

Women in the intersection of digital technology and the agriculture sector in Nepal

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Key message

Digital technology has the potential to overcome problems the small holder farmers face associated with market knowledge and access, agriculture extension services, and value chain management. There are positive outcomes of digital intervention in agriculture sector in Nepal. These digital dividends, however, aren't equitably shared in communities pervasive with structural inequalities, gender being a prominent one. The digital gender gap can thus exacerbate the existing inequalities for women and historically marginalised groups. The indispensable and inevitable digital transformation in the agriculture sector, therefore, require focused interventions and actions to engage women and marginalised groups for a more equitable digital future.

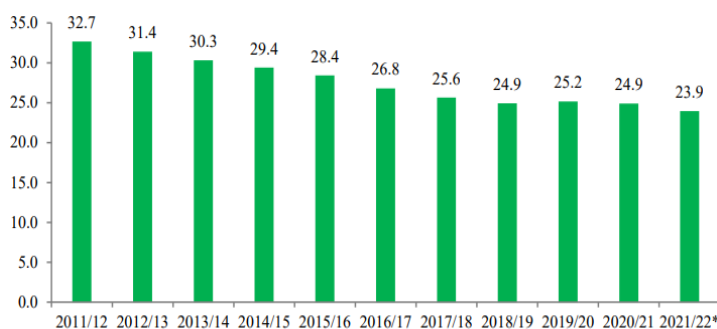
Recommendations

- Develop national and local level policies to earmark mandatory budget for localised intervention towards digital infrastructure development at every ward of rural municipalities of Nepal.
- Create opportunities at the local level for digital training focusing on the specific needs of rural women and girls.
- Develop strategies to encourage and incentivise private sector to co-produce agro technologies tailored to the needs of women entrepreneurs and farmers.
- Ensure special policy provisions to increase women's right to land and financial resources to address structural inequities for inclusive opportunities for agro-entrepreneurship and business.

Background

In Lower- and Middle-Income Countries (LMICs), mobile phones are the primary way people connect to the internet. Rural migration for foreign employment and the steady proliferation of mobile phones and the expansion of internet services in Nepal have made mobile internet the primary means of communication. At the beginning of 2024, 37.47 million mobile connections were active in Nepal, which is 120.6% of the total population⁴. Such proliferation of mobile phones has set the necessary backdrop for the inevitable and indispensable digital transformation in the Nepali agriculture sector.

Transformation of the Nepali agriculture sector



Source: Central Bureau of Statistics, 2022

Note: The above bar graph presents annual contribution (in percentage) of agricultural sector in gross value addition over the years. Graph retrieved from Economic Survey Report 2021/2022 (GoN, 2023).

The agriculture sector employs two-thirds of the Nepali population and contributes to one-third of the total GDP (GoN, 2023). As an important sector contributing to employment, food security and the overall economy, the development of the agriculture sector has remained a primary priority in all the periodic plans so far. Digital technology has been identified as one of the catalysts for agriculture sector transformation in Nepal (Magar, 2020). The immense potential of digital technology for agriculture sector transformation is identified by the Government of Nepal (GoN) as reflected in the [2019 Digital Nepal Framework \(DNF\)](#). The framework lays

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⁴ Data retrieved from: Digital 2023: Global Overview Report

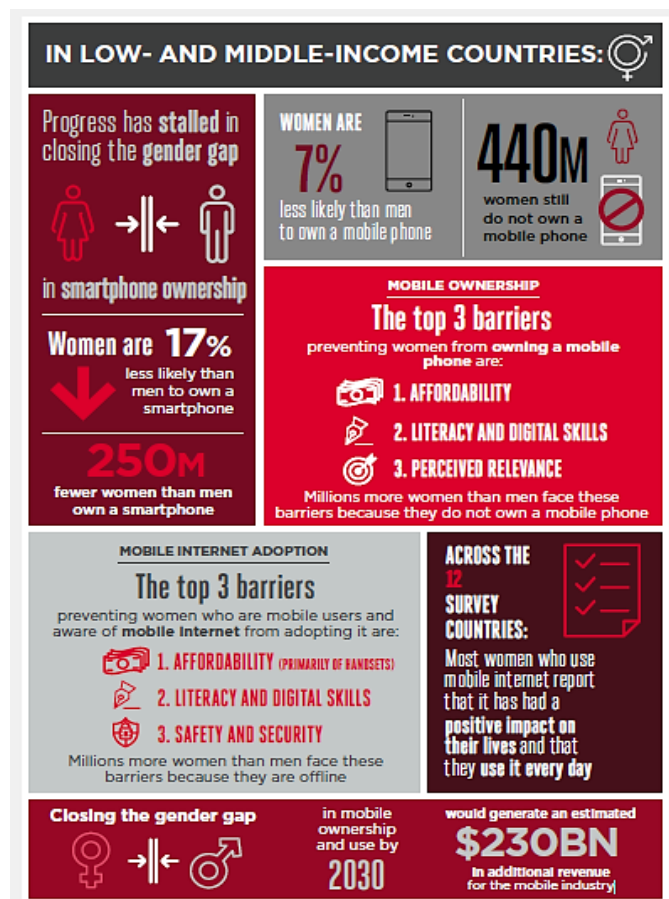
out the digital transformation strategies in eight priority sectors – the agriculture sector being one of them. While DNF identifies the potential of digital agrarian transformation, it does not adequately address the changing dynamics of the agriculture sector and the persisting gender inequalities.

Digital technology, despite its potential for agrarian transformation, needs to be abreast with the steady change in the Nepali agriculture sector especially due to male out-migration and feminisation of the agriculture burden. The agriculture sector absorbs 80% of the working women population, making them the key players in the sector (FAO, 2019). Despite their significance, most women are limited to lower nodes of the agriculture value chain– more so in the case of high-value crops which yield better financial returns (Upreti et al., 2018). If yielded correctly, agricultural transformation through digital technology has the potential to level the gender gaps in the sector by challenging the everyday cultural norms and structural barriers faced by women (DNF, 2019; Scott, Balasubramanian and Ehrke, 2017). The dangers, however, lie in gender-blind approaches to digital inclusion initiatives which can further entrench existing gender gaps. The technology therefore should be tailored to the responsibilities and needs of women and marginalised communities experiencing intersecting inequities within the agriculture sector.



Recognising the transformational potential of digital technology in agrarian transformation, SIAS carried out a 30-month participatory action research project – Coproducing a shock resilient business ecosystem for women-engaged enterprises in Nepal (CREW). One of the aims of the study was to understand the feasibility of co-producing agro technology with women. This policy brief presents findings and analysis of the participatory action research project. The recommendations presented in the policy brief are synthesised from the survey findings and reflect the recommendations made at the

Infographic from GSMA, 2023



stakeholder dialogue on [Digital Technology for Women Farmers and Entrepreneurs in Nepal](#) carried out in Kathmandu as a part of the project.

Digit-All opportunities in agro transformation

Table 1: Digital status of nepal retrieved from datareportal – global digital insights

	Data in numbers	Data in percentage of the total population
Households with internet access	2.5 million	37.80
Active internet users	15.40 million	49.60
Active cellular mobile connections	37.47 million	120.60
Digital wallet users	16.12 million	51.90
Social media users	13.50 million	43.50

One in two Nepali citizens is connected to the internet (see Table 1). The [Digital 2023: Global Overview Report](#) highlights exponential growth in e-commerce in Nepal with all major financial institutions offering mobile banking services.

The COVID-19 pandemic and the associated mobility restrictions accelerated the change from traditional trading to e-commerce. The rapid change in the economy and people's adaptability to this change underscores the opportunities to harness the technology for agro transformations in Nepal.

Digital innovations can be instrumental in the development of the agriculture sector, especially in Nepal with geological variations and topographical challenges that have constrained agriculture extension services to the rural population and deprived communities of adopting climate-smart agriculture. With the availability of E-extension services, farming knowledge and skills can be spread cost-effectively (Kaini, 2020). The previously identified constraints faced by women in the agriculture sector such as limited mobility options that limit access to markets, pressures of care work, feminisation of agriculture work burden (Leder et al., 2023) and resulting time-poverty can be overcome with digital innovations that bring agriculture services to women. Similarly, the literacy constraints can be overcome with the use of multimedia (audio/video outputs) thereby making innovations equitably accessible to both literate and literarily challenged populations. Furthermore, building apps that work without internet connection can make it equitably accessible to farmers irrespective of their economic status.

Digital disbursements of agriculture subsidies, tele-vet medical facilities, smart irrigation projects, and virtual agri-market technologies are identified as potential game-changers for the agriculture sector (MoCIT, 2019). The private sector has been active in micro-level interventions with mobile phone-based agriculture information apps, such as GeoKrishi, SmartKrishi, Krishi Guru, and NARC Krishi to name a few. At present, these agro-apps perpetuate the structural differences of everyday life in cyberspace as they fail to consider the intersectional realities of their user groups. Most of the available apps are still linguistic-based and are dependent on internet connection. Digital innovations can be deployed to overcome structural inequities only if they are designed with cognizance of the diversity of their end users.

Digitalisation initiatives and limitations

The Ministry of Communication and Information Technology (MoCIT) commissioned a



Digital Nepal initiatives in the agriculture sector encompass technological solutions aimed at maximising yield and minimising agricultural input. The use of agri-tech solutions is anticipated to boost farm productivity and sustainability to meet growing food consumption, and in turn, increase farmers' incomes.

DNF, 2019

comprehensive framework titled 'Digital Nepal Framework, 2019' to mainstream digital technologies in all economic sectors. The DNF presents a comprehensive framework to integrate digital technologies in the agriculture sector by identifying the major pain points and proposing digital solutions.

Agriculture sector – pain points

- Poor access to agriculture input and supply
- Low yield and declining productivity
- Poor irrigation reach
- Limited financing and incentives
- Poor access to market, transport and distribution facilities
- Labour shortages
- Poor access to agriculture input and supply

Proposed digital solutions

- eHaat bazaar
- Precision agriculture
- Agriculture tool sharing
- Digital disbursement for merchant service providers and subsidies
- Digitisation of land records
- Smart irrigation project
- Smart livestock and wildlife management
- Tele-vet medical centre establishment
- Agriculture input and output product quality tracking system
- Education and training program for farmers
- State-of-the-art knowledge centres and government agriculture centres

Tables 2 and 3. Adopted from DNF (2019) by the authors

The framework has identified digital solutions corresponding to each 'pain point'. As shown in Tables 2 and 3 above, the proposed solutions

range from the utilisation of digital technologies to improve market access of small farmers through virtual agri-mart and e-commerce platforms, to Agriculture Product Quality Tracking Systems to improve productivity and yield. It has identified a pathway for digital transformation of Nepali society starting with increasing digital connectivity, then improving digital skills, and finally leading to a digital governance system.

The framework is ambitious in its vision and spread wide in its scope. Although ICT has been identified as an ‘enabler’ in the agriculture sector, DNF also acknowledges the limitations of digital solutions due to ‘inadequate digital literacy and access to a digital device’. One of the major limitations of DNF which remains unrecognised, is its lack of recognition of gender-differentiated barriers to digital inclusion in Nepal. The framework assumes a gender-blind approach to digital solutions thereby increasing the risk of perpetuating structural gender inequalities into the digital realm.

Barriers to digital inclusion

Despite the ubiquity of mobile phones and the proliferation of the internet in rural as well as urban areas, access remains unequal and gendered. The digital gap is reflective of the intersectional inequities faced by the marginalised based on their class, caste, gender, and geography in their everyday lives. The major barriers to equitable digital technology access as identified by the CREW project are summarised in the following sections.

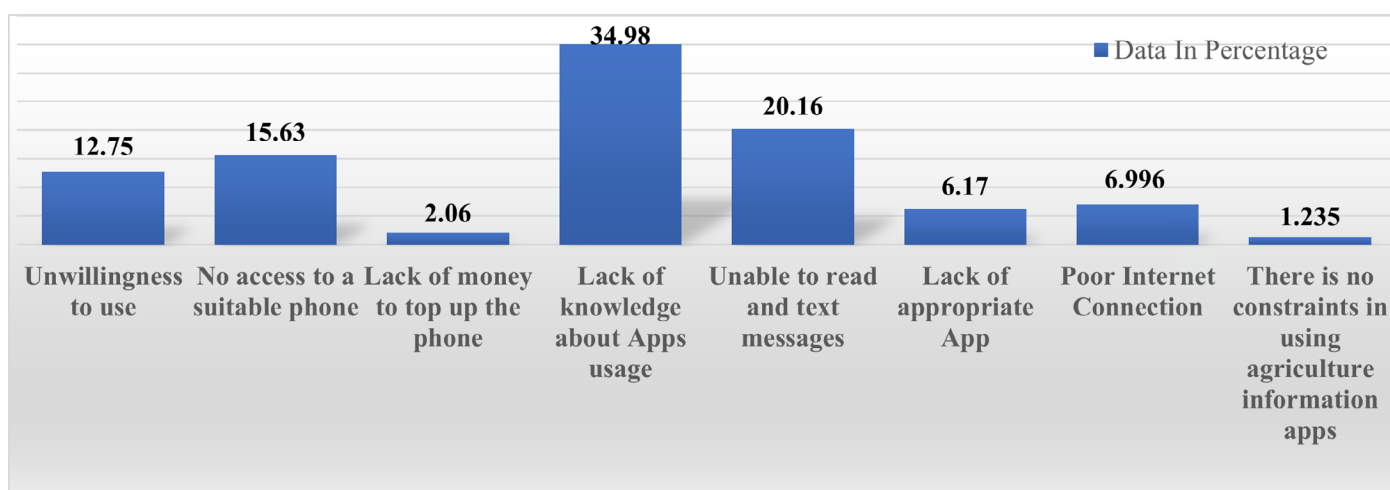


Figure 2: Constraints in Using Agri-Specific Mobile Apps Based Technology: Evidence from Rural Nepal. Source: Household survey in 2023/24

Relevance of digital technology



The CREW project research shows that women are more likely to adopt mobile phone-based agrotechnology if the apps are relevant to their daily farming activities⁵ (Mainali et al., forthcoming). The prevalent use of mobile banking apps among women receiving remittance in the field sites underscores the perceived relevance of technology as an enabling factor for adopting digital technology. Nonetheless, previous studies show that compared to men, women are less likely to believe that mobile apps – their contents and services provided through the apps are significant to their everyday lives (Chassin, 2022). Women’s scepticism towards the relevance of technology has two interrelated and overlapping causes. First, the lack of awareness of what technology is available, and how it can be used to enhance/meet their agricultural practices/

⁵ CREW Baseline Survey Report 2023



Internet has helped me with my [tailoring] business. I look for new blouse designs and sometimes I also show pictures of trending designs to my customers to give them more options [...] I use Facebook messenger to communicate with fabric dealers in Kathmandu. I make the buying selection through video chat [...] It has saved me regular trips to Kathmandu and saved money and time

Woman entrepreneur in Ramechhap, 2023



I do not have a Wi-Fi connection in my house and rely on a mobile data package which is quite expensive. I only use data to communicate with my husband, who is abroad. However, I download videos using the school's Wi-Fi and watch them later. If someone nearby my house is interested to get a Wi-Fi connection installed, we could share the cost as it is not possible for us to cover the expense on our own.

Woman project stakeholder in Ramechhap, 2023

needs. Second, gender-blindness in technology design and digitalisation interventions (Criado Perez, 2019). In the context of Nepal, this could mean, apps that are based on linguistics rather than multimedia (audio/video) and require an internet connection to use. In the case of FinTech, it could also mean pre-requisites such as citizenship numbers, existing bank accounts, or landownership certificates to access the services. In short, a lack of factoring in conditions that disfavours women in technology adoption.

The agriculture sector employs 82% of the women workforce, which on one hand highlights the feminisation of agriculture burden, while on the other, underscores the indispensability of women's labour in the agro sector (Upadhyaya et al., 2021). Agro- technologies design should reflect this changing reality of the Nepali agriculture sector. A gender-blind approach for digitalisation like [The Nepal Digital Framework, 2019](#) pose the danger of perpetuating the structural inequities faced by women and reinforcing gendered stereotypes on tech adoption.

Affordability and access

Affordability operates in two overlapping tiers- ownership of internet-enabled handsets, and the cost of cellular data. [The Mobile Gender Report, 2023](#) (GSMA, 2023) shows that the affordability of mobile phones is the primary barrier to ownership in low- and middle-income countries, also reflected in our survey. When combined with broader structural inequalities such as women's lower employment rate and persistent gender pay gap, it is valid to infer that the affordability of mobile phones is more negatively consequential for women compared to men. CREW survey presents a similar scenario in the project districts as only 48% of the surveyed women owned a smart device, and 39% had access to the internet.

Over the last 10 years, although there has been a steady rise in the number of mobile phone users in Nepal, the ownership of internet-enabled phones is highly gendered- with higher ownership tilting towards men.

Mobile phones are also the primary devices used to access the internet, especially in rural areas that are not connected to broadband services. The gendered nature of mobile phone ownership translates into fewer opportunities for women for mobile internet access. Additionally, for women who own an internet-enabled handset, the affordability of mobile internet is an additional barrier to digital inclusion. According to the CREW survey, the annual average mobile data expenses is NPR 2,716 which is a considerable amount of investment in rural communities. The



Even though I have received training to use online digital payment platforms, I cannot use them as my phone does not properly support these applications. If I had a phone that could support them, I would use these platforms to make payments.

Woman project stakeholder in Ramechhap, 2023



With proper guidance or training, I believe everyone would start using online applications like mobile banking, e-Sewa, Khalti and other apps to make various payments including electricity bills and phone recharges. I think these apps are secure and extremely useful, especially during emergencies.

Woman project stakeholder in Ramechhap, 2023

survey revealed that these expenses were used in internet-based communication platforms like Facebook, Messenger and Viber and used by a small minority of the surveyed population. The use of internet-based technology despite the high costs indicates a potential adoption of digital technology-based intervention in farming communities. Lowering the cost of use through broadband expansion can, therefore, lower the digital gap which has been limiting women's access. Investment and expansion of digital infrastructure in the rural hinterlands is the first step towards affordable/accessible technology.

Knowledge and ability

The lack of digital literacy is considered one of the major barriers to digital inclusion. Digital literacy is influenced by various factors such as income, literacy levels, access to technology, and most importantly, biases inherent in patriarchal societies against women and girls that dissuade them from technology adoption. In short, the gender inequality in the real world is mirrored in the digital world. Previous studies have linked the relationship between literacy with digital literacy—implying the latter is dependent on the former (Galpaya and Zainudeen, 2022). The CREW project survey also shows correlation between women's literacy and willingness to adopt digital agro-interventions and participate in training program. Nevertheless, the versatility of mobile apps can also be an opportunity to circumvent these knowledge/skill gap caused by discrepancies in literacy levels. For example, the use of audio/visual interactive technology can overcome the challenges associated with literacy and language constraints in apps.

The recent census reports the literacy rate of women in Nepal at 69.4% (NSO, 2021). Similarly, the Nepal Multiple Indicator Cluster Survey carried out in 2019 by the Central Bureau of Statistics reports that 92% of the women participating in the survey had access to mobile phones, and 41% accessed

the internet (CBS, 2019). Despite the relatively low literacy rate, the rate of digital uptake (through mobile phones) presents a positive picture for potential digital transformation. The numbers highlight that literacy skills do not directly affect tech adoption. Nevertheless, digital literacy is consequential to adopt any other tech-based interventions like financial literacy or digital agro-technology which at present are primarily based on linguistic skills. Providing women farmers with basic digital skills and making the apps customised to their needs can enhance the use of digital technologies by women. While lack of literacy may seem like a hindering factor for tech adoption, with technology designs tailored to the specific needs of women farmers and entrepreneurs, such limitations can be turned into pathway for inclusive innovation.

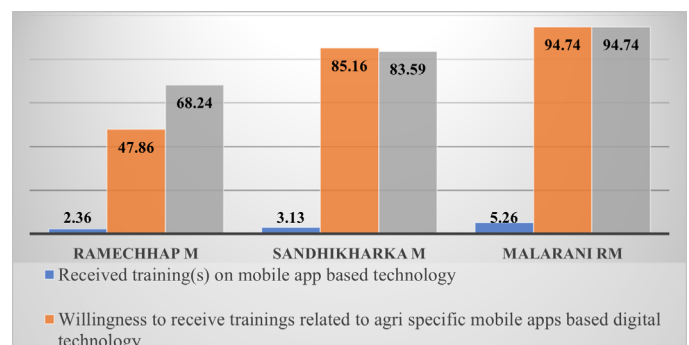


Figure 3: Interest in Training and Future Use of Agri-specific Apps (data in percentage)

Source: CREW Survey

Policy recommendations

Digital Inclusion is predicated on designing policies and strategies that recognise pervasive gender and intersecting inequalities and address them through targeted actions. Special focus is required to overcome the challenges of women, girls, and people from marginalised communities to increase their adoption of digital technology. This entails involving women, girls, and people from marginalised communities in the processes of technology development.

Specific policy recommendations,

- **Investment in digital infrastructure**- The foremost step towards digital inclusion is making it accessible and affordable. Therefore, the investment in digital infrastructure should prioritise digital expansion in rural areas by providing accessible broadband services. The internet in rural areas is accessed through mobile phones, hence making it an expensive commodity. Broadband expansion in rural areas will decrease the cost of access and use and hence lay the groundwork for digital technology-augmented cross-sectoral development interventions. Additionally, affordable technology is accessible technology, especially to women, girls, and marginalised communities.
- **Technology tailored to women's needs and experience**- Technology design, so far, isn't tailored to women's specific limitations such as lower literacy rate and less control over household finances to access the internet. Additionally, digital technologies should reflect the changing realities of the agriculture sector and recognise women's changing role within the sector. The technology should be tailored to the needs of women working at the various nodes of the value chain and empower them to engage at the higher nodes of the agriculture value chain. Women's needs can be better addressed if they are part of the technology development process. Therefore, coproduced technology should be incentivised.
- **Skills development**- Like the design of the technology, digital training and education should be tailored to the needs of women, girls, and marginalised populations. The training content should be interactive and in vernacular languages administered by women trainers. The training should build upon

the digital technologies popular among rural women (like TikTok and YouTube videos).

- **Participation of user groups in the identification of problems**- Understanding the operational inefficiencies in the agriculture sector should be the first step towards designing apps that are relevant to the users. Technology should be relevant to the users at various value chain nodes- farmers, cooperatives, banks, intermediaries, technology providers and distributors - to reap economic benefits. Collaboration among all these actors is the key as technology silos can be counterproductive to sector-wide digital uptake.
- **Government and non-government collaboration**- Digital technology is increasingly recognised as one of the essential services. In collaborating with non-government sector partners and private companies, the pace of digital expansion can be accelerated, especially in rural areas. The local and national governments can leverage the expertise and financial resources of non-governmental organisations and the private sector by incentivising efforts on digital literacy and designing technology relevant to the users in the Nepali socio-economic context.

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