

Digital Transformation in Central Asia: Opportunities And Risks in a Late Start

Received: 26/05/2025
Revised: 29/07/2025
Accepted: 31/07/2025

This is an open-access article.

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Abstract

This study examines the structural dynamics, social impacts and policy orientations of digitalization in Central Asian countries, which have been involved in the digital transformation process later on a global scale. Through the examples of Kazakhstan, Uzbekistan, and Turkmenistan, themes such as digital infrastructure investments, inequalities in internet access, and digital education practices are examined.

The study questions not only technical development but also how digitalization transforms social relations, family structure and educational practices. Topics such as digital parenting, digital and education, media literacy and access to digital content for disadvantaged groups present the current state of the region's digital transformation. Regional digitalization efforts shaped by the World Bank-supported Digital CASA program are evaluated not only in the context of economic integration but also in the context of social equity and cultural sustainability. In this context, the study reveals that digital technologies function not only as a development tool but also as a transformation dynamic in Central Asia.

Keywords: Digitalization, Digital Transformation, Central Asia, Digital Inclusion.

Cite: Zehir ,B, & Odabaşı, F. (2025). Digital Transformation in Central Asia: Opportunities and Risks in a Late Start. *Digital Security & Media*, 2(1), 3-15

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INTRODUCTION

With digitalization, 21st century skills have started to be shaped by concepts such as digital literacy and new media literacy (Devrani, 2021). This development has brought with it not only the ability of individuals to use technology, but also more comprehensive competencies such as critically evaluating digital content, accessing reliable information, and exhibiting ethical behavior in online environments. Digital literacy is no longer just a technical skill; it also plays a central role in areas such as social participation and cultural interaction. In this context, cross-country differences in access to digital literacy and digital skills have led to inequalities in digital literacy and digital skills.

Central Asian countries have integrated into the digital transformation process relatively late compared to other regions and have tried to carry out this process within various structural constraints and inequalities. Limited internet access, especially in rural and disadvantaged areas, deepens the digital divide and creates significant problems in areas such as equal opportunity in education, access to digital public services and protection of cultural content. On the other hand, digital technologies have a wide range of impacts from family communication to child-rearing practices, from media literacy to the digitization of cultural heritage. This transformation also brings concepts such as digital parenting, children's online safety and digital social memory to the agenda.

This study examines both the infrastructural and cultural dimensions of the digitalization process through the examples of Kazakhstan, Uzbekistan and Turkmenistan. Through regional initiatives carried out within the framework of the World Bank's Digital CASA program, the impact of digitalization on social structures in Central Asia is questioned, and the relationship between digital inequalities and social transformation processes is discussed in the light of the literature. Thus, not only the technical dimension of digitalization policies, but also the impact of these policies on daily life practices are discussed.

The digital strategies recently implemented by Central Asian countries, which have experienced digitalization more slowly and late compared to other countries, stand out as an important issue to be researched within this strategic context. This article aims to examine the digitalization trends, managerial approaches and collaborations in the region through the examples of Kazakhstan, Uzbekistan and Turkmenistan, which have been involved in the

digital transformation process late. The study aims to provide an up-to-date framework on how digital transformation in Central Asia is shaped in a strategic context.

Digitalization Outlook in Central Asia: Infrastructure and Access

The digitalization process in the Central Asian region faces serious infrastructure and access challenges, especially in rural and remote areas, compared to urban centers. This digital divide is fueled not only by economic conditions but also by infrastructural barriers due to geographical challenges (Ali, 2024). This leads to significant restrictions in access to basic services such as education, health, finance, and limits the region's integration into the digital economy. Therefore, in order for Central Asia to fully realize its digitalization potential, it is crucial to develop inclusive and sustainable connectivity solutions in rural areas.

As of January 2020, the number of internet users in Kazakhstan was approximately 14.73 million, with an increase of 637 thousand users between 2019 and 2020, representing a growth of 4.5%. In Uzbekistan, there are 18.34 million internet users and the number of users increased by 1.2 million between 2019 and 2020, growing by 7.1%. In Turkmenistan, the number of internet users was 1.56 million in January 2020 and grew by 12% in 2019-2020, with an increase of 161 thousand users (DataReportal, 2020). These data show that while digital access in the region is growing, there are significant differences between countries.

Poor access to digital in Central Asia leads to falling behind in many opportunities in social life. Many areas such as business life, education, civic participation, etc. are becoming difficult areas to progress with the deficiencies in digital life. While the world is becoming a faster and more practical place with the innovations of digital life, the inequality experienced by societies that cannot benefit from this situation emerges as an important problem. In this sense, Central Asia is still far behind the world in terms of providing digital connectivity and utilizing digital developments. Central Asia lags behind the world average in terms of internet usage rates, indicating that the digital divide is still a significant problem. However, barriers to digital inclusion are not limited to access. In Central Asia, digital access is not only limited to lack of infrastructure, but also the quality and cost of internet services. While internet penetration is relatively high in some countries in the region, low connection speeds limit the effectiveness of digitalization. Central Asian countries lag far behind in global rankings, especially in terms of access to online educational materials or video content (Burunciuc, 2021). Internet connections in Central Asia are both high cost and low quality. Even in Kazakhstan, the country with the highest internet penetration in the region, connection quality is still a major issue. This shows that digital inclusion is directly related not only to access but also to quality of service.

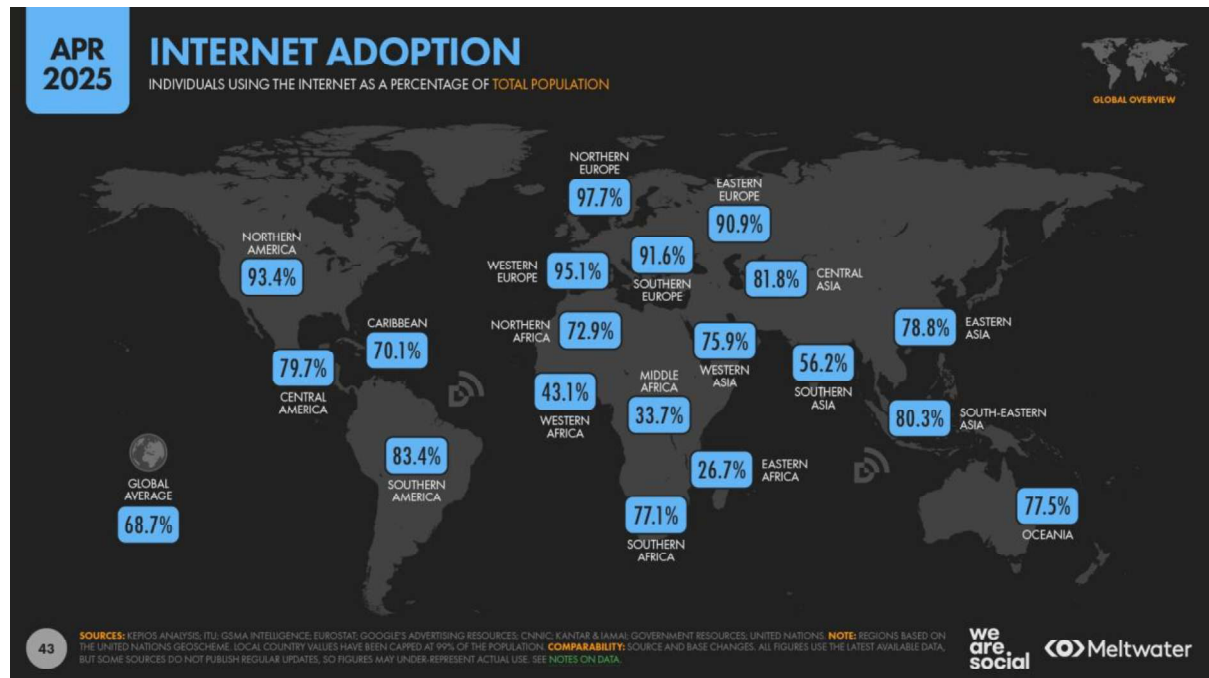
Affordable and widespread internet access plays a key role in the digitalization processes of countries today. Strong internet infrastructure not only facilitates individuals' access to information, but also directly affects states' digital service delivery, economic competitiveness and their position in international indices. This is clearly observed for Central Asian countries in various international digital development indices of 2016.

International Indices (2016) / Countries	Kyrgyzstan (KYR)	Uzbekistan (UZB)	Kazakhstan (KAZ)	Tajikistan (TJK)	Turkmenistan (TKM)	Afghanistan (AFG)
ITU ICT Development /175	113	110	52	-	-	164
UN E-Government Development /193	97	80	33	139	140	171
UN E-Participation /193	67	47	67	149	179	104
WEF Networked Readiness /139	95	-	39	114	-	-
ITU Global Cybersecurity (2014) /29	25	24	23	24	26	20
UNCTAD B2C E-Commerce (2015) /137	109	108	88	-	-	130
WEF	113	-	88	114	-	-
Enabling Trade /136						

Source: World Bank (n.d.). *The example of the Digital CASA regional program*. United Nations ESCAP.

In the ICT Development Index published by the International Telecommunication Union (ITU), Kazakhstan ranked 52nd among 175 countries, while Afghanistan ranked 164th. Similarly, in the UN E-Government Development Index, Kazakhstan ranked 33rd, while Tajikistan, Turkmenistan and Afghanistan ranked 139th, 140th and 171st, revealing a serious digital divide. This difference shows how access to digital government services is decisive on the opportunities that countries offer to their citizens. A similar picture emerges in more technical indicators such as Network Readiness and Cyber Security. Kazakhstan, in particular, leads the region in terms of digital infrastructure and cybersecurity policies. In contrast, Turkmenistan and Afghanistan are represented by missing data in many indices, indicating that digitalization processes in these countries are either far behind or lack sufficient measurement and transparency. E-commerce and digital trade facilitation indicators are lagging behind across the region. Kazakhstan ranks 88th in the UNCTAD B2C E-Commerce Index, while Afghanistan ranks 130th. This indicates that similar regional differences persist in the digitalization of the private sector. In conclusion, it is clear that the internet is not only an individual need but also a critical element for economic growth, public service delivery and international reputation. The Central Asian case clearly demonstrates that countries without affordable and widespread internet access are lagging behind in the global digitalization process, which has a negative impact on long-term development goals.

Looking at internet usage rates, it is seen that the number of internet users worldwide has reached 5.64 billion as of April 2025. This figure corresponds to approximately 68.7% of the global population. In the last year, the number of internet users increased by 144 million people, representing a growth of 2.6%. However, there are still around 2.57 billion people offline (DataReportal, 2025).



Source: We Are Social. (2024)

By 2025, global internet penetration reached 68.7%. In Central Asia, the rate of 81.8% is higher than the global average, but lags behind regions such as Western Europe (95.1%) and Northern Europe (97.7%). This shows that digitalization efforts in the region are gaining momentum, but digital inequalities (especially between rural and urban areas) persist.

Digital Transformation in Central Asia: Opportunities and Challenges

In Central Asian countries, digital transformation is having a significant impact on the region's economic, social and institutional structures, creating both new opportunities and risks. In particular, countries such as Kazakhstan and Uzbekistan aim to strengthen their digital economies by prioritizing investments in artificial intelligence applications and digital infrastructure. For example, Uzbekistan's "2030 Digital Strategy" covers areas such as strengthening digital infrastructure, expanding e-governance systems and developing a national digital technology market. Similarly, the development of multilingual artificial intelligence-supported digital platforms in Kazakhstan attracts attention (Kavut, 2024). These strategic steps demonstrate the potential of digitalization to contribute to economic growth and social development.

According to Gagarina (2024), the field of digital humanities in Central Asia still lags behind Western countries in terms of institutionalization. However, despite the lack of infrastructure, various initiatives to integrate digital methods into humanities research are underway. Studies in areas such as computational linguistics, digital philosophy, digital history and the preservation of cultural heritage through digital tools demonstrate the potential in the region. However, the lack of a common institutional framework for these efforts poses challenges in terms of standardization, sustainability and international cooperation. On the other hand, this situation also presents new opportunities for the development of Central Asia-specific digital

research structures and approaches. These findings suggest that the field of digital humanities is developing in the region but still faces many structural challenges. In this framework, the reflections of the digitalization process in Central Asia on the field of education is an important area of investigation that can be addressed from a digital humanities perspective. The impact of the opportunities and risks of digitalization on educational policies, contents and access opportunities should be carefully evaluated in this context. In addition, the aim of "preserving cultural heritage" emphasized in the research should also be rethought within the framework of the possibilities offered by digital technologies. Inadequacies in the digital infrastructure make it difficult to transfer cultural heritage to the digital environment, which brings with it social risks such as the weakening of social memory and the interruption of cultural continuity.

Family and Digital Challenges in Central Asia

As the effects of digitalization on social structures are becoming increasingly visible, the institution of the family is also affected by this transformation. A study on digital and family (Çeçen, et al. 2023) presents the concept of "Digital Family Contract" developed through interviews with experts, parents and children. Focusing on the issue of using digital technologies correctly, the study reveals how the relationship between parents and children should develop in the context of responsibilities in the digital world. It is clearly seen that family relationships have undergone a change with the development of digital technologies. The continuity of change will continue with the continuity of technology development.

With the digital transformation, family structures and dynamics around the world have been deeply affected, and the transformation of roles within the family has started to take shape around this structure. As reported in Derya Gül Ünlü's (2023) study titled "Transcendental Parenting and Child Raising in the Digital Age", parents today make intensive use of digital

communication tools both to establish a relationship with their children and to improve their parenting practices. The increase and accessibility of digital platforms also strengthens communication between parents. In this sense, parents have an open and accessible position to share their experiences and parenting practices. Facilitating the transfer of knowledge and experience can change and transform parenting practices. Thus, issues such as the position of digital life in the family, its impact on parenting roles, and ensuring digital control of children are important. Parenting and family dynamics in the digital age is also an important issue in Central Asian societies where technology is rapidly spreading; it is necessary to examine this transformation.

This issue is also seen as important in Central Asia, where the issue of the family is an issue that needs to be examined alongside the issue of digital. The fact that digital-related projects in Central Asia are developed within the scope of the "family" issue shows that family and digital are inseparable issues. When an examination is made on the basis of countries in Central Asia, it is seen that digital-related projects are also carried out within the scope of the family issue. This shows that awareness of the importance of family in digital life is increasing and this is a positive development. Since the family, which is at the center of digital life, is in a position to provide digital skills, transfer digital literacy, and control digital use, this issue is of great importance. In sum, family structure and parenting roles in Central Asia today are being transformed by the impact of digital technologies, and parents face both opportunities and new responsibilities. While digital parenting offers significant opportunities to support children's development, it also brings new challenges, such as family privacy, the burden of constant connectivity, and the need to deal with digital risks.

Digitalization in Central Asia: The Cases of Turkmenistan, Uzbekistan and Kazakhstan

The digitalization process in Turkmenistan faces serious structural barriers, especially in the areas of education and parenting, although it is trying to make progress. A digital campaign

launched by UNICEF during the COVID-19 pandemic aimed to encourage parents to spend quality time with their children and to promote activities that support child development through games (UNICEF, 2022). As part of the campaign, parents were invited to document their activities with their children in photos and videos and share them on Instagram. This initiative aims to increase family interaction and ensure that digital tools are used positively for child development. However, the inadequate digital infrastructure in the country and strict state control over digital content limit the effectiveness of such initiatives. Low internet speed and access restrictions make it difficult for both students to access digital educational resources and teachers to access the necessary materials. In addition, the complete ban on access to popular social media platforms such as Facebook, Instagram and WhatsApp can strengthen the reach of digital campaigns by organizations such as UNICEF (AsiaNews, 2023). All these conditions show that despite the potential of the digitalization process in Turkmenistan, it still struggles with serious infrastructural and political obstacles.

Turkmenistan is taking various steps towards digitalization in the field of education, encouraging access to digital materials and platforms for teachers, students and parents. However, the main problems limiting the effectiveness of these initiatives are inadequate internet infrastructure and state control over digital content. Students who want to access digital educational materials spend long periods of time downloading content, which both reduces motivation to learn and interrupts the teaching process. Indeed, it is observed that some teachers give low grades to students who cannot access digital materials, regardless of students' lack of access (AsiaNews, 2023).

The digital campaign launched by UNICEF during COVID-19 encourages parents to spend quality time with their children and positions digital tools as a communication and development tool in this process. However, infrastructure deficiencies and access barriers to social media platforms limit the spread and social impact of such initiatives (UNICEF, 2021).

The "e-Mekdep" digital platform launched in Ashgabat is considered an important initiative that aims to facilitate information sharing among students, teachers and parents (Turkmenportal, 2024). However, in order for this platform to reach a wider user base, the technical infrastructure needs to be strengthened, internet access needs to be expanded, and digital content control needs to be made more flexible.

In conclusion, in order for the digitalization process in Turkmenistan to be sustainable and effective in the fields of education and parenting, it is of great importance to eliminate structural infrastructure deficiencies, remove access barriers and develop holistic policies to increase digital literacy.

Uzbekistan:

Uzbekistan is undertaking significant initiatives to accelerate the digital transformation process. This process is directly linked to the development of internet access and digital infrastructure in particular. The digital divide observed in rural areas of the country leads to inequalities in educational opportunities and hinders young people from realizing their potential. According to 2018 data, only 7% of schools in Uzbekistan have high-speed internet access, which is a significant barrier to access to digital education (Generation Unlimited, 2023). However, projects carried out in cooperation with the government and international actors are seen as promising steps to address these infrastructure gaps.

UNICEF-supported projects aim to increase young people's access to education, especially in rural areas, by expanding internet access and developing digital learning platforms (Generation Unlimited, 2023). These digital transformation efforts are not limited to improving infrastructure, but also include comprehensive strategies to ensure equal opportunities in education. Skills development programs, especially for disadvantaged groups such as girls with disabilities, emphasize the importance of inclusion in education. The country believes that

a generation with digital competencies will make it possible for Uzbekistan to effectively integrate into the global digital economy and take full advantage of its demographic advantages.

Investments in digital security and online education also aim to enable young people to use the Internet safely and effectively, and important steps are being taken in this direction (United Nations Uzbekistan, 2023). Uzbekistan's digitalization initiatives are also strengthening global cooperation mechanisms for the future of education. Joint projects with UNICEF and local educational institutions aim to expand digital education platforms and improve the quality of education. These initiatives not only improve the existing educational infrastructure, but also contribute to creating the conditions for a sustainable digital transformation of education. Thus, Uzbekistan aims to prepare its young population for the future, equipped with the skills required by the digital age, and to become an active actor in the global digital economy.

In addition, Uzbekistan has been carrying out extensive work in cooperation with the International Telecommunication Union (ITU) and local institutions to improve children's digital skills and ensure their online safety (United Nations Uzbekistan, 2023). In this context, ITU's online safety guidelines have been translated into Uzbek and disseminated, and free online training modules on cyber hygiene and information security have been developed for teachers. Workshops organized across the country provide information resources for educators and parents, covering topics such as information security, information technologies and legislation, the impact of digital devices on children's mental health, and children's digital safety and cyber hygiene. These initiatives aim to create a safe digital environment for children and consider mental health and information security from a holistic perspective.

A workshop held in Tashkent on June 12-13, 2024 focused on supporting the integration of digital technologies into the education system. It was attended by more than 50 national and international representatives. This program, in partnership with the Ministry of Preschool and School Education of Uzbekistan, UNICEF Uzbekistan and the UNICEF Global Learning Innovation Center, is part of the second phase of the Learning Pioneers Program, which aims to address the global learning crisis and shape the future of learning with the support of the Government of Finland. The program contributes to the digital transformation process in Uzbekistan by providing innovative approaches to education (UNICEF, 2024).

One of the innovative applications of digital learning in Uzbekistan's education system is the piloting of the Eduten platform by UNICEF in partnership with the Helsinki-based UNICEF Global Learning Innovation Center in 2023 (UNICEF, 2024). This AI-based digital math learning platform has been used in more than 50 countries since 2017. Eduten offers a gamified and personalized learning experience that makes mathematics education more engaging and accessible. The platform empowers students with logical thinking, problem solving and analytical skills, while enabling teachers to individualize lesson plans and track student progress. At the same time, it allows teachers to evaluate student performance on the platform, paving the way for personalized feedback for students. Parents observed an increase in their children's motivation to learn and positively evaluated the platform's potential to improve the quality of education. Alberto Biancoli, UNICEF's Head of Education in Uzbekistan, says that this pilot clearly demonstrates the potential of educational technologies to transform education and achieve better learning outcomes (UNICEF, 2024).

In conclusion, Uzbekistan's digital transformation initiatives can be considered as an important milestone in ensuring equal opportunities in education and developing inclusive education policies. Projects carried out in collaboration with the government and international stakeholders have significant potential to strengthen digital infrastructure and disseminate digital skills. By equipping its young population for the digital age, the country aims to ensure equal opportunities in education and play a more active role in the global digital economy. This is an important strategic step that will contribute to Uzbekistan's long-term development goals.

Kazakhstan:

In recent years, Kazakhstan has attracted attention with comprehensive projects and regulatory initiatives in the areas of digitalization, child safety, family welfare and media freedom. The digitalization process in the country is particularly focused on ensuring the safety of children online, providing effective social support services to families and improving media literacy skills. *The Kazakhstan Kids Online* project, conducted in cooperation with UNICEF and Kazakhstan's Ministry of Education, provides important data to assess the opportunities and risks in children's digital lives (UNICEF Kazakhstan, 2023). On the other hand, the *Digital Family Card* project, jointly launched by the Ministry of Labor and Social Protection and the United Nations Development Program (UNDP), stands out as an innovative digital platform that aims to facilitate families' access to government services (UNDP Kazakhstan, 2024). However, these advances in digitalization and child protection approaches have been subject to criticism due to restrictions on media freedom under the recently adopted new Law on Mass Media (Human Rights Watch, 2024). While this comprehensive transformation process brings about a significant change in Kazakhstan's social dynamics, it also raises policy debates in terms of democratic development and social equality goals.

The Kazakhstan Kids Online study was conducted by UNICEF and the Kazakhstan Ministry of Education to analyze the opportunities and risks associated with children's digital experiences (UNICEF Kazakhstan, 2023). The study reveals important findings on improving children's internet safety skills, raising parental awareness and developing support mechanisms for children in the digital environment. Surveys conducted as part of the study show that children between the ages of 9 and 12 frequently violate age limit rules on social media and gaming platforms, indicating that there are significant failures in the implementation of existing age restrictions. Nassymzhan Ospanova, Chairperson of the Committee for the Protection of Children's Rights of the Ministry of Education of Kazakhstan, emphasized that parents, teachers, IT professionals and media organizations play a critical role in ensuring children's online safety. The findings strongly suggest the need to ensure children's digital safety, as well as to develop comprehensive educational programs for parents and educators.

Another important initiative in Kazakhstan is *the Digital Family Card* project implemented in cooperation with the Ministry of Labor and Social Protection and UNDP (UNDP Kazakhstan, 2024). This digital platform aims to unify families' access to state services such as health, education and social support under a single system, and provides automatic and transparent provision of social assistance to families in need based on economic situation analysis. Developed on the basis of big data and advanced technologies, this system aims to increase the effectiveness of social services for families in different regions and improve the quality of life. The project also developed a unique scoring model and digital service delivery method to more accurately assess the situation of families. The Digital Family Card and the mobile application-based integrated model for social workers offer a comprehensive and holistic approach to social services by increasing inter-agency coordination in the fields of education, health, social protection and public welfare.

Education programs in the field of media literacy in Kazakhstan are also among the noteworthy developments. In particular, the media and information literacy training implemented in Almaty School No. 5 in cooperation with UNESCO includes innovative strategies to develop media literacy skills with the active participation of teachers, students and parents (UNESCO, 2024). These trainings aim to increase students' competencies to access accurate information, critically evaluate media content and act safely in the digital environment. In addition, sessions for parents and teachers are designed to raise awareness of misinformation and disinformation and encourage critical thinking. The program includes contributions from media literacy experts, local resource developers, civil society organizations and technology representatives, ensuring the multidisciplinary nature of the training.

On the other hand, the new Law on Mass Communications adopted in Kazakhstan in the field

of media freedom is causing various controversies. The law includes provisions such as reducing the statute of limitations on charges of disseminating false information from three years to one year and shortening the time for media outlets to respond to inquiries, which could increase control over the media and intensify pressure on journalists. However, the strengthening of legal protections for journalists and the recognition of the "special status of journalist" in the law are considered positive steps (Human Rights Watch, 2024). The new law expands the scope of mass media to include online publications, requiring them to be registered with an authorized state body and have a physical presence on Kazakhstan's territory. In addition, the government has been given the power to identify materials containing "extremist propaganda" and to refuse registration of foreign media outlets, thereby suspending the activities of foreign journalists. These regulations provide a framework for increased state control over the media and aim to block content that contravenes national legislation and vaguely defined "national, cultural and family values". There is serious criticism that this could lead to widespread self-censorship among journalists and restrictions on freedom of expression. Increasing state control over the media, direct or indirect government management of major media outlets, and intensifying criticism of the closure or exile of opposition publications are considered a serious threat to media freedom in Kazakhstan (Human Rights Watch, 2024).

- **Good Practices in Kazakhstan: Institutions - Collaborations - Practices**

- **Internet Society**

The Internet Society works on Internet and digital media regulation, data security and digital rights (Internet Society Kazakhstan, n.d.).

- **Kazakhstan Ministry of Digital Development and KazAID Cooperation**

Kazakhstan's Ministry of Digital Development, Innovation and Aviation Industry, in partnership with UNDP and KazAID, focuses on projects to accelerate digital transformation and increase social inclusion (UNDP Kazakhstan, 2023). By developing innovative solutions, such as the digital family card, this partnership demonstrates how digital technologies can be used to achieve sustainable development goals. These initiatives offer a model of digital transformation that promotes knowledge sharing with other Central Asian countries.

- **United Nations Development Program (UNDP) Kazakhstan**

UNDP supports development work in Kazakhstan using digital solutions and strives to make digital applications accessible to all, especially in line with the principle of "Leave No One Behind". In this context, with projects such as "Digital Family Card", it provides social services for family structure in digital environment (UNDP Kazakhstan, 2024).

Ozim Platform

The Ozim Platform was developed to support families' child development and especially to help parents with children with disabilities. The application, launched by graduates of Nazarbayev University's Faculty of Education, is designed to track children's development, provide early intervention and offer digital educational resources to families. Further developed in cooperation with UNICEF, the platform has gained international recognition thanks to its "Digital Public Good" status and guides parents in raising children (UNICEF, 2024).

Conclusion and Recommendations

Digitalization processes in Central Asian countries are shaped by different institutional capacities, infrastructure capabilities and political visions. While investments in digital infrastructure are increasing and internet penetration rates are rising across the region, there are still serious structural inequalities in digital inclusion. Access problems, especially in rural areas, limit the use of digital services, while the cost of the internet and poor quality of service deepen the digital divide. Moreover, low digital literacy and inadequate digital security policies are among other important factors limiting individuals' participation in digital spaces. In the light of the findings obtained in this context, the following conclusions were reached:

- Digital infrastructure investments are of strategic importance, especially in terms of supporting regional development and ensuring equal access to public services. However, the establishment of hardware and technology infrastructure alone is not sufficient to fully realize the expected benefits of digitalization. The effectiveness of these investments is directly related to increasing the knowledge, skills and digital competencies of individuals and institutions using the infrastructure.
- The digital transformation processes observed especially in Uzbekistan and Kazakhstan, which are among the Central Asian countries, play an important role in adapting education systems to the requirements of this new digital age. Digitalization in education includes multidimensional approaches such as moving learning materials to digital platforms, equipping teachers with digital skills, increasing distance education opportunities and providing students with access to information technologies.
- Digital studies have a significant potential for the preservation of cultural heritage and the reconstruction of social memory in the digital environment.
- Family structure, parenting roles and digital parenting are important topics in terms of social reflections of digital transformation. In this context, family-oriented digital projects should be supported in terms of social solidarity and sustainability of cultural values.

In this framework, the main recommendations for policymakers are as follows:

- 1. Scaling up infrastructure investments:** Public-private partnerships should be supported to address digital access in rural areas, and infrastructure investments should be integrated with regional development plans.
- 2. Increasing digital literacy:** Expand training programs on digital skills in schools and community centers and produce guidance materials for teachers and families.
- 3. Legal regulations on data security and digital rights:** Cyber security strategies should be strengthened and the safety of children and disadvantaged groups in the digital environment should be prioritized.
- 4. Strengthening regional digital cooperation:** Expand initiatives such as Digital CASA and establish multilateral mechanisms for information sharing and technical capacity building.
- 5. Ensuring the integration of digital into education:** While the use of digital tools in education creates an opportunity, access to these devices should be facilitated. This would be an important step to reduce the digital divide, which is an existing problem.

In conclusion, digital transformation is not only a technological advancement for Central Asia, but also a strategic opportunity for rebuilding the social structure, reducing inequalities and strengthening regional integration. Sustainable and inclusive progress in this process will only be possible through multilevel cooperation and people-centered policies.

REFERENCES

- Ali, J. (2024). *Central Asia's transition to a digital economy*. Caspian Alpine Society. <https://caspian-alpine.org/central-asias-transition-to-a-digital-economy/>
- Asianews. (2024, December 13). *Ashgabat: The digital school without Internet*. Asianews. <https://www.asianews.it/news-en/Ashgabat:-the-digital-school-without-Internet-60064.html>
- BBC News. (2023). *Kazakhstan: Oil boom brings prosperity and problems*. <https://www.bbc.com/news/world-asia-pacific-15482614>
- Burunciuc, L. (2021, June 21). *How Central Asia can ensure it doesn't miss out on a digital future*. World Bank Blogs. <https://blogs.worldbank.org/en/europeandcentralasia/how-central-asia-can-ensure-it-doesnt-miss-out-digital-future>
- Çeçen, A. F., Çokluk, N., Bostancı, M., & Atmaca, S. (2023). Aile kurumuna dijital bir yaklaşım: Dijital aile sözleşmesi. *Gaziantep Üniversitesi Sosyal Bilimler Dergisi*, 22(1), 66–84. <https://doi.org/10.21547/iss.1206730>
- DataReportal. (2020). *Digital 2020: Kazakhstan*. <https://datareportal.com/reports/digital-2020-kazakhstan?rq=central%20asia>
- DataReportal. (2020). *Digital 2020: Turkmenistan*. <https://datareportal.com/reports/digital-2020-turkmenistan?rq=central%20asia>
- DataReportal. (2020). *Digital 2020: Uzbekistan*. <https://datareportal.com/reports/digital-2020-uzbekistan?rq=central%20asia>
- DataReportal. (2025, April). *Digital 2025: April Global Statshot Report*. <https://datareportal.com/reports/digital-2025-april-global-statshot>
- Gagarina, D. (2024). Digital History in Central Asia: Initiatives, Regional Specifics and Community. *Л.Н. Гумилев Атындағы Еуразия Ұлттық Университетінің Хабаршысы*, 148(3), 36–55. <https://doi.org/10.32523/2616-7255-2024-148-3-36-55>
- Generation Unlimited. (n.d.). *Connecting Uzbek schools to the internet and students to information: Uzbekistan aims to 'build back better' for youth*. <https://www.generationunlimited.org/stories/connecting-uzbek-schools-internet-and-students-information>
- Human Rights Watch. (2024, June 22). *New mass media law threatens freedom of speech, information in Kazakhstan*. <https://www.hrw.org/news/2024/06/22/new-mass-media-law-threatens-freedom-speech-information-kazakhstan>
- IT Park. (n.d.). *IT Park*. <https://it-park.uz/en/itpark>
- Kavut, S. (2024). Topluların dijital dönüşüm aracı olarak yapay zekâ çalışmaları: Türkiye'nin ve Türk Devletleri Teşkilatının yapay zekâ kullanımı üzerine bir analiz. *Erciyes İletişim Dergisi*, 11(1), 325–344.
- Posos Devrani, A. E. (2021). Gençler için 21. yüzyıl becerileri ve dijitalleşen dünyanın gereklilikleri: Yeni okuryazarlıklar. *Gençlik Araştırmaları Dergisi*, 9(24), 5–24.
- Turkmenportal. (2024, February 22). The practical application of the e-Mekdep digital platform was discussed in Ashgabat. *Turkmenportal*.

<https://turkmenportal.com/en/blog/74341/the-practical-application-of-the-emekdep-digital-platform-was-discussed-in-ashgabat>

UNDP Kazakhstan. (2023, October 13). *UNDP, Kazakhstan's Ministry of Digital Development and KazAID signed statement of intent to advance inclusive digital transformation in Central Asia*. <https://www.undp.org/kazakhstan/news/undp-kazakhstans-ministry-digital-development-and-kazaid-signed-statement-intent-advance-inclusive-digital-transformation-central>

UNDP Kazakhstan. (2024, April 24). *Digital Family Card: A society transformed through technology*<https://www.undp.org/kazakhstan/stories/digital-family-card-society-transformed-through-technology>

UNESCO. (2024, April 11). *Kazakhstan: School for young media and information literacy trainers in action*. <https://www.unesco.org/en/articles/kazakhstan-school-young-media-and-information-literacy-trainers-action>

UNICEF. (n.d.). *Architects of learning explore digital horizons for Uzbek education*. <https://www.unicef.org/digitaleducation/blog/architects-learning-explore-digital-horizons-uzbek-education>

UNICEF. (n.d.). *Digital learning – innovative approach in education system in Uzbekistan: Eduten - digital math learning platform based on artificial intelligence*. <https://www.unicef.org/uzbekistan/en/stories/digital-learning-innovative-approach-education-system-uzbekistan>

UNICEF Kazakhstan. (2024, January 30). *Kazakhstan digital public good start-up Ozim Platform supports childhood upbringing and development*. <https://www.unicef.org/kazakhstan/en/stories/kazakhstan-digital-public-good-start-ozim-platform-supports-childhood-upbringing-and>

UNICEF Kazakhstan. (2023, December 28). *The digital lives of Kazakhstani children: Challenges and opportunities*. <https://www.unicef.org/kazakhstan/en/press-releases/digital-lives-kazakhstani-children-challenges-and-opportunities>

UNICEF. (2024, December 13). *#WithMyChild campaign engages young parents across Turkmenistan*. <https://www.unicef.org/turkmenistan/stories/withmychild-campaign-engages-young-parents-across-turkmenistan>

United Nations Uzbekistan. (n.d.). *Uzbekistan - strengthening digital skills to build a safe cyberspace for children*. <https://uzbekistan.un.org/en/241659-uzbekistan-strengthening-digital-skills-build-safe-cyberspace-children>

Ünlü, D. G. (2023). Aşkın ebeveynlik ve dijital çağda çocuk yetiştirme. *TRT Akademi*, 8(19), 1018–1025. <https://doi.org/10.37679/trta.1368075>

We Are Social. (2024, January 31). *Digital 2024: Social media users pass 5 billion*. <https://wearesocial.com/uk/blog/2024/01/digital-2024-5-billion-social-media-users/>

World Bank. (n.d.). *The example of the Digital CASA regional program*. United Nations ESCAP. <https://www.unescap.org/sites/default/files/The%20example%20of%20the%20Digital%20CASA%20regional%20program%20World%20Bank.pdf>