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DIGITALIZATION AND ARTIFICIAL INTELLIGENCE IN CENTRAL ASIA: GOVERNMENTAL RESPONSES AND FURTHER IMPLICATIONS

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Abstract. Digitalization and new technologies are now firmly on the agendas of governments worldwide. New technological trends have not only become catalysts for economic development, but are also reshaping how the public sector works and implements its policies. Amid technological transformations, the countries of Central Asia are searching for new ways to adapt to these changes. This paper aims to assess these attempts by exploring the digitalization policies of the five Central Asian countries. By using qualitative methods and expert interviews, the article identifies key limitations and potential areas of development for the Central Asian states regarding digitalization and artificial intelligence. By providing valuable insights, the article contributes to a deeper understanding of the digitalization challenges faced by developing countries. Through the analysis of local expert opinions, the article seeks to contribute valuable insights to the distinct approaches adopted by these countries, thus enriching the understanding of the region's trajectory in the digital era.

Keywords: *digitalization; artificial intelligence; governance on digitalization and artificial intelligence; Central Asia; public policy; public administration.*

Reikšminiai žodžiai: *skaitmeninimas; dirbtinis intelektas; skaitmeninimo ir dirbtinio intelekto valdymas; Centrinė Azija; viešoji politika; viešasis administravimas.*

Introduction

New innovative trends including artificial intelligence (AI), robotics, big data, and blockchain are expected to have a significant impact in the near future. Public bodies have been also influenced and challenged by technological advances. The challenges associated with new technological trends go beyond upgrading the workings and business processes of governments, conceptually relating to transformational changes in policies, economies, and people's lives. Technologies can directly benefit the achievement of approximately 70% of the Sustainable Development Goals (SDGs), while more digitally mature countries have performed better in achieving SDG progress compared to other similar states. Digital infrastructure built and supported by a government can be the roads and bridges of the future, delivering crucial services for people (UNDP 2023).

Despite global geopolitical turbulence, the Central Asian (CA) countries of Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan illustrate economic growth. With their landlocked but geostrategic locations, they strive to find new ways to boost their economies and improve their competitiveness. In this regard, the technological dimension of their policies is of interest for practical and theoretical reasons. Exploring the digitalization and AI-related strategies of these countries helps to identify key perceptions, obstacles, and institutional, political, and social issues. Furthermore, conducting a comparative analysis between these five countries can reveal how contextual factors affect the implementation of digitalization and AI policies. To this day, there have been only a few attempts to investigate this issue. The purpose of this paper is to evaluate the digitalization and AI strategies of the five CA countries by critically analyzing major problems and barriers in their technological development.

Literature Review

For the CA countries, digitalization has the potential to modernize and integrate national economies into the global economy, spur a digital leap, and build an information society in the post-pandemic era. Under these conditions, the CA countries all intend to improve their digital potential and carry out political reforms to better cope with current and future challenges. As a result, they are currently implementing ambitious national strategies and programs aimed at transforming their societies into ICT-proficient cultures by creating digital economies and digital governments, as well as achieving sustainable economic growth. Although the approaches of the CA countries to the national development of ICT and digitalization differ, they all face common problems and obstacles, such as: the digital gap at the national and regional levels; insufficient legislative frameworks, especially concerning confidentiality and the protection of personal data; a lack of financial, technical and infrastructural resources; costly and slow Internet; a lack of qualified professionals

with IT skills; low public trust in online services; and a relatively low level of digital literacy (Khakimov 2022).

World Bank research shows that a 10% increase in broadband penetration adds around 1% to economic growth in CA, and that a 1% increase in Internet access corresponds to a 4.3% increase in export growth. This digital communication drive will expand the access of the enterprises and citizens of CA to secure Internet via reliable satellite communications, reducing the digital inequality in the region and promoting inclusive last-mile digital services. In addition, ground stations with built-in Internet traffic exchange points and green data processing centers will be located in the territory of the CA countries. Along with investments in infrastructure, the EU promotes reforms in digital governance, including in the telecommunications sector, the field of personal data protection, cybersecurity, and respect for human rights. These initiatives represent the beginning of the concrete implementation of the Digital for Development Hub in the Asia-Pacific region (Stano 2022).

AI as a technology is developing rapidly in CA. At the same time, it entails several potential risks, such as a lack of transparency in decision-making, gender or other forms of discrimination, the invasion of privacy, and its use for criminal purposes. Against the background of fierce global competition, a firm approach is needed from the CA countries based on a centralized AI policy. To take advantage of AI-associated opportunities and challenges, CA must act as a whole and define its path based on the values of the region in order to promote the development and implementation of AI (Younas 2020). Researchers from the Asian Development Bank (Tokyo) and professors from the Lee Kong Chian School of Economics (Singapore) examine in detail the main transmission channels through which digital transformation is increasing the productive capacity of economies in Asia. Numerous authors have explored how improving digital infrastructure, digital literacy, and financial regulation can help maximize the benefits of digitalization for the region's economy (Beirne and Fernandez 2022).

A "Central Asia-as-a-platform" strategy is being proposed in order to create an innovative competitive advantage for the region in the era of digital transformation. In addition, a sub-regional center for digital sustainable development solutions in Almaty, Kazakhstan, is also being mooted as a potential venue for a digital platform that might enable the implementation of the proposed digital strategy for CA (Tazhiev 2021). To accelerate economic and social digital transformation, a digital solutions center (DCR) for the research and development of proposals has been suggested to decision-makers concerned with the use of new digital technologies. In particular, three scenarios were presented in the DCR report. In Scenario 1, the DCR presents GovTech in Kazakhstan with an emphasis on digital transformation, and does likewise in other CA countries but with a specific emphasis on the digitalization of their value chains. In Scenario 2, the DCR applies GovTech to Kazakhstan with an emphasis on digital transformation, but its scope of activity can be expanded to other CA republics to then move back in line with Scenario 1. Here, a given country would assess its ability and desire to leap into becoming a predominantly digital economy and

society. In Scenario 3, the main focus is the implementation of the Asia-Pacific Information Superhighway program (Ure 2021).

This literature review is primarily concerned with the economic and political aspects of digitalization in CA in the context of international and global processes, and these are undoubtedly important for the framework of this paper. However, an analysis of the literature shows that the problems of digitalization and the use of AI in CA are largely not considered from the perspective of the science of public policy and public administration. Therefore, this paper attempts to fill this research gap. In addition, many authors study the problems of digitalization in CA in terms of the interests of major international actors (USA, China, the EU). This article provides new insights by identifying national and regional barriers to digitalization and the use of AI, and presents a vision of the prospects for addressing them.

Objective

The objective of this paper is to study the challenges and barriers faced by digitalization and AI in CA. This entails an analysis of the key priorities and objectives outlined in the digitalization policies of the countries concerned, as well as the practice of implementing these policies and the measures of the governments of these countries. The article aims to explore common challenges, opportunities for regional cooperation, and synergies. This involves assessing the extent of collaboration among CA countries on regional initiatives and understanding the factors that shape their collective approach.

Exploring the opinions and assessments of local experts concerning the effectiveness of government policies on digitalization and artificial intelligence is the first stage of this research. By incorporating expert viewpoints, the study seeks to capture nuanced insights into the perceived strengths and weaknesses of the implemented strategies, providing a comprehensive understanding of the policy landscape. These research questions collectively form the foundation for a thorough analysis of CA digitalization policies, contributing valuable insights to the broader discourse on regional integration and technological advancement.

The following research hypothesis is put forward based on the goal and research question: Different digitalization challenges in the CA countries are explained by the differing effectiveness of public policy.

Methods

The article uses interviews with experts and other qualitative methods. To enhance the validity of the research and ensure triangulation, secondary sources are used alongside primary sources such as national legislation (national strategies and programs), official

statements, speeches, and international and regional government publications.

Expert interview is a type of in-depth interview method in which the respondents are highly qualified specialists – in this case, in the field of public administration and political science. The expert interviews in this studies involved 9 respondents (2 respondents each from Kazakhstan, Uzbekistan, Kyrgyzstan, and Tajikistan; one respondent from Turkmenistan). The interviews lasted for an hour or more, and the electronic Delphi method was used to create rankings through multiple rounds of interviews, ensuring that important topics were thoroughly explored. Among the experts were university professors, heads of NGOs, heads of government departments, heads of think tanks, journalists, and scientists. The purpose of the expert interviews was to identify key problems and barriers, as well as prospects for cooperation in the use of AI. During the expert interviews, the factors hindering the development of digitalization and the use of AI at the national and regional levels were identified (a total of 10 factors in 2023).

The processing and interpretation of the interview results was carried out in compliance with general rules for editing video and audio recordings. The descriptions and results of the interviews were summarized according to the Consolidated Criteria for Reporting Quality Research checklist. Participants were invited to participate in the study via personal contact, after which a formal invitation letter was sent via email. Interviews were conducted with experts from CA to determine key problems and barriers, as well as to identify prospects for cooperation in the field of digitalization and the use of AI. The analysis of transcripts unveiled various theories and observations, from the specific to the general. In the first stage, aspects of the broader topic were described in order to develop hypotheses. To establish connections between the distinctive features of the interviewees' experiences, further categorical analysis was carried out, combining classifications into clusters. Based on this clustering, the analysis of the opinions of experts bearing information from different countries was able to reflect a more unified picture for the broader CA region.

Results

The following section describes the dynamics of the digitalization process in the five CA countries based on its main indicators. This information allows the public policy and state measures undertaken by CA countries to be analyzed and evaluated.

For the CA countries, effective government policies in the field of digitalization and AI are of global importance and will provide significant potential for modernization, as well as allow integration into the global digital economy. One of the most effective digitalization strategies is e-government, which is considered the main tool of digital transformation. The United Nations E-Government Survey is an effective indicator of a country's current readiness for digitalization and digital transformation.

One of the most important aspects of digitalization in the field of public administration

in Central Asia is the e-government development indicator. Kazakhstan ranks first in this indicator, as e-government was created there in 2006 as a platform for providing public services. More than 10 million people have since gained access to more than 760 electronic services.

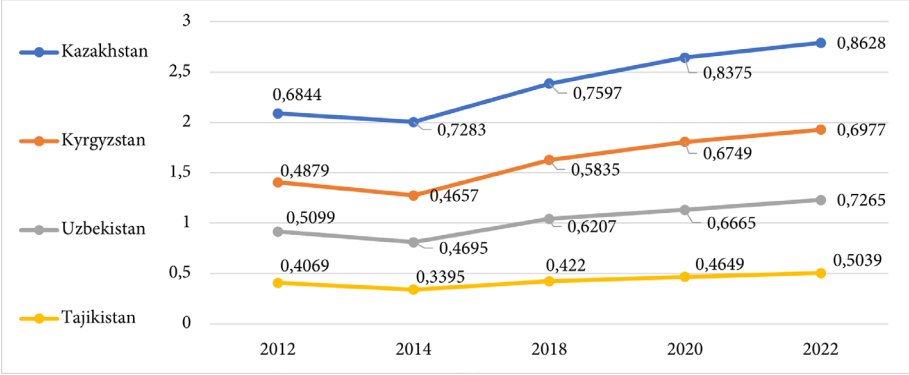

Figure 1. CA countries ranked by level of e-government development

In a recent United Nations E-Government Survey, Kazakhstan rose from 38th place in 2012 to 28th place in 2022, with an E-Government Development Index (EGDI) of 0.8628. Meanwhile, Uzbekistan improved from 91st place to 69th place, with an EGDI of 0.7265; Kyrgyzstan moved up from 99th place to 81st place, with an EGDI of 0.6977; while Tajikistan fell from 121st place to 129th place, with an EGDI of 0.5039 (Figure 1; UN DESA 2022).

Thus, Kazakhstan can be classified as having a very high EGDI, while it can be said that Uzbekistan, Kyrgyzstan, and Tajikistan all have high EGDI values. One of the most important indicators of innovation and technological potential is the Network Readiness Index, which characterizes the level of development of information technologies around the world. There is a close connection between the development of information and communication technologies and economic well-being, as technologies today play a leading role in countries' development, productivity, and competitiveness, while also diversifying economies and stimulating citizens' business activity, thereby contributing to the improvement of people's living standards. The Network Readiness Index unites four groups of indicators: the technological component, the human factor, managerial skill, and influence (Table 1).

Table 1. The Network Readiness Index of CA countries

Countries	Technologies	People	Management	Influence	Total	Ranking
Kazakhstan	42.87	49.51	62.87	54.60	52.46	58
Kyrgyzstan	30.64	33.48	51.21	48.79	41.03	95
Tajikistan	29.41	26.89	34.69	47.92	34.73	111

(Source: Dutta and Lanvin 2022)

The 2022 Network Readiness Index (Dutta and Lanvin 2022) provides estimates for a total of 131 countries, which together account for almost 95% of the world's gross domestic product (GDP). Kazakhstan is in the top three countries in the CIS region, occupying 58th position overall.

Cheap access to reliable and fast Internet is an important indicator for the development of digital transformation. At the same time, access to the Internet in CA countries is growing. Currently, Kazakhstan's indicators are close to the OECD average, while in Tajikistan the growth rate of Internet access remains fairly low (Figure 2).

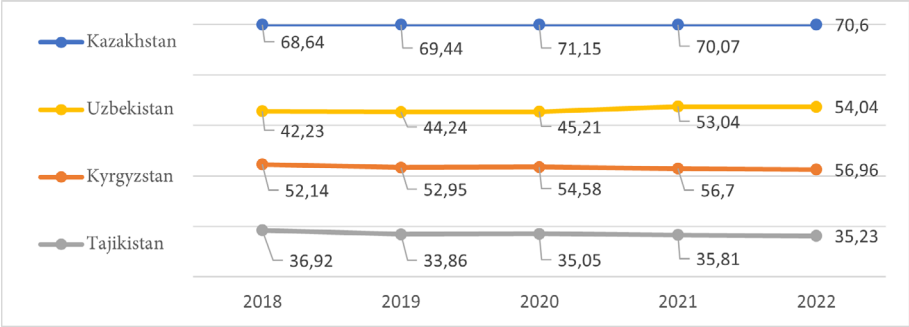

Figure 2. CA countries' ranking for Internet penetration rate

(Source: IMD 2022)

In the 2022 World Digital Competitiveness Ranking (IMD 2022), Kazakhstan occupied a leading position in terms of Internet penetration among CA countries with a value of 70.6 (advanced). In Kazakhstan, 73% of the population has Internet access. In Uzbekistan, 50% of the population has Internet access, with a value of 50.4 (transition). Meanwhile, in Kyrgyzstan, 34% of the population has Internet access, with a value of 54 (transition). Finally, 19% of the population has Internet access in Tajikistan, with an Internet penetration rate of 35.2 (emerging). Limited access to the Internet is a serious obstacle to the development of digital transformation in the CA region.

Table 2. Internet penetration rates in CA countries in 2021

Country	Infrastructure	Affordability	Network coverage	Mobile data affordability	Basic skills	Gender equality	Online security
Kazakhstan	58.03	72.22	82.82	91.36	85.30	100.00	93.15
Kyrgyzstan	58.44	44.15	81.93	44.93	76.34	100.00	49.64
Tajikistan	51.13	18.88	78.11	22.59	71.12	16.02	17.10
Uzbekistan	54.04	44.62	79.68	63.70	74.06	63.36	71.11

(Source: GSMA 2022)

The use of digital technologies and Internet penetration rates vary significantly in different countries (Table 2). Of the CA countries to be assessed or for which data are available, Kyrgyzstan occupies the leading position in infrastructure, with an indicator value of 58.44, while Tajikistan has the lowest value of 51.13. In terms of accessibility, Kazakhstan leads with 72.22, and again Tajikistan has the lowest indicator value – 18.88. Tajikistan also has a low indicator value in terms of gender equality, as only 16.02% of women have access to digital technologies, and the country likewise lags behind in terms of security (17.10). Meanwhile, there is no gender inequality in the use of digital technologies in Kazakhstan and Kyrgyzstan. In countries with low incomes, the level of education is often also low, which leads to an insufficient level of basic skills. This trend is reflected in the ratings of the CA countries in this area.

Insufficient government support for digitalization as a limiting factor in the development of AI and digitalization in CA countries

The analysis of statistical data shows that significant differences in the main indicators of the implementation of digitalization are explained by insufficient government support in CA countries, especially in Tajikistan. According to World Bank data from the 2022 GovTech Maturity Index, in terms of the level of digitalization and public administration in the CA countries, Kazakhstan and Uzbekistan have significantly improved their indicators (Kazakhstan – 0.817; Uzbekistan – 0.813). This indicates increased government support in the field of digitalization.

The B and C rankings given to Kyrgyzstan (0.578) and Tajikistan (0.309), respectively, show that they have not improved their positions. It is obvious that the government of Tajikistan does not pay significant attention to state support for digitalization and is characterized by an insignificant level of modernization in the field of digitalization and the use of AI in the public sector. Turkmenistan (0.125) is the only country in Central Asia with a very low GovTech indicator level (World Bank, 2022).

The role of digitalization in CA countries

In general, the interviewed experts noted the positive effects of digitalization. The

degree of penetration and use of various software, in particular of Western origin, differ markedly across the region, but residents nevertheless use the same products. This demonstrates the significant potential for the formation and development of a unified CA network. On a related note, an expert from Uzbekistan outlined the following: "Of course, there is a difference in the spread of different social networks. Much of this depends on political will and state policy, but in general, the same social networks are used throughout the region."

In particular, many of the interviewed experts agreed that if all CA countries unite and form a common approach to digitalization, they can create a digitally integrated CA. Furthermore, country-specific features of the development of digitalization were noted by several experts. In particular, the situation has changed in the context of the war in Ukraine, especially with the arrival en masse of Russian nationals. Specifically, one expert from Uzbekistan claimed: "Many IT specialists have arrived, who work hard and do a lot for the development of the digitalization of our country. Two years ago, the president announced a special program in Uzbekistan, called Million Programmers, training the local workforce to become programmers and IT specialists. Therefore, this suggests that the concepts of digitalization and intellectual innovation are very well recognized at the highest level." In Turkmenistan, the experts note that despite the concept of creating a national sovereign network having been developed, it is still unclear what work such a network will do. One of respondent stated: "I can see the desire to work in this direction, but the desire to create a more closed autonomous network of sovereign Internet should also be noted, where the state will have very tight control." In general, it can be concluded that digitalization has huge potential for unification within the CA region, through which effective scenarios for the development of regionalism are plausible.

Challenges and obstacles in digitalization and AI implementation

The responses offered in the interviews show that there are certain difficulties and problems regarding digitalization and the implementation of AI, both in specific countries and the region as a whole. The most important problem concerns connection speed and Internet quality. In addition, the overall speed of digitalization differs from one country to the next. While in some countries digitalization and related programs have been developing for a long time and at a good pace, in others the process of digitalization is only just beginning. An expert from Kyrgyzstan explained this: "There is no quality Internet in the departments or the representative offices of the regions. I recently visited the post office, and everything was processed using old, antediluvian ways." Low-quality Internet represents a significant obstacle to the development of a unified regional approach to digitalization. Another expert from Kazakhstan offered an opinion regarding public policy, which they claim is directly related to the freedom to regulate the information flow and the exchange of information. They claimed: "States are concerned about maintaining control over information from the point of view of security."

Differences in the understanding of threats to regional security: the "switch" is in the hands of the state

This study also examined the question of the existence of differences in the understanding of regional security in CA. From the interviews, it can be concluded that in Kazakhstan and Uzbekistan, a significant transformation is being observed, and approaches to understanding security, including cybersecurity, are changing. However, in the other CA countries there is a tendency toward excessive securitization. An expert from Kazakhstan stated: "This is because uncontrolled information, networks, technologies, and so on are still considered as a potential source of threat." Based on this response and others like it, excessive control by the state authorities appears to be a common factor across CA countries. Meanwhile, some experts note that a certain intergenerational division is unique to Kazakhstani society, where young people choose and vote for freedom and free access to information, while the older generations often favor censorship, prohibition, and constant control. Ultimately, there is no single approach and vision that permeates across society.

In particular, one of the experts from Tajikistan expressed the following opinion: "Nevertheless, there is a low level of digital security, a high level of fraud, to which the entire population is exposed." The peculiarity of Turkmenistan lies in the issue of security, and especially concerns over national interests and the stability of the regime. A further expert from the country observed: "Therefore, for them, digital technologies, or the Internet, or globalization in the field of Internet technologies can influence or serve the stability of an entire state, and not its development."

Concrete steps to develop digital skills: legislative initiatives to create a single digital CA space

The interviewed experts were also asked about the steps that CA countries should take to create a single digital space. The analysis of their responses shows that all countries ought to initiate a regional program, which could subsequently be legislatively enforced. On the other hand, digitalization itself is likely to be largely influenced by the pace of the regionalization process. An expert from Uzbekistan noted: "If we see some kind of regional organization in CA in the near future, it would be possible to see a legislative initiative within this organization. Thereafter, it will be possible to talk about the formation of a unified approach to digitalization and the use of artificial intelligence." Thus, this research has shown that there are still significant difficulties to overcome in the field of digitalization, which are connected, first of all, through the existing state policies of all CA countries. Importantly, government officials believe that the development of digitalization can directly affect freedom of speech and the security of the state as a whole.

Opportunities and risks when creating a regional platform for digitalization and AI

Overall, improving cooperation between CA countries by creating a regional platform for digitalization and AI brings clear benefits and opportunities by contributing to data integration and the exchange of knowledge, despite some risks related to the loss of national identity and an increase in cybercrime. However, this potential remains largely unfulfilled due to different digitalization approaches and conditions across the CA countries.

These differences are limiting factors for digital transformation in the region.

In the CA countries, there are different levels of digital literacy and Internet accessibility, variations in the quality of Internet services, and a weak legislative framework in several countries.

Digitalization and AI unite, standardize, and set a single platform for a common perception, creating completely new conditions both at the national and regional levels. This study has also demonstrated that the CA countries have different technical capabilities, such as those concerning the speed and quality of Internet coverage. These factors complicate and slow down the process of creating a unified regional approach to digitalization.

Conclusions

Currently, all CA countries implement strategies aimed at introducing a digital economy and digital government to achieve sustainable economic growth. At the same time, all of the CA countries face the following array of similar problems: weak legislative framework in the field of digital security, weak Internet coverage and low speed, lack of qualified specialists, low level of digital literacy, and lack of cooperation between countries.

This allows a number of key conclusions to be drawn:

1. There are certain difficulties and problems in digitalization and the implementation of AI in the CA region. The most important problem concerns connection speed and Internet quality. In addition, the overall speed of digitalization differs across countries. While digitalization and related programs have been developing for a long time and at a good pace in Kazakhstan, Uzbekistan, and Kyrgyzstan, in Turkmenistan and Tajikistan the process of digitalization is at its early stage.
2. The absence of effective policies addressing the digital gap in CA impedes the uniform development of the IT sector, creating barriers to inclusive economic and social growth.
3. The lack of educational programs promoting digital literacy and cybersecurity poses a threat to building a skilled workforce and fostering responsible technology use.
4. Inadequate investments in digital infrastructure and AI through public-private partnerships hinders technological progress, impeding innovation and economic growth in the CA countries.

Based on the conclusions of this article, the following recommendations for policymakers and legislators are formed:

a. Enact policies to narrow the digital divide nationally and regionally by improving IT infrastructure and ensuring equal access. Develop a regional strategy for digitalization and AI to encourage collaboration among CA countries.
b. Advance digital literacy, cybersecurity, and skills through educational programs.

c. Increase investment in digital infrastructure, including broadband networks and data processing centers.
d. Drive national AI progress through public-private partnerships, propelling digitalization and AI development in CA countries.

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SKAITMENINIMAS IR DIRBTINIS INTELEKTAS VIDURINĖJE AZIJOJE: IŠŠŪKIAI IR POVEIKIS VYRIAUSYBĖMS

Skaitmeninimas ir naujosios technologijos pastaruoju metu yra reikšmingos viso pasaulio vyriausybių darbotvarkėje. Naujųjų technologijų tendencijos ne tik tapo ekonominio vystymosi katalizatoriumi, jos taip pat keičia viešojo sektoriaus veiklą ir viešosios politikos įgyvendinimą. Vykstant technologinėms transformacijoms Centrinės Azijos regiono šalys ieško naujų būdų, kaip prisitaikyti prie šių pokyčių. Šiuo straipsniu siekiama įvertinti tokius bandymus išnagrinėjus penkių Vidurinės Azijos šalių skaitmeninimo politiką. Taikant kokybinius metodus ir ekspertų interviu straipsnyje buvo nustatyti pagrindiniai Centrinės Azijos valstybių skaitmeninimo ir dirbtinio intelekto apribojimai ir galimos plėtros sritys. Manoma, kad pateikus vertingų įžvalgų galima nuodugniau suprasti skaitmeninimo iššūkius, su kuriais susiduria besivystančios šalys. Analizuojant vietos ekspertų nuomones, straipsnyje siekiama pateikti vertingų įžvalgų apie skirtingus šių šalių metodus, taip praturtinti regiono trajektorijos skaitmeninėje eroje supratimą.

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