Academicus Journal of Research
ISSN (E): 3054-3371
Volume 1, Issue 3, March, 2026
Website: https://researchiapress.com

COMPARATIVE ANALYSIS OF THE DIGITALIZATION PROCESS AND GENDER SUSTAINABILITY IN UZBEKISTAN AND OTHER CENTRAL ASIAN COUNTRIES

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Abstract

This article presents a comparative analysis of digitalization processes and gender sustainability in Uzbekistan and other Central Asian countries. It examines how digital transformation influences gender equality, economic independence, and the labor market, while identifying structural barriers that persist despite technological advancement.

Keywords: Digitalization, gender equality, gender sustainability, Central Asia, digital transformation.

Introduction

In the countries of Central Asia, the process of digitalization is rapidly developing and penetrating all spheres of society. The expansion of digital infrastructure, increased access to the Internet, and the implementation of state digitalization policies create opportunities for women to demonstrate their potential using modern technologies. The reforms being carried out in the region have a positive impact on gender equality and contribute to increasing women's digital literacy and economic independence.

In particular, as of 2025, the share of internet users in Uzbekistan was 94.2%, while the share of internet users among women was 93.1%[1]. In Kazakhstan, the

[1] 94.2% of Uzbekistan's population uses the Internet https://stat.uz/en/press-center/news-of-committee/64213-zbekiston-a-olisining-94-2-foizi-internetdan-fojdalanadi-4

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share of women employed in the IT sector has reached 33.6%[2], while in Kyrgyzstan, 54% of those registered on online educational platforms are women[3]. When comparing indicators of digital development, Kazakhstan's institutional development indicator appears quite high. According to the UN E-Government Survey 2024[4], Kazakhstan ranked 24th in the EGDI ranking, and Uzbekistan - 63rd. (Table 1).

E-Government Development Index (EGDI) of Central Asian countries and its structural indicators[5] Table 1

Country	EGDI rank (2024)	EGDI value (2024)	OSI Online services	TII Telecom infrastructure	HCI (Human Capital Index)
Kazakhstan	24	0.9009	0.9390	0.9235	0.8403
Uzbekistan	63	0.7999	0.7648	0.8769	0.7580
Kyrgyzstan	78	0.7316	0.6072	0.8815	0.7061
Tajikistan	123	0.5606	0.4476	0.5810	0.6531
Turkmenistan	145	0.4757	0.2506	0.5151	0.6614

These differences are related not only to the number of platforms but also to the design of services, integration, digital identification, and the stabilization of public-citizen dialogue through digital platforms. In this process, there is a direct influence on gender dynamics. Digital government services reduce 'time and travel costs' for women; specifically, streamlining document workflows and application submissions provides si gnificant relief for those with high household responsibilities.

However, if we do not limit digital infrastructure only to public services, the picture will become clearer. In particular, according to the open data of the GSMA Mobile Connectivity Index[6], digital development in the region is not in the same direction, but is formed on the basis of different models. (Table 2)

[2] Women and men of Kazakhistan 2019-2023 https://stat.gov.kz/upload/iblock/6b4/e2spyxs1nfjyld3ovbpyca056e0ey3cq/C-11-Г%20(англ).pdf
[3] DATAREPORTAL Digital 2026: Kyrgyzstan https://datareportal.com/reports/digital-2026-kyrgyzstan
[4] Un E-government knowledgebase https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/87-Kazakhstan?
[5] Developed by the author (UN DESA — UN E-Government Survey 2024 Technical Appendix (EGDI 2024 dataset jadvali) https://desapublications.un.org/sites/default/files/publications/2024-09/Technical%20Appendix%20%28Print%20version%29%201292024.pdf).
[6] GSMA Mobile Connectivity Index https://www.mobileconnectivityindex.com/assets/excelData/MCI_Data_2024.xlsx

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GSMA Mobile Connectivity Index (MCI) indicators in Central Asian countries[7] Table 2

Country	MCI	Infrastructure	Affordability	Consumer readiness	Content and services
Kazakhstan	74.65	64. 78	80.04	80.68	74.23
Uzbekistan	60.38	72.95	50.24	65.69	55.21
Kyrgyzstan	60.43	61.85	51.96	76.97	53.91
Tajikistan	37.22	52.98	18.83	55.44	34.68
Turkmenistan	-	-	-	-	-

In the case of Kazakhstan, it can be seen that digital systems are supported not only by infrastructure, but also by a culture of real use of services, market maturity, and user readiness. This allows technology to penetrate deeper into everyday social life. In Uzbekistan, however, digital modernization is manifested more through technical expansion and increased coverage, and the next stage of the system, i.e., economic accessibility, diversity of services, and deepening of the culture of use, is still in the process of development.

In the case of Kyrgyzstan, although the population's readiness to adopt digital technologies is significant, the insufficient stability of the market and service ecosystem may slow down the transformation of this potential into a full economic and social result. In Tajikistan, the main limitation is economic accessibility and the vulnerability of the digital services ecosystem. As a result, digital transformation encounters more structural barriers.

Due to the limited availability of openly comparable data on Turkmenistan, a thorough comparison of the country's digital development through regional indices requires a cautious approach. In general, the experience of the region shows that digital development depends not only on the technical infrastructure, but also on the harmonious development of economic access, social training, and the ecosystem of services, and these factors play a decisive role in the equal distribution of digital opportunities in society, including the formation of gender sustainability.

[7] Developed by the author (GSMA Mobile Connectivity Index — *MCI_Data_2024.xlsx* (2014–2023). https://www.mobileconnectivityindex.com/assets/excelData/MCI_Data_2024.xlsx

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Another large area of comprehensive analysis of digital training is the Network Readiness Index. In the 2025 profiles published by the Portulans Institute, Kazakhstan ranked 65th (score 49.06), Uzbekistan - 72nd (score 46.47)[8].
Kyrgyzstan is in 90th place (42.44 points). At the same time, country profiles for Tajikistan and Turkmenistan within the framework of NRI 2025 are not included in the list. This can be seen from the fact that the names of these two countries are not included in the website's "View another country" list. In Central Asia, Kazakhstan is a leader in digital training, showing particularly strong results in Governance and People. This means that institutional governance and digital skills are relatively developed.
While Uzbekistan's technological infrastructure indicators are improving, the real economic impact of human capital and digital services is still in the growth stage. At the same time, the country's rise in the rating is assessed as positive dynamics. Kyrgyzstan lags behind in the overall ranking due to its low level of technology and digital skills, but some indicators of social impact appear relatively better.
In Central Asian societies, the opportunities of women and men are determined more by institutional arrangements, the labor market, family norms, and social mechanisms shaped by the distribution of resources than by the framework of "personal choice." Although there is formal equality in education, opportunities in the economic and political spheres do not start from the same "starting point." Therefore, when explaining the issue of gender equality in the region, it is necessary to look not only at the resulting indicators, but also at the structural conditions that "create" these results. Indices serve as a convenient "measuring window" for such analysis. While they show positive shifts in some areas, they also reveal hidden imbalances in others.
Gender stability can be interpreted as a state expressing how institutionally and socially strongly gender equality is formed in society, that is, how balanced and consistent the results are in such key areas as healthcare, representation, and participation in the labor market. In this context, the UNDP Gender Inequality Index serves as a methodological basis for a comparative analysis of the level of gender sustainability, including measures of reproductive health, empowerment, and the labor market. In the index, Kazakhstan occupies the most favorable position in the region, while Tajikistan showed a relatively close result.

[8] Network Readiness Index https://networkreadinessindex.org/

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Uzbekistan occupies the middle position in the region. For Turkmenistan, the UNDP table does not provide the GII value and rating. (Table 3)

Gender Inequality Index (GII) table for Central Asian countries[9] Table 3

Country	GII value	GII rank	Share of women in parliament %	Labor market participation % (women)	Labor market participation % (men)
Kazakhstan	0.182	50	19.6	63.3	74.6
Uzbekistan	0.291	74	30.0	43.6	72.0
Kyrgyzstan	0.340	83	20.0	45.9	74.7
Tajikistan	0.258	68	26.6	34.4	52.7
Turkmenistan	_	_	21.2	_	_

Comparative analysis of the countries of the region shows that gender equality does not develop along the same line, but represents a different structural picture, formed by the historical experience, economic model, and social norms of each society. While Kazakhstan stands out as a space where gender differences appear softer due to a relatively more open economic and institutional environment, Uzbekistan and Kyrgyzstan, despite the presence of elements of formal equality, still have significant gaps in the process of accessing real opportunities. The experience of Tajikistan demonstrates gender inequality not only at the level of institutions, but also in conditions of limited economic participation itself, which is explained by the narrowing of the space of opportunities. The incompleteness of information on Turkmenistan suggests the presence of certain "invisible layers" in shaping the overall picture of the region.

This comparative picture shows that while gender equality is often positive in formal indicators such as education or political representation, it is limited by complex institutional and cultural barriers at the level of access to the labor market and economic resources. As a result of the predominantly female burden of family care work, the lack of flexible and safe jobs, the high proportion of informal employment, and the gender-based classification of professions, women are often redirected to secondary segments of the economic system. Thus, the values formed in society encode women's labor as an activity that should be more

[9] Developed by the author (UNDP, *Human Development Report 2025*, Statistical Annex https://hdr.undp.org/sites/default/files/2025_HDR/HDR25_Statistical_Annex_GII_Table.pdf)

Academicus Journal of Research
ISSN (E): 3054-3371
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harmonious and flexible with the household, and this circumstance limits their full participation in the market economy.

These processes encourage the understanding of gender inequality not only as an economic or statistical phenomenon, but also as a deep cultural construct associated with the distribution of time, labor, and social roles. That is, the problem is not in the simplified interpretation that women are not working, but in which type of work is valued in society and which activity is accepted as a "natural task." As a result, the ongoing gap between formal equality and real opportunities serves the reproduction of gender roles even in the context of the region's digital and economic modernization.

Although at first glance the indicator seems relatively high in some countries, it should be remembered that in socio-philosophical analysis "digital representation" does not always turn into "content representation." Informal networks within political institutions, recruitment, access to resources, and legitimacy criteria can limit women's real influence on decision-making processes. UN Women's regional materials also note that factors such as youth employment, NEET indicators, and the disproportionate burden of care reduce women's access to social elevators[10].

The UNDP's gender strategy for Europe and Central Asia also considers gender gaps in care work, low representation at the level of political decisions, and STEM work as structural problems[11]. Consequently, the differences shown by the indices are not explained by "personal motivation." They are explained by the fact that the internal norms of the social order and the classification of institutions "to whom what role is suitable" are constantly being reworked.

Political and legal aspects also determine gender dynamics. The Law "On Guarantees of Equal Rights and Opportunities for Women and Men," adopted in Uzbekistan in 2019, strengthens equality as an institution[12]. Also, the 2019 Law on the Protection of Women from Harassment and Violence brings gender safety under legal protection[13]. On the digital policy side, the "Digital Uzbekistan-2030" strategy was approved in 2020, which provides an institutional roadmap for

[10] Gender snapshot dor Europe and Central Asia https://eca.unwomen.org/sites/default/files/2025-04/web_regional_gender_snapshot_eng.pdf
[11] UNDP Gender Equality Strategy for Europe and Central Asia (2024-2025) https://www.undp.org/eurasia/publications/gender-equality-strategy-Eurasia-2024-2025
[12] O‘RQ-562-son “Xotin-qizlar va erkaklar uchun teng huquq hamda imkoniyatlar kafolatlari to‘g‘risida” https://lex.uz/docs/-4494849
[13] O‘RQ-561-son “Xotin-qizlarni tazyiq va zo‘ravonlikdan himoya qilish to‘g‘risida” https://lex.uz/docs/-4494709

Academicus Journal of Research
ISSN (E): 3054-3371
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digital transformation[14]. In Kazakhstan, the Concept of Family and Gender Policy until 2030 as an official document links gender equality to a long-term goal[15]. In Kyrgyzstan, within the framework of the "Digital Kyrgyzstan 2019-2023" concept, institutions and a roadmap have been formed[16]. Although Turkmenistan has a 2019-2025 digital economy concept, the database of gender-disaggregated indicators, which is open and regularly updated, is limited[17]. These legal and fundamental differences indicate that gender issues are on the agenda in both countries, but the real effectiveness of gender equality policy is also different due to the different level of digital government and digital market readiness.

The Network Readiness Index (NRI), published by the Portulans Institute, reveals how opportunities are being redistributed against the backdrop of technological modernization in the region, focusing on technology, human capital, governance, and impact (see Table 4).

NRI-2025 Country Profiles (Central Asia)[18] Table 4

Country	Value	Rank	Technology	People	Governance	Impact
Kazakhstan	49.06	65	38.93	41.08	61.40	54.81
Uzbekistan	46.47	72	40.73	37.83	57.33	50.01
Kyrgyzstan	42.44	90	31.37	32.22	50.98	55.19

Note: *The NRI-2025 website does not have a separate list of country profile databases for* ***Tajikistan*** *and* ***Turkmenistan,*** *therefore it was not included in the table.*

The above figures reveal that while the general historical and cultural context within the region is close, the technological infrastructure, the reliability of institutions, and the mechanisms for "connecting" human capital to technology work differently. For example, the rise in Uzbekistan's NRI ranking from 81st place in 2024 to 72nd place in 2025 indicates the pace of modernization, but the lower indicator in the "People" direction compared to Kazakhstan indicates that

[14] PF-6079-son "Raqamli O'zbekiston — 2030" strategiyasini tasdiqlash va uni samarali amalga oshirish chora-tadbirlari to'g'risida" https://lex.uz/en/docs/-5030957
[15] On approval of the Concept of family and gender policies in the Republic of Kazakhstan until 2030 https://adilet.zan.kz/eng/docs/U1600000384
[16] The concept of digital transformation "digital Kyrgyzstan " - 2019-2023 https://adam.kg/media/uploads/2022/04/15/sanarip_kyrgyzstan_koncepciya.pdf
[17] Concept of Digital Economy Development in Turkmenistan for 2019-2025 https://dig.watch/resource/concept-of-digital-economy-development-in-turkmenistan-for-2019-2025
[18] Muallif ishlanmasi (NRI-2025 country profiles (official) https://networkreadinessindex.org)

Academicus Journal of Research
ISSN (E): 3054-3371
Volume 1, Issue 3, March, 2026
Website: https://researchiapress.com

the channels for connecting human potential and skills to the market are still not sufficiently "open." This clearly illustrates the issue of the institutional bridge between "the availability of technology" and "the ability to benefit from technology." That is, until rules, trust, security, educational skills, and labor market flexibility function as a single system, the results of modernization will require further study. For comparative analysis, the indicator of internet access and migration in the region is important. As of 2024, the share of internet users was 92.9% in Kazakhstan, 89.0% in Uzbekistan, 88.5% in the Kyrgyz Republic, 56.8% in Tajikistan, and 34.9% in Turkmenistan[19]. Regarding migration, Tajikistan has indicators of 47.9% of GDP in 2024, the Kyrgyz Republic - 17.7%, Uzbekistan - 14.4%, and Kazakhstan - 0.1%[20].

Based on this, while remote work in Kazakhstan works more as a professional modernization and expansion of the services market, in Uzbekistan and the Kyrgyz Republic it can be an additional support for income diversification against the backdrop of migration. In Tajikistan, it is theoretically the most necessary safety cushion, but in practice, due to the restriction of digital access, it becomes a more selective option. In Turkmenistan, due to low digital access, remote employment is difficult to reach the level of a mass stabilizing institution.

In the first mechanism, the stabilization of the family budget through a woman's remote income has different impacts in the region. Since the share of migration in Kazakhstan is very low, remote income makes families more flexible, mainly, to fluctuations in the domestic market. In Uzbekistan and the Kyrgyz Republic, however, due to the significant share of migration, remote income is more likely to reduce "dependence on one source" and play the role of an additional guarantee in family planning. The high migration rate in Tajikistan renders remote work a vital strategic alternative, as it can reduce risks associated with the geography of migration. However, it is here that the problem of income instability becomes

[19] Datareportal. (Kemp, S. (2025, March 3). *Digital 2025: Kazakhstan*. DataReportal – Global Digital Insights. https://datareportal.com/reports/digital-2025-kazakhstan Kemp, S. (2025, March 3). *Digital 2025: Uzbekistan*. DataReportal – Global Digital Insights. https://datareportal.com/reports/digital-2025-uzbekistan Kemp, S. (2025, March 3). *Digital 2025: Kyrgyzstan*. DataReportal – Global Digital Insights. https://datareportal.com/reports/digital-2025-kyrgyzstan Kemp, S. (2025, March 3). *Digital 2025: Tajikistan*. DataReportal – Global Digital Insights. https://datareportal.com/reports/digital-2025-tajikistan
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[20] World Bank. (n.d.). *Data for Kazakhstan, Kyrgyz Republic, Uzbekistan, Tajikistan* (Indicator: *Personal remittances, received (% of GDP)*; most recent value: 2024). World Bank Open Data (World Development Indicators). Retrieved February 21, 2026, from https://data.worldbank.org/?locations=KZ-KG-UZ-TJ

Academicus Journal of Research
ISSN (E): 3054-3371
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more acute. In the operation of the platform, the order is variable, social protection mechanisms are often weak, and this makes it difficult to plan family "long-term goals."

The second mechanism, flexibility, appears as "family comfort," but from a socio-philosophical point of view, it often means "the dissolution of the boundaries of labor and home." The OECD's analyses of teleworking suggest that remote work can help women avoid leaving employment altogether, while also increasing the burden in places where existing care and home-based work inequalities are strong[21]. The ILO's 2024 global assessment showed that this issue is not a "personal choice," but a structural barrier. According to the report, 708 million women are excluded from the labor market precisely because of unpaid care obligations. This process manifests itself differently in the region. In Kazakhstan, high-digital access can spread remote work within more professional standards. In Uzbekistan and the Kyrgyz Republic, remote work is often legitimized as "earning income without leaving home," which reduces conflict in a short time.

The third mechanism - the easing of territorial restrictions - changes the social meaning of "space" in Central Asia. Transportation and time costs will be reduced, and remote areas will be able to connect to global order streams. This mechanism works relatively faster in Kazakhstan, Uzbekistan, and the Kyrgyz Republic, where internet access is high. But it is in this process that a new discipline of labor arises. In the platform economy, evaluation, rating, continuous monitoring, and algorithmic management reinforce "invisible management," bringing work stress into the home.

The fourth and fifth mechanisms - skills, growth of social capital, and strengthening of the role of women - are the most "transformative" layer in the region. Due to the high level of digital inclusion in Kazakhstan, remote employment is likely to bring women into relatively more stable segments. This strengthens the family's motivation to invest in future plans, education, and healthcare. In Uzbekistan and the Kyrgyz Republic, the strengthening of the agency often leads to a re-discussion of "in-house resource allocation." A woman's income can balance the decision center within the family, but this change also causes control, doubt, and conflicts of the "who controls whom" type in some families. In Tajikistan, remote income can actually rebuild the economic

[21] OECD Teleworking through the gender looking glass https://www.oecd.org/en/publications/teleworking-through-the-gender-looking-glass_8aff1a74-en.html

Academicus Journal of Research
ISSN (E): 3054-3371
Volume 1, Issue 3, March, 2026
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architecture against the backdrop of migration dependence, but if this opportunity becomes an "elite corridor" in conditions of limited digital access, the issue of social justice and inter-family equality will become acute.

The most critical point of the risk layer is the "continuous" penetration of violence and online harassment into family life. UN Women noted that technology-mediated violence can act as a mechanism for intimidating, silencing, and pushing women out of the social sphere, the consequences of which are not limited to online, but also affect the sense of security in real life[22]. In remote work, this risk does not become a "professional risk." It is confined to the home space and can undermine the moral and psychological foundation of family stability. Therefore, transforming remote employment into a family-strengthening institution is not just a matter of the internet or jobs, but a matter of security, legal protection, and regulatory balance.

In conclusion, the "comparative picture" in Central Asia shows that remote work in Kazakhstan affects family stability more along the path of professionalization and the service economy. In Uzbekistan and the Kyrgyz Republic, it can not only mitigate risks against the backdrop of income diversification and migration, but also exacerbate the tensions of "two shifts" when home-based labor inequality is high. In Tajikistan, it may be the most economically necessary support, but due to restrictions on digital access, it becomes selective. In Turkmenistan, low digital access makes it difficult to bring remote employment to the level of a mass institution. In socio-philosophical terms, remote work brings families closer to the market, but stability comes not from the market itself, but through a fair restructuring of the care economy, strengthening decent labor standards, and digital security.

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