the region, can contribute significantly to creating a prosperous and secure digital future. Despite existing challenges, the potential for developing cooperation in digital technologies in the Caspian region is enormous.

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