

Country Report

Digital governance in Mongolia and Taiwan: A gender perspective

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Abstract. The objective of this country report is to apply a gender lens to examine the development of digital governance in two democratic countries in the Asia-Pacific: Mongolia and Taiwan. By studying various contextual factors and presenting interpretations associated with gender and the process of digital transformation in these two countries, this research underscores the gender-based differences in ICT usage based on the available data from governmental and other official sources. The paper concludes with possible e-government practices that can help mitigate digital gender divide and transition to gender-sensitive, evidence-based policymaking that serves both genders.

Keywords: Digital governance, gender digital divide, evidence-based policymaking

1. Introduction

Gender is an essential aspect of digital government development and has increasingly attracted more and more attention from scholars and public administrators. While some progress has been made to close the gender in the last three decades, recent studies still indicate that gender parity has not been achieved in access to the Internet (Hargittai, 2010; Mariscal et al., 2019), device ownership (Mariscal et al., 2019), and learning about computers (Cooper, 2006). Moreover, this phenomenon is not restricted to a specific country or region but occurs worldwide (e.g., Abu-Shanab & Al-Jamal, 2015; Brännström, 2012; Choi & Park, 2013; Gray et al., 2017; Mariscal et al., 2019). Since nearly every aspect of people's lives has been affected by the rapid advancement and application of information and communication technology (ICT), sufficient access to ICT and digital skills are paramount for both genders to ensure equal opportunities in receiving government services (Martin & Goggin, 2016) and other resources such as employment, healthcare, education, etc. (Mariscal et al., 2019). Given the circumstances, researchers and practitioners have been calling for greater awareness of the gender digital divide and practical solutions to enhance gender inclusiveness (Martin & Goggin, 2016; Nesti, 2019; Open Government Partnership, 2019).

This comparative country report contributes to the literature by highlighting the gender-based differences in ICT usage and examining the e-government practices that can help mitigate digital gender

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inequality in two democratic countries in the Asia-Pacific: Mongolia and Taiwan. Mongolia, a landlocked and world's most sparsely populated state, is considered a developing country and experiences many challenges that are common to the rising nations. On the other hand, Taiwan is a dense-populated island nation recognized as a developed, high-income economy. The two nations with contrasting geographical and economic conditions serve as excellent case studies on how the digital gender divide occurs and can be addressed in different contextual settings. This report intends to tackle the following two questions in the aforementioned two nations: (1) what are the gender-based similarities and dissimilarities in using ICT? and (2) how can digital government initiatives address the digital gender gap?

This study utilizes, *inter alia*, multiple data sources, including government documents, international rankings and reports, and a national survey to answer these questions. The article proceeds as follows: Sections 2 and 3 analyze and present the use of ICT by women and men in Mongolia and Taiwan, respectively, across four significant facets – infrastructure, digital literacy and skill, usage patterns, and finally, e-government services and civic participation. Drawing on the patterns discovered in the two countries, Section 4 critically assesses Mongolia's and Taiwan's e-government practices and proposes potential strategies to improve digital gender inequality. The concluding part (Section 5) summarizes the main findings of the article.

2. Mongolia

2.1. Infrastructure

In terms of ICT infrastructure, Mongolia has been continuously trending upwards across various core ICT indicators, as reported in Table 1. Nonetheless, there is still room for improvement concerning a 'stationary' Internet usage, as suggested by slower growth in the number of fixed-broadband subscriptions and computer ownership rates. At the same time, Mongolia could be considered as a case study for leapfrogging to mobile solutions given the robust mobile cellular infrastructure – as indicated by the 2G/3G uptake and network coverage statistics – that serves almost the whole population transcending the potential divides that otherwise a sparse population yet urbanized at 68.45% can engender (The World Bank, n.d.-c). Progress still can be made in 4G coverage, but the demand is viable with the number of users exceeding half of the population.

ITU reports that the percentage of individuals owning a mobile phone in Mongolia was 94% between 2017–2019, which places the country in the group of thirty economies with ownership above the 90% threshold (International Telecommunication Union, 2020). Further, as the metric for cellular subscriptions indicates, an individual can have more than one service contract and, almost surely, with a mobile broadband package. For handsets, smartphone ownership is high and was last reported at 3.3 million in 2018, which exceeded the official population of 3,238,479 at that time. The latest available statistics inform that Android devices dominated the market with 2,174,853 users, followed by the iOS with 646,365 users and other OS at 470,023 in 2018 (Communications Regulatory Commission of Mongolia, n.d.).

Since 2018, UN E-Government Surveys adduce bandwidth and speed as potential regressors of a digital divide. Concerning the former, international bandwidth in Mongolia has steadily expanded over the years but remains a fraction of the bordering countries. For the latter, mobile and fixed broadband download speeds in Mongolia hover at 16.13 mbps for 120th place out of 176 and at 41.74 mbps for 82nd rank out of 176, respectively (Ookla, LLC, 2020). Moreover, Mongolia met the affordability target – set by the Broadband Commission for Sustainable Development in developing countries – that entry-level

Table 1
Core ICT indicators

ICT indicator	Source	2014	2015	2016	2017	2018	2019	% δ 2014–19
Permanent internet users (in 1000s)	NSO	1,862.7	2,430	2,872.7	3,587.9	4,295.4	5,450.6	192.62%
Internet users, total (% of population)	ITU [†]	19.9	22.5	22.3	23.7	47.13	51.08	156.68%
Fixed broadband subscr. (per 100)	ITU	6.71	6.94	7.40	9.16	9.66	9.84	46.65%
Active mobile broadband subscr. (per 100)	ITU	56.47	74.11	79.52	79.79	83.72	98.12	73.76%
Mobile-cellular subscr. (per 100)	ITU	102.96	102.33	110.18	124.81	133.18	137.01	33.07%
3G users (in 1000s)	NSO	1,677	2,222	2,430.3	2,625.7	2,439.4	3,190.6	90.26%
4G users (in 1000s)	NSO	N/A	N/A	216.4	677.13	1,329.3	1,956.8	N/A
Computers (per 1000)	NSO	182	196	197	199	202	208	14.29%
Smartphone ownership (in 1000s)	CRC	1,776	1,927	2,019 [‡]	2,439	3,302	N/A	85.92%
International bandwidth (in Mbit/s)	ITU	10,000	15,000	15,500	16,540	20,675	63,042	530.42%
Average fixed broadband download speed (in Kbps)	EIU	N/A	N/A	N/A	20,134	14,207	21,230	N/A
Average mobile download speed (in Kbps)	EIU	N/A	N/A	N/A	3,336	12,144	15,974	N/A
Network coverage – min. 2G (% of pop)	EIU	N/A	N/A	N/A	99	99	99	N/A
Network coverage – min. 3G (% of pop)	EIU	N/A	N/A	N/A	95	95	95	N/A
Network coverage – min. 4G (% of pop)	EIU	N/A	N/A	N/A	6.9	6.9	21	N/A
Fixed-broadband basket (5 GB) [§] as % of GNI per capita	ITU	2.00	1.85	2.07	2.14	1.94	2.16	8%
Price of data-only mobile broadband (1.5 GB)** as % of GNI per capita	ITU	1.85	1.42	1.45	1.78	2.24	2.24	21.08%

[†]The source also references estimates from the National Statistics Office of Mongolia (NSO). [‡]This metric is for the first half of 2016. [§]This fixed broadband basket was 1GB before 2018. ^{**}This mobile broadband basket was 1GB before 2018.

broadband services should correspond to less than 2% of monthly Gross National Income (GNI) per capita between 2014–2017 but has slightly exceeded this ceiling in recent years for mobile broadband; fixed broadband prices, on the other hand, stayed relatively affordable throughout the years.

2.2. Gender-disaggregated ICT indicators

Similar to most of the developing countries, Mongolia lacks gender-disaggregated ICT data, but efforts to mitigate this shortcoming are underway. The available information and early findings in this specific area echo gender equality as per Table 2. ITU reports that there were slightly more female Internet users than males in 2018 and asserts that the country recorded gender parity in terms of mobile phone ownership in 2017–2019 per the score between 0.98 and 1.02 on the corresponding measure (International Telecommunication Union, 2020). In its Mobile Connectivity Index, GSMA emphasizes that Mongolia has maintained high scores on its Gender Equality dimension throughout the years, consisting of six various indicators with two ICT metrics that determine the gender gap in mobile phone ownership and gender gap ratio in social media use. Therefore, as a low-middle income country (The World Bank, n.d.-b), Mongolia exceeds expectations and is an exception to the premise that women in low and middle-income nations are 20% less likely than men to own a smartphone (The GSM Association, 2020).

The Inclusive Internet Index (3i), commissioned by Facebook and conducted by The Economist Intelligence Unit, confirms the gender parity in mobile phone access but suggests a “reverse” gender gap in Internet access, meaning that women are more connected than men (The Economist Intelligence Unit, 2020). ITU data on female Internet users as a percentage of the population in 2018 also substantiates this unusual gender gap.

2.2.1. ICT skills and usage patterns

UN Sustainable Development Goal 4 for inclusive and equitable education aims to increase the proportion of youth and adults with information and communications technology skills under its target

Table 2
Gender-disaggregated ICT indicators

ICT indicator	Source	2014	2015	2016	2017	2018	2019
Internet users, female (% of population)	ITU	N/A	N/A	N/A	N/A	51.1	N/A
Gender parity score for mobile phone ownership	ITU	N/A	N/A	N/A		0.98–1.02	
Gender equality	GSMA	90.25	93.44	93.29	93.21	93.69	93.7
Gender gap in mobile phone ownership	GSMA	100	100	100	100	100	100
Gender gap in social media use	GSMA	100	100	100	100	100	100
Female members of collegial ICT regulators	ITU	N/A	N/A	1	1	1	1
Gender gap in Internet access (% difference)	EIU	N/A	N/A	N/A	N/A	-4.7	-6.1
Gender gap in mobile phone access (% difference)	EIU	N/A	N/A	N/A	N/A	-1.0	0.0

indicator 4.4.1. In this regard, metrics designed to assess ICT skills continue to be mainstreamed to explain the current state of socio-economic development and predict future growth for a given country. ITU, for instance, considers lack of ICT skills as a barrier to effective Internet use in the context of measuring digital development. From 2014 and onwards, UN E-Government Surveys reference the ICT skill gap as one factor contributing to the digital divide. In 2017, The World Economic Forum introduced an index component entitled “digital skills among active population” to its Global Competitiveness Index as one of the metrics to assess ICT skills of the current workforce as a proxy for the aptitude of the human capital (The World Economic Forum, 2018). According to the indexes mentioned above, Mongolia is currently underperforming.

Between 2017–2019, the percentage of individuals in Mongolia with basic, standard, and advanced ICT skills constituted 13%, 10%, and 3%, respectively (International Telecommunication Union, 2020). Across all these skill levels, Mongolia ranked in the bottom 0–20% group and did not record any improvement in this cluster ranking since 2014–2018 (International Telecommunication Union, 2019). In terms of the “digital skills among the population,” Mongolia approximately averaged 3.7 out of 7 points and ranked below the regional median of 4.6 for East Asia and Pacific and the World median of 4.2 in 2017–2019 (The World Bank, n.d.-a). These marginal scores call for intervention and also highlight the need for more in-depth data collection.

The dearth of detailed gender-disaggregated data has been an enduring challenge in Mongolia, and it persists vis-à-vis ICT usage. In this light, it is challenging to draw inferences in relation to the extent of the current digital divide between the genders, age groups, urban and rural residents. Nonetheless, several Big Data channels can be useful in providing a glimpse into the state of digital usage parity. In countries with limited gender-disaggregated statistics, scholars have demonstrated the feasibility of using Facebook data for real-time tracking of digital gender gaps (Fatehkia et al., 2018). Alexa, Amazon’s analytical company, reports Google.com as the top site in Mongolia, with YouTube coming in third place whereas domestic news portals were a runner-up and held the rest of the top ten spots; Facebook.com comes in twelfth but with second-highest daily time spent on a non-Mongolian website after Google.com (Amazon.com, 2021).

As reported by domestic (Davkhardavaa, 2018) and international (Internet World Stats, 2021; Kemp, 2020) sources, the number of Facebook users in Mongolia has reached 2.2 million or approximately 67% of the population, which puts the country on the list of top ten nations in Asia in terms of Facebook penetration rate. Per Facebook Audience Insights for Mongolia, women access the platform more (53%) than men (47%). The edge is achieved by a higher usage among females over males in age groups above 45 years old while remaining generally equal for the younger cohorts; this constitutes a unique intragenerational and intergenerational dynamic that favors women. The social media usage patterns among the youth in Mongolia, a country with a median age of 29.8 years, also mostly hints at a

Table 3
E-participation context

Indicator	Source	2014	2015	2016	2017	2018	2019	2020
E-government development index	UN	0.5581	N/A	0.5194	N/A	0.5824	N/A	0.6497
E-participation index	UN	0.6863	N/A	0.7119	N/A	0.7360	N/A	0.6071
Online service index	UN	0.6142	N/A	0.5194	N/A	0.5972	N/A	0.5294
Trust in online privacy (in %)	EIU	N/A	N/A	N/A	N/A	16.0	32.1	30
Trust in government websites and apps (in %)	EIU	N/A	N/A	N/A	N/A	64	45.3	42
Trust in non-government websites and apps (in %)	EIU	N/A	N/A	N/A	N/A	18.0	24.5	22

“reverse” gender gap, but it is nuanced. According to the 2019 survey, 90.9% of university students have smartphones, with half of them (51.7%) accessing the Internet through a mobile network (Communications Regulatory Commission of Mongolia & National University of Mongolia, 2019). In respect to the social media, females have a slight edge over men in using YouTube, Instagram, and other platforms except for Facebook, where men have a minor advantage.

EQUALS, a collaboration between ITU and UN Women launched in 2014 and tasked with reversing the increasing digital gender divide, presents some ancillary metrics concerning Mongolia. In particular, the inaugural report of the EQUALS draws on the Global Findex Database 2017 published by the World Bank and asserts that Mongolia has higher than 85% female penetration for digital payments – ahead of the curve for the region; in other words, more women than men made or received electronic payments (*Taking Stock: Data and Evidence on Gender Equality in Digital Access, Skills, and Leadership*, 2019). Regarding ownership of a bank account, the gender gap has also been reversed in Mongolia and is measured at –4% between men and women (Demirgüç-Kunt et al., 2018). These indicators are comparatively striking and signal digital competencies among Mongolian women that could help them better shape opportunities and outcomes.

2.3. E-government services and civic participation

Due to the lack of in-depth gender-disaggregated data in relation to e-governance and civic participation, several general inferences will be drawn based on the available information. In the context of digital civic participation, Mongolia’s performance has been mixed, as illustrated in Table 3. According to the UN E-Participation Index, a qualitative metric designed to evaluate civic engagement and open, participatory governance through ICTs, Mongolia has slipped from 30th rank in the world in 2014 with a value of 0.6863 to 87th overall with a value of 0.6071 in 2020 (United Nations, n.d.). Comparatively, this decline of –57 spots represents the sharpest decrease in e-participation index ranking among 31 landlocked countries and the second-highest drop among the group of lower-middle-income states and only behind Sudan (–58). Between 2014–2020, these country scores have been above the world and regional average except for 2020 when Mongolia found itself ahead of the global average but behind the regional mean. As to the Online Service Index, a subcomponent of the E-Government Development Index that evaluates the quality of online public services, Mongolia has also fallen from its position of being significantly ahead of the world and regional average in 2014 to finding itself behind both of these thresholds in 2020.

The Economist Intelligence Unit reports that the trust in government websites and apps remains low in Mongolia but is currently higher than in non-government providers. Indeed, between 2018–2020, confidence in government portals and apps has declined by 34.38%, from 64% to 42%. On the other hand, non-government websites are less trusted despite a slight improvement in 2019. Further, only 30% have trust in online privacy, which puts Mongolia among the group of countries with the lowest score on this metric. Together, these factors signal disfranchisement among the population with government digital outputs, which can undoubtedly affect e-participation.

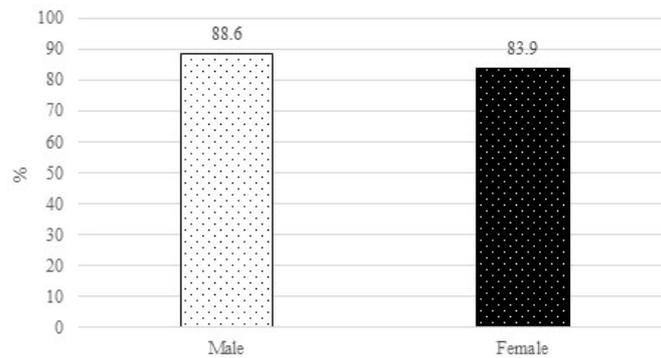


Fig. 1. Personal internet access rate.

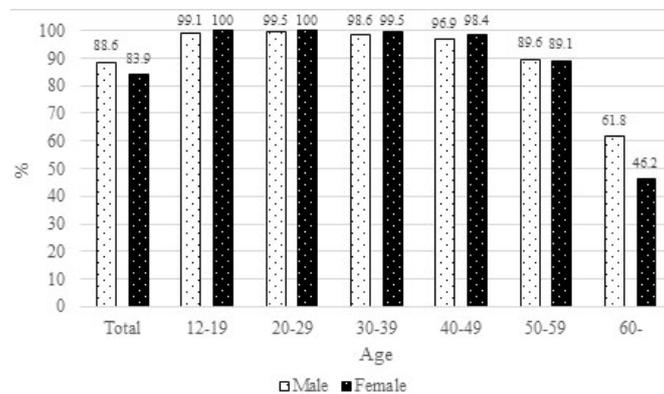


Fig. 2. Personal internet access rate by age.

3. Taiwan

The Taiwanese government has been conducting surveys on digital divides and opportunities every year since 2004 to develop national digital development strategies. The country report utilizes *the 2019 Individual/Household Digital Opportunity Survey in Taiwan*, implemented and published by the National Development Council (National Development Council, 2020) to compare men's and women's responses. The survey targets Taiwanese nationals aged 12 and above in the average household and was conducted from July 2, 2019, to August 30, 2019. The effective sample size is 13,015, and the survey is nationally representative after weighting. Below presents the analysis results.

3.1. Infrastructure

In terms of access to the Internet and mobile devices, as Fig. 1 demonstrates, 88.6 percent of males have access to the Internet – greater than the female population (83.9%) by 5 percent. The gap is narrower than the worldwide situation, where the proportion of all men using the Internet is 58%, whereas 48% for all women, revealing a 10-percent gender gap (International Telecommunications Union, 2019). Nonetheless, the gap does not present equivalently in each age cohort. Figure 2 indicates that the Internet access rate is similar between men and women from 12 until 59; however, there is a significant difference within the elderly population. Among the people aged 60 and above, men's Internet access rate is 61.8%, and

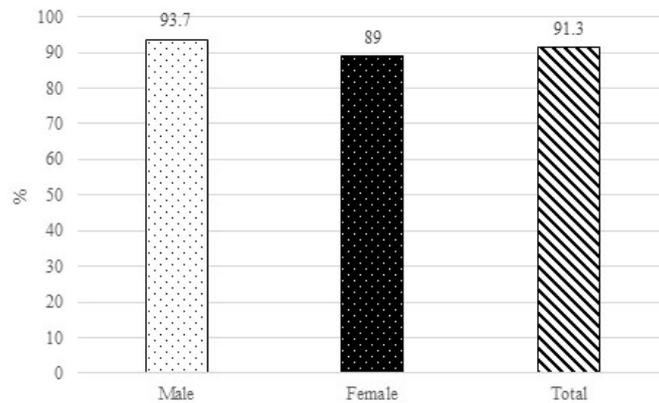


Fig. 3. Cell phone usage rate (in the past three months).

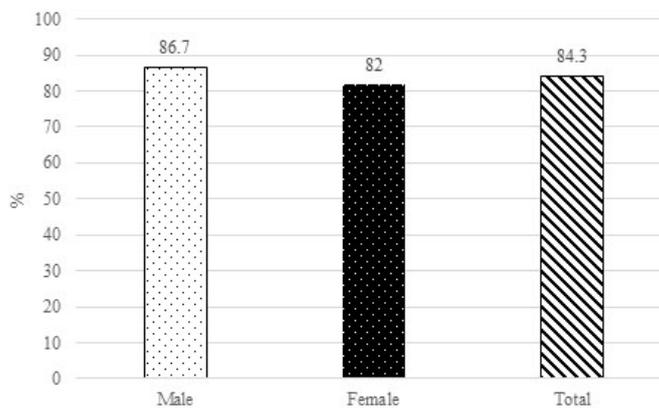


Fig. 4. Personal mobile internet access rate.

women's is 46.2%. Consequently, it is evident that the national gender discrepancy in personal Internet access primarily results from the gap existing among the elderly. In addition to internet access, the gender difference appears in cell phone usage in the past three months and mobile internet (Figs 3 and 4). In both cases, women's rate is lower than men's by 4.7 percent. These distributions illustrate that although internet access and cell phones are prevalent in the country, there still are some noteworthy gaps between men and women that originate from the divide among the elderly population.

3.2. Digital literacy and skills

Women and men also differ in digital literacy and skills. Figures 5 and 6 present the respondents' awareness of network access rights and digital footprints, respectively. The network access rights awareness is evaluated by asking the respondents whether they are clear that the downloaded software can access their personal information when using a computer or mobile phone. The awareness of digital footprints is measured by inquiring the extent to which they understand that others can record and analyze their online activities and publicly available information. Both plots illustrate that men are more aware than women, especially among the category of "very clear." The gender gap among this category is 6 percent for network access and 8.6 percent for digital footprints. In terms of digital skills, Fig. 7. shows

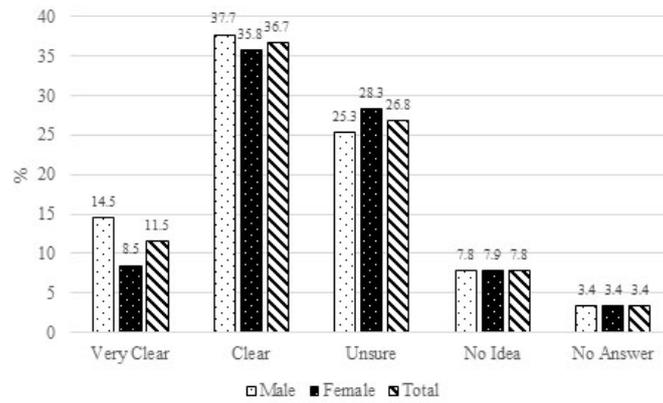


Fig. 5. Internet users' network access awareness.

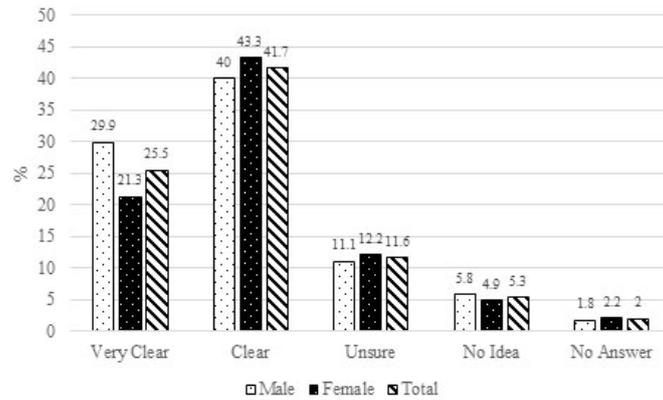


Fig. 6. Internet users' digital footprints awareness.

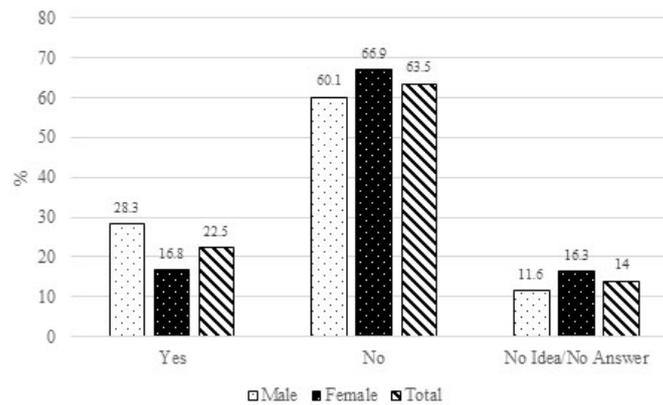


Fig. 7. Programming ability.

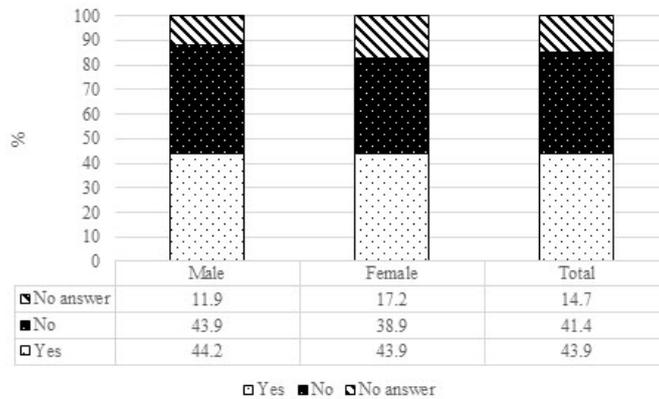


Fig. 8. Learning new skills online (in the past year).

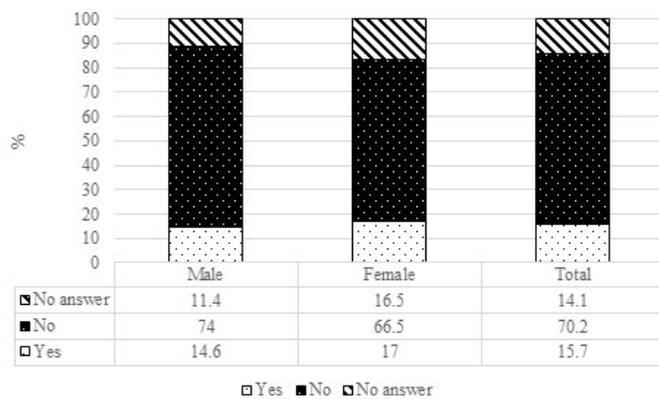


Fig. 9. Attending online courses (in the past year).

that 28.3 percent of the male respondents have learned programming, which is 11.5 higher than the female respondents (16.8%). The evidence here suggests evident gender discrepancies in digital literacy and skills.

3.3. Usage patterns

In terms of Internet activities, women and men have a few similarities and differences. As for learning activities, there is no significant discrepancy in learning new skills online (Fig. 8). However, as shown in Fig. 9, the percentage for women who participated in online courses (17%) is slightly higher than that for men (14.6%). Regarding social activities, Fig. 10 presents that 84.6 percent of the male respondents have reported engaging in instant messaging and social networking during the past year, which is subtly higher than the female respondents (80.7%). In addition to learning and social activities, the internet is an essential tool for economic purposes. Figure 11 demonstrates that approximately 53 percent of both men and women have utilized the Internet to search online reviews and compare prices for the products of interest. Nevertheless, interestingly, Fig. 12 indicates that women have more online shopping experiences in the past year (58.3%), approximately 6% higher than men (52.4%). A similar pattern can also be seen in health improvement activities. Figure 13 depicts that 46.9% of women responded using the internet to

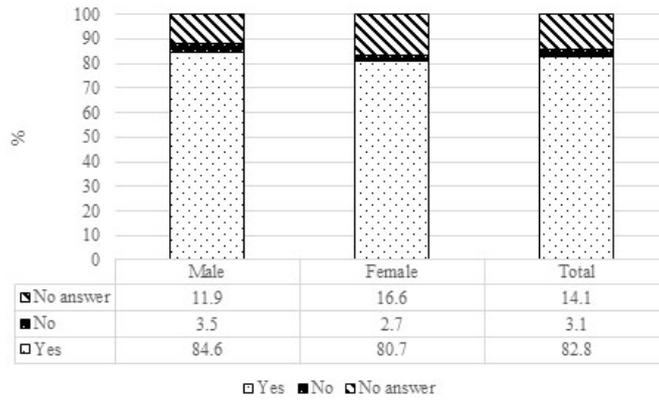


Fig. 10. Instant messaging and social media usage (in the past year).

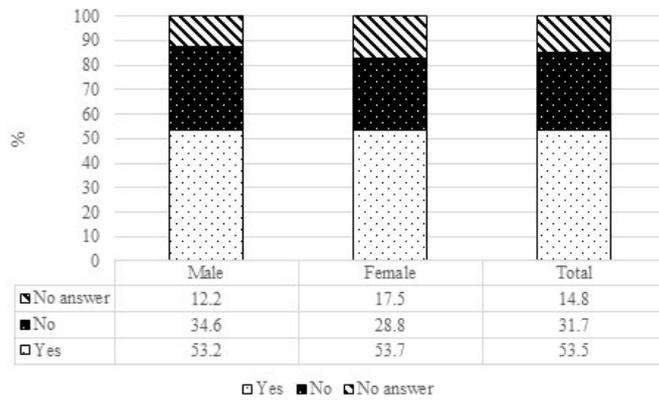


Fig. 11. Online reviews or price comparison (in the past year).

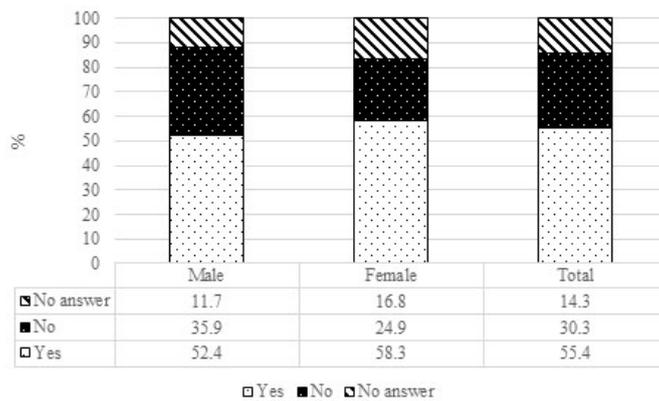


Fig. 12. Online shopping (in the past year).

make a doctor’s appointment or check the progress of appointment in the past year, which is 7.2% greater than men (39.7%). The survey indicates that women are more active in learning through online courses, online shopping, and accessing health services.

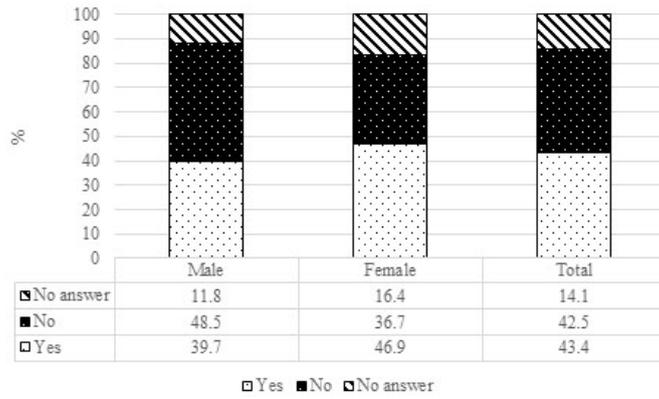


Fig. 13. Online doctor's appointments or check progress of appointment.

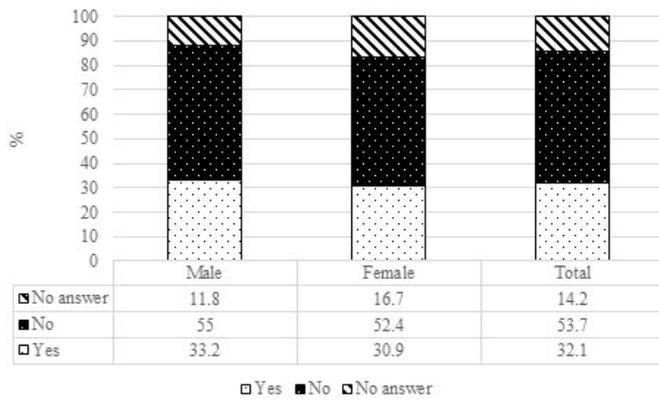


Fig. 14. Receiving government notifications and Information (in the past year).

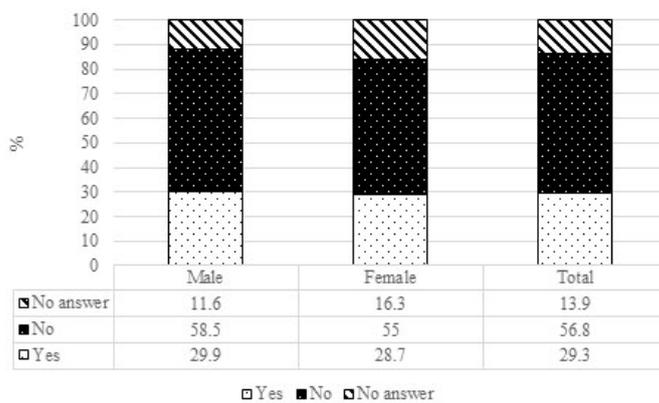


Fig. 15. Applying for government services online.

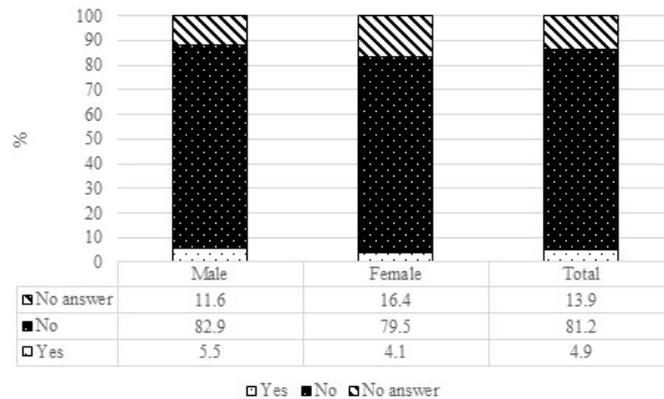


Fig. 16. Expressing opinions via official online channels.

3.4. E-government services and civic participation

Lastly, the development of the Internet and digital devices has enabled citizens to interact and communicate with the government through technology. The survey reveals that most citizens aged 12 and above do not utilize these resources. The utilization rate for receiving government notifications and information (e.g., disaster prevention and newsletter) is 32.1% (Fig. 14). Similarly, 29.3% of respondents replied that they applied for online government services (e.g., filing tax and paying fines) during the past year (Fig. 15). The percentage of expressing opinions via official online channels (e.g., 1999 citizen hotline, city mayor's mailbox, and the public policy participation platform) is even lower – only 5% of people participated (Fig. 16). Women and men have similar patterns in these activities. For instance, approximately 30% of both men and women have the experience of receiving the government's information and notifications and applying for public services online in the past year. As for expressing opinions via official online channels, the gender difference is less than one percent, with 5.5% for men and 4.1% for women. It is evident that the gender digital gap in using online services and engaging in the discussion of social issues is not significant.

4. Comparative analysis

4.1. Gender-based data collection

The first critical issue that arises from the preceding discussion of the two nations is gender-based data collection. The data presented in this country report on Mongolia hints at a “reverse” digital gender gap as more women have access to the Internet than men and in terms of usage as illustrated by higher uptake in social media and digital banking by females compared to males. However, the paucity of the detailed gender-disaggregated data – despite recent scattered efforts to address this issue – still remains a challenge as different levels of governments do not systematically collect or exchange this type of information. In this light, grounds are, in general, not yet set for informed gender analysis and in relation to digital government development. Consequently, the Government of Mongolia should prioritize aggregation of gender-sensitive data through the whole-of-government approach and, as applicable, ensure the continuity of the positive efforts in this direction.

Tools for promotion of gender-disaggregated data akin to “*Toolkit for Mainstreaming and Implementing Gender Equality*” by OECD, “*Gender Mainstreaming Toolkits*” by the European Institute for Gender Equality, and “*2019 Individual/Household Digital Opportunity Survey*” published by Taiwan’s National Development Council could certainly serve as frameworks that could help facilitate a transition to gender-sensitive, evidence-based policymaking not only for women but men in Mongolia as such data captures specific issues for both sexes. Given the demographic trends in Mongolia, accurate collection of this information will be instrumental in advancing gender equality and empowerment on a larger scale and scope.

As for Taiwan, although the government has conducted the annual national survey for the past two decades and started to compare the responses by gender in recent years, specific questions targeting the reasons for gender similarities and dissimilarities are still lacking. Beyond the survey results that reveal specific gender-based disparities regarding access to the Internet and mobile phones, usage patterns, literacy and skills, and e-government engagement, the Government of Taiwan should take one step further to comprehensively identify potential differences in other aspects and, more importantly, investigate why there are such differences. Essential questions such as “what are the barriers that prevent elderly women from accessing the Internet?”, “why do women, on average, exhibit a lower level of digital literacy and skills?”, and “why do men engage in less online learning, shopping, and health activities?” would be of substantive help for the government authorities to put forward evidence-based action plans to enhance gender equality in terms of digital opportunities.

4.2. Gender-sensitive e-governance

On the surface, the gender context of Mongolia appears to suggest favorable conditions for gender-sensitive e-governance. Multiple dimensions of the census statistics also offer support for this inference. In terms of pure demographics, the Mongolian population itself remained relatively equal in terms of gender balance until 1989 when women started to outnumber men, and this 30 year-streak continued as of 2019 (National Statistics Office of Mongolia, n.d.-i). At the same, the country reports higher death rates and a consistently shorter lifespan for men since 1989 and 1992, respectively, while slightly more females have been born than males during all years after 1980 (National Statistics Office of Mongolia, n.d.-j). Further, the average life expectancy favors women. In terms of education, there were on average 28,908 more female students enrolled in universities and colleges than males between 2010–2020 (National Statistics Office of Mongolia, n.d.-g), with more women graduating than men (National Statistics Office of Mongolia, n.d.-b). As of college entrance exams on STEM subjects, women recorded higher scores than men in mathematics and physics while men had a slight edge in biology and chemistry (National Statistics Office of Mongolia, n.d.-a). Under labor force underutilization, women surpass men across all age cohorts above 20 between 2014–2019 (National Statistics Office of Mongolia, n.d.-e).

However, profound gender gaps and inequalities persist in Mongolia that are impediments to true gender parity and equal opportunity. In 2020, The World Economic Forum ranked Mongolia 79th out of 153 countries and the 7th best in East Asia and the Pacific on gender equality; this is a –21 rank change since 2018 (Schwab et al., 2019). In particular, this report asserts that Mongolia disappoints its women in political empowerment with no female head of state in the last 50 years and a low percentage of women in parliament and ministerial positions. In the labor force, there have been more men than women since 1992 (National Statistics Office of Mongolia, n.d.-d) and, on average, earned approximately 17% more in wages between 2001–2020 (National Statistics Office of Mongolia, n.d.-f). At the same, the unemployment rate has been steadily higher among men than women since 2014 (National Statistics

Office of Mongolia, n.d.-k). Further, a statistic that reports “persons outside the labor force” shows that the third major reason for not being employed or unemployed behind retirement and studying was childcare for 103,316 women compared to 2,840 men in the third quarter of 2020 (National Statistics Office of Mongolia, n.d.-h). Moreover, there were on average 53,016 more female heads of household compared to men between 2003–2020 (National Statistics Office of Mongolia, n.d.-c).

Although the aforementioned factors provide a glimpse into the state of gender affairs in Mongolia, they collectively highlight the need for a greater gender-sensitive digital governance. Given the infrastructure and early indications of digital gender parity, the environment in Mongolia appears to be conducive to more progress in this particular area. However, without bridging gender inequalities and disheartening disparities that endure in the society as a whole, advancements in gender-responsive digital governance could lose their relevance as catalysts for a positive change. Mongolia cannot be an E-Mongolia until all members of society can equally benefit from the empowerment that comes with the digital transformation.

Taiwan initiated and implemented its first digital government plan in 1998, which has evolved through five stages ever since, addressing issues ranging from basic digital infrastructure establishment, online service universalization and integration, civic participation and open data, to data-based governance. Thanks to these enduring endeavors, Taiwan has received global recognition in digital government development. According to the 2018 Waseda-IAC International Digital Government Rankings (Obi, 2018), published by the Institute of Digital Government Waseda University and the International Academy of CIO, Taiwan was ranked 9th among 65 countries and the 4th best in the Asia-Pacific region. In addition, Taiwan’s e-government experiences have attracted extensive attention among academic researchers. For example, Chen and Hsieh (2009) suggest that the Taiwanese government’s comprehensive administrative reform leads to high performance in network and technical infrastructure and service integration. A recent study shows that context-awareness, frontline civil servant empowerment, and citizen-centric strategy are vital features in Taiwan’s proactive e-governance plan (Linders et al., 2018). Other research examines and tests various models of information sharing in Taiwan’s context (Yang et al., 2012, 2014; Yang & Wu, 2014). It is evident that the Taiwanese government’s sensible strategies, in collaboration with other stakeholders, have contributed to Taiwan’s e-government accomplishment.

Taiwan’s awakening and promotion of gender equality also have their roots during the mid-1990s, motivated by a series of social movements organized by women’s rights groups. The protests and lobbies propelled the government to modify or promulgate numerous laws to secure gender equality, including the family chapter in the *Civil Code*, *Domestic Violence Prevention Act*, *Sexual Assault Crime Prevention Act*, *Act of Gender Equality in Employment*, *Sexual Harassment Prevention Act*, and *Gender Equity Education Act*. Based on these legal foundations, the government started implementing the UN’s gender mainstreaming policy in 2005, incorporating gender’s perspective into public organizations’ functions. The efforts made by the government and civil society have extremely narrowed gender disparity in multiple aspects. For instance, in 2016, Taiwan elected Tsai Ing-wen as its first female President, marking the success of Taiwan’s gender equality in politics. In a much broader sense, Taiwan was ranked 1st place in Asia and 6th worldwide for gender equality in reproductive health, empowerment, and the labor market, based on the methodology of 2019 UN’s Gender Inequality Index (Gender Equality Committee, 2020).

While Taiwan has its stellar records in digital governance and gender equality, the e-governance strategy incorporating a gender perspective is still in its infancy. As mentioned earlier, the National Development Council began the digital divide/opportunity survey at the beginning of the 2000s to inform the government of the latest digital differences between urban and rural areas and between general and vulnerable populations. Since 2004, the administration body has proposed several strategies to bridge

the digital divide. From 2005 to 2019, the first four stages primarily concentrated on improving the rural areas' digital opportunities and did not touch on the gender dimension. The latest interagency policy, the Promotion Project on Progressing Toward Digital Equality (2020–2023), takes the equality of broader aspects into account. The plan commits to “Serve diverse population groups and sharing the digital environment and resources, regardless of gender, race, ethnic group, age, occupation, birthplace, social class. Everyone enjoys digital equality. (Ministry of Education, 2020). Since the project is still in its preliminary stage, the details about how the government will address the gender issue are yet to be concluded. That said, the promotion project is a valuable initial step for advancing digital gender equality.

5. Concluding remarks

Gender inequality in digital opportunities is a wicked problem that requires governmental attention and intervention. From the government's perspective, a digital gender gap can define the scope of digital services it can offer and thereby is critical to its ability to serve its citizens equally, plan for the future, and better allocate the scarce resources. For the citizens, unequal digital opportunities can prejudice against them and limit their essential rights to social welfare, education, healthcare, political participation, and employment. Moreover, for the country as a whole, bridging the digital gender gap can contribute to the advancement of democracy and help achieve national or international development goals for the future generations.

The progress both Mongolia and Taiwan made in digital development has been commendable and can serve as references for other countries at various stages of their respective journeys vis-à-vis digital transformation. Indeed, Mongolia can be an example for rising democracies, landlocked states, and economies that share a socialist past. Taiwan, on the other hand, with its progressive governance and a higher level of development, can spread its experience with building institutional capacity for continuous improvement in terms of digital governance. This research identified several gender discrepancies across some major aspects in the two nations. Based on the analysis presented in this report, possible solutions and governments actions have been proposed. Both the challenges and solutions elaborated in this article could be helpful for other countries that attempt to analyze and address gender digital inequality as well.

More specifically, we highlight the importance of a gender-sensitive e-governance strategy enabled by evidence-based policymaking. Two actions can help achieve this goal. First, gender-disaggregated data collection is instrumental to realizing the full potential of inclusive digital transformation. One useful tool for data collection is a survey. Surveys conducted regularly with general questions on ICT usage and digital skills and specific items conducive to entangling the factors accounting for the gap can provide valuable insights for policymaking. Our second recommendation is to propose a gender-sensitive e-governance strategy. The government should tailor its digital government policies by considering a gender lens to ensure that no citizen is left behind on the path to digital transformation. We also encourage scholars to conduct more research relevant to these questions. In doing so, both academics and practitioners will gain a better sense of the reasons leading to digital gender inequality and the critical practices that can help bridge the divide.

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