



INITIATIVE ON  
Gender Equality



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GENDER  
Platform

# A Guide on Gender-Responsive Digital Technologies in the Agrifood Systems

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## EXECUTIVE SUMMARY

This guide on gender-responsive digital technologies in agrifood systems aims to address the gender gap in accessing and utilizing digital technologies within agriculture. It provides strategies for policymakers, extension workers, development practitioners, technology developers, and farmers to integrate gender perspectives into their work. The guide emphasizes the empowerment of women and youth farmers through the adoption of digital solutions, enhancing productivity and food security. Key sections include an overview of traditional gender roles in agriculture, the challenges faced by women and marginalized groups, and opportunities for empowerment through digital technologies. The guide highlights the importance of designing inclusive technologies and implementing effective training programs to increase digital literacy. Furthermore, it advocates for supportive policy frameworks that promote gender equity in access to technology and resources. The guide seeks to ensure an inclusive agricultural environment that leverages digital innovations for sustainable development. The ultimate goal is to empower all farmers, ensuring equitable access to production technologies, information, markets, and financial services, thereby contributing to a more resilient agrifood system.

## ABBREVIATIONS

<b>CIAT</b>	International Center for Tropical Agriculture
<b>IoT</b>	Internet of Things
<b>GDP</b>	Gross Domestic Product
<b>KALRO</b>	Kenya Agricultural and Livestock Research Organization
<b>MSPs</b>	Multi-Stakeholder Platforms
<b>PABRA</b>	Pan-Africa Bean Research Alliance
<b>SMS</b>	Short Message Service
<b>UAVs</b>	Unmanned Aerial Vehicles
<b>USSD</b>	Unstructured Supplementary Service Data

## PURPOSE OF THE GUIDE

The primary objective of this guide is to bridge the gender gap in accessing, adopting, and utilizing digital technologies in agriculture. It offers strategies and tools aimed at enhancing the capacity of policymakers, extension workers, development practitioners, and technology providers to integrate gender perspectives into their work. The guide aims to empower women and youth farmers to adopt and effectively utilize digital technologies (such as animations and digital platforms and forums) and promote the development and deployment of gender-responsive digital agricultural solutions. This guide also highlights the importance of digital gender-disaggregated data as we move towards using algorithms to make decisions.

It is important to note that while this guide provides a comprehensive overview of gender-responsive approaches, it may not address all specific contexts and challenges faced by different regions and communities. Therefore, adapting the recommendations to local contexts and needs is essential.

## TARGET USERS

**Policymakers:** This guide will serve as a crucial resource for policymakers, enabling them to craft and implement inclusive agricultural policies that address the unique technological needs of men and women farmers. By understanding the gendered dimensions of digital technology use in agriculture, policymakers can promote equitable access to resources, services, and opportunities, ensuring that no one is left behind in the sector's digital transformation. The guide will

**Agricultural extension workers:** The guide is designed to enhance the capacity of agricultural extension workers by equipping them with the digital knowledge and tools needed to effectively support both male and female farmers from an intersectional lens. It emphasizes the importance of recognizing gender differences in technology adoption and usage, enabling extension workers to tailor their services to meet the specific needs of diverse farming communities.

**Development practitioners:** This guide provides



The primary objective of this guide is to bridge the gender gap in accessing, adopting, and utilizing digital technologies in agriculture

insights into the design and implementation of gender-sensitive agricultural projects. It highlights best practices and strategies for integrating digital technologies in a human-centered way that empowers both men and women. By applying these approaches, development practitioners can ensure that their projects promote gender equity and contribute to sustainable agricultural development.

**Technology developers:** This guide will be invaluable for technology providers who want to develop digital solutions that are accessible, relevant, and responsive to the needs of all farmers, regardless of gender. The guide underscores the importance of user-centered design and inclusive practices, encouraging providers to create technologies that enhance productivity and improve livelihoods for men and women in agriculture.

**Farmers:** At its core, the guide is designed to empower farmers—both men and women and youth—with access to information and knowledge about digital tools they need to improve their agricultural practices. The guide helps farmers access information, services, and markets more effectively, leading to better productivity, increased income, and enhanced food security.

## HOW TO USE THE GUIDE

This guide is designed to be precise, user-friendly, and practical. It includes clear explanations, real-world case studies, and actionable steps. Interactive components, such as checklists and templates, are provided to

facilitate implementation. Users are encouraged to adapt the tools and strategies to their specific contexts and needs. Following the insights and recommendations provided, stakeholders can effectively integrate gender perspectives into their digital agriculture initiatives and contribute to a more equitable and sustainable agricultural sector. It is essential to adapt the recommendations to local contexts and needs.

## UNDERSTANDING GENDER IN AGRICULTURE

### Gender roles and responsibilities in agriculture

Traditional gender roles and responsibilities significantly influence the agricultural landscape. While these roles vary across cultures and regions, common patterns emerge. Men are often primarily involved in cash crop production, decision-making related to land use, and market access (Peralta, 2022). They are more likely to own land and have access to agricultural extension services. Conversely, women predominantly engage in subsistence farming, food processing, and household chores (Kajale & Shroff, 2020). They often manage livestock, collect water, and process agricultural products (Patil & Babus, 2018). This division of labor has implications for access to resources, knowledge, and decision-making power (Ugwu, 2019). It also influences access and use of digital technology by women and girls, which could boost global gross domestic product (GDP) by approximately US\$524 billion by 2025<sup>1</sup>.

### Gender digital guide

As the world becomes a small village connected by digital tools and networks, it is necessary to reexamine who can access, use, and benefit from it and who is excluded due to social, cultural, and institutional barriers. Access to online digital tools with information on multiple services benefits men and women and helps bridge gender gaps. The lack of women role models and mentors is also a well-known factor contributing to the gender digital divide.

## Challenges faced by women, youth, and marginalized groups in agriculture

**Access to resources:** Disparities in land ownership, access to credit, and ownership of agricultural inputs and assets disproportionately affect women, youth, and marginalized groups. Limited access to these resources constrains their ability to invest in their farms and adopt improved agricultural practices (Maina & Maina, 2012; Ishaq & Memon, 2016) and gender-friendly technologies and tools.

**Educational barriers:** Lower literacy rates and educational opportunities among women and youth limit their access to agricultural information and technologies. This knowledge gap hinders their ability to make informed decisions and adopt innovative approaches (Ishaq & Memon, 2016; Patil & Babus, 2018).

**Social and cultural constraints:** Deep-rooted gender norms and stereotypes often restrict women's participation in agricultural decision-making and market activities (Kajale & Shroff, 2020). These constraints limit their economic empowerment and leadership opportunities. In addition, it also defines what men and women can own or use limiting their access to information and use of digital infrastructures such as radio, television, phones etc

**Access to resources:** Disparities in land ownership, access to credit, and agricultural inputs

**Educational barriers:** Lower literacy rates and educational opportunities among women and youth

**Social and cultural constraints:** Deep-rooted gender norms and stereotypes

<sup>1</sup> <https://webfoundation.org/docs/2021/10/CoE-Report-English.pdf>

### Opportunities for empowerment

Addressing gender inequalities in agriculture is essential for achieving sustainable development and food security. Empowering women, youth, and marginalized groups through gender-responsive approaches can lead to significant benefits for individuals, communities, institutions and the agricultural sector as a whole. We can unlock the full potential of these groups by providing equal access to resources, education, and opportunities. Digital technologies offer a promising avenue for empowering women and youth in agriculture by providing access to information, markets, and financial services. It also provides opportunities for networking and partnerships through hybrid forums, where men, women and youths can build their businesses by learning from each other, reflecting and improving our services with updated information and products. Digital exclusion can prevent individual women and girls, especially, from realizing the benefits of digital technologies.

## DIGITAL TECHNOLOGIES IN AGRICULTURE

### Overview of digital technologies

Digital technologies are rapidly transforming the agricultural landscape, offering innovative tools and solutions to enhance productivity, efficiency, and sustainability. These technologies encompass a wide range of applications, including mobile applications, Internet of Things (IoT) devices, drones, animations, and data analytics (Elijah et al., 2018; Raj et al., 2021). Digital technologies drive agricultural transformation and empower farmers to make informed decisions by providing access to real-time information, data-driven insights, and automation (Duncan et al., 2021; Du et al., 2023). There is still a big gender digital divide,<sup>2</sup> and closing it is critical especially as we use big data.

### Current trends and innovations

The agricultural sector is witnessing rapid advancements in digital technologies. Some of the most prominent trends and innovations include:

<sup>2</sup> It is the gap between men's and women's ability to access and use the Internet and digital technologies and contribute to and benefit from their development.



Digital technologies are rapidly transforming the agricultural landscape, offering innovative tools and solutions to enhance productivity, efficiency, and sustainability

**Mobile Apps:** These applications allow farmers to access agricultural advice, market prices and trends, weather forecasts, extension services and e-payments through their mobile phones (Elijah et al., 2018).

**IoT devices:** Sensors and connected devices enable farmers to monitor soil moisture, temperature, and other environmental factors, optimizing resource use and improving crop yields (Ayaz et al., 2019).

**Drones:** Unmanned aerial vehicles (UAVs) are used for crop health monitoring, pest and disease detection, land size and precision spraying, increasing efficiency and reducing environmental impact (Boursianis et al., 2022).

**Blockchain:** This technology enhances supply chain transparency, traceability, and food safety, benefiting both farmers and consumers (Bermeo-Almeida et al., 2018).

**Animations:** Agricultural messages designed as animations and delivered via smartphones have resulted in better learning for farmers. It requires limited or no physical presence and has a wider reach.

In addition to advanced digital technologies, traditional communication methods such as radio and television play a crucial role in agriculture. They help disseminate important agricultural information, particularly in rural areas. Furthermore, innovative uses of SMS services and platforms like WhatsApp provide essential channels for information exchange and community building among farmers.

## Challenges and barriers

**Technological challenges:** Limited digital infrastructure exists in rural areas, including poor internet connectivity and low smartphone penetration, which severely limit access to digital tools. This digital divide prevents small-scale farmers from benefiting from online resources such as weather forecasts, market prices, and advanced farming techniques.

**Infrastructural challenges:** Poor transportation and road infrastructure make delivering digital devices and services to remote communities difficult. Additionally, unreliable electricity in these areas further limits the use of digital technologies.

**Financial challenges:** The high cost of digital devices, data plans, and necessary digital literacy training is prohibitive for small-scale farmers, particularly for women and youth who may have limited financial resources. Without subsidies or financial support, these groups struggle to access the benefits of digital technologies.

**Gender-specific challenges:** Women face additional challenges, including limited access to education, digital literacy, and financial resources. Cultural norms and traditional gender roles further restrict their ability to adopt and benefit from digital technologies, exacerbating existing inequalities in agriculture.

### Technological challenges

Limited digital infrastructure, including poor internet connectivity and low smartphone penetration, especially in rural areas, restrict access to digital tools.

### Infrastructural challenges

Inadequate transportation and road networks impede the delivery of digital devices and services to remote communities.

### Financial challenges

The high cost of digital devices, data plans, and digital literacy training can be prohibitive for small-scale farmers, especially women and youth.

### Gender-specific challenges

Women face additional barriers, such as limited access to education, digital literacy, and financial resources, which hinder their ability to adopt and benefit from digital technologies.

## How digital technologies can increase inclusion in agriculture

**Data-driven decision-making:** Technologies like remote sensing and artificial intelligence can generate valuable data on crop conditions, soil health, and market trends, enabling farmers to make informed decisions and improve their livelihoods. This can be inclusive if we collect data from fields of diverse farmers, so the artificial machine is trained with real data that is inclusive and captures the needs and realities of the multiple actors.

**Expanded market access:** Digital platforms can connect farmers to buyers, reducing information asymmetries and providing opportunities for marginalized groups to access larger markets. They can also connect farmers to off-takers, input dealers, and consumers – diverse buyers and consumers of their products.

**Financial inclusion:** Digital financial services can facilitate access to credit, insurance, and savings for farmers, especially women who often face challenges obtaining traditional financial products.

**Knowledge sharing and capacity building:** Digital platforms can be used to disseminate agricultural knowledge, best practices, agricultural services and training materials, empowering farmers to adopt new technologies and improve their skills

### Data-driven decision-making

Technologies can generate valuable data on crop conditions, soil health, and market trends

### Expanded market access

Digital platforms can connect farmers to buyers

### Financial inclusion

Digital financial services can facilitate access to credit, insurance, and savings for farmers

### Knowledge sharing and capacity building

Digital platforms can be used to disseminate agricultural knowledge, best practices, and training materials

## GENDER-RESPONSIVE APPROACHES TO DIGITAL TECHNOLOGIES

### Designing inclusive technologies

To ensure that digital technologies effectively address the needs of all farmers, it is essential to adopt a gender-responsive design approach. This involves considering the unique challenges and opportunities faced by men and women in agriculture. Digital technologies should be designed with gender-specific needs, preferences, and constraints in mind. This involves considering factors such as literacy levels, physical accessibility, time constraints, and cultural norms. Engaging men, youth, and women in the design process is crucial to ensure that their needs and perspectives are incorporated. This can be achieved through focus groups, interviews, and participatory design workshops.

### Implementing digital solutions

**Deployment strategies:** Partnering with local organizations, extension officers and farmer groups can facilitate the adoption of digital technologies across all genders. These partnerships can help build trust, provide training, and offer ongoing support.

**Accessibility and usability:** Digital solutions should be designed to be user-friendly and accessible to all with varying levels of digital literacy. This includes using clear and simple language, providing visual aids, and ensuring compatibility with different types of devices. Also, there is a need to provide information that can be accessed and used by those with different disabilities (like deaf, dumb and blind)

**Localization:** Adapting digital solutions to local contexts, languages, and cultural norms is essential for effective adoption. This involves translating content, customizing interfaces, and incorporating local knowledge into the technology.

### Training and capacity building

**Tailored training programs:** It is essential to develop training programs that address the specific needs and learning styles of different genders. These programs should be practical and hands-on, with opportunities for practice and skill-building. The training should also consider the role and time men, women, and youths can be available to learn.

**Building digital literacy:** Providing basic digital literacy skills, including mobile phone usage and internet navigation, is essential for all genders to utilize digital technologies effectively.

**Mentorship and support:** Offering ongoing mentorship and support can help marginalized groups overcome challenges and build confidence in using digital tools.

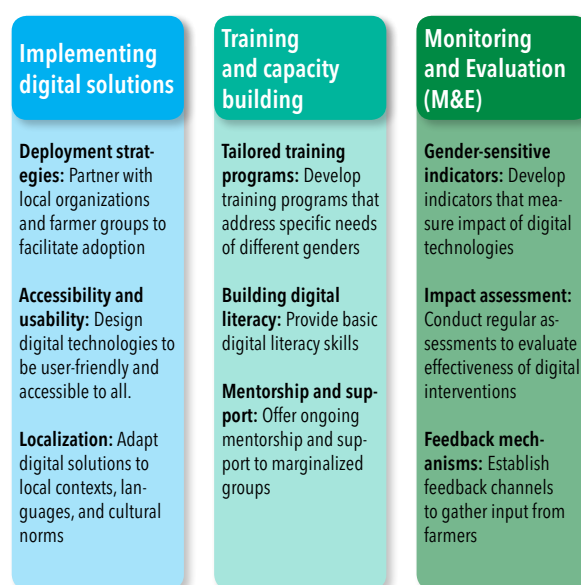
### Monitoring and Evaluation (M&E)

Robust monitoring and evaluation (M&E) systems are essential to assess the impact of gender-responsive digital technologies. Key components of M&E include:

**Gender-sensitive indicators:** Developing indicators that measure the impact of digital technologies on the lives of men, youth and women, including changes in income, productivity, empowerment, attitude, practices and decision-making power.

**Impact assessment:** Conduct regular assessments to evaluate the effectiveness of digital interventions and identify areas for improvement.

**Feedback mechanisms:** Establishing feedback channels to gather input from both men and women farmers on their experiences and needs can help refine and improve digital solutions.



## CASE STUDIES AND BEST PRACTICES IN AFRICA

**Green Agro Solution operationalizing the Lersha Digital Platform through the Gender Equality Initiative Empower in Ethiopia with World Vegetable Center and SNV** (<https://www.youtube.com/watch?v=PM2W06tVWy0>)

The Lersha Digital Platform, developed under CGIAR's Gender Equality initiative (HER+), has significantly transformed the agricultural landscape for women farmers in Ethiopia. Collaborating with the World Vegetable Center and SNV, this initiative aims to promote gender-responsive digital technologies that enhance empowerment, resilience, and food security.

In rural communities where women and men work tirelessly to cultivate their lands, access to quality farm inputs and reliable markets has been a persistent challenge. The Lersha platform addresses this issue by connecting smallholder farmers to a vast network of trusted input dealers and off-takers. With just a few taps, farmers can easily access fast and affordable farm inputs, mechanization services, and dynamic agro-climatic advice.

The platform specifically empowers women through Vegetable Business Networks, facilitating collaboration and knowledge sharing among farmers. These networks enable women to negotiate fair prices and stabilize markets for their produce, ensuring they are no longer isolated in their endeavors. As a result, women farmers are experiencing increased yields and improved livelihoods. Through these efforts, women farmers are not only thriving but also playing a pivotal role in transforming their agricultural practices and food systems.

**Strengthening Capacity of Extension Officers in Gender-responsive Bean Research, Digital Extension and Agribusiness, in Laikipia and Nyeri Counties, Kenya** (<https://alliancebioversityciat.org/stories/extension-officers-gender-responsive-bean-research-digital-agribusiness>)

The Alliance of Bioversity International & CIAT has spearheaded the development and deployment of innovative interactive bean animations to disseminate critical information on bean production

and marketing to smallholder farmers, with a particular focus on reaching women and other marginalized groups.

Through a training program organized with the Kenya Agricultural and Livestock Research Organization (KALRO), extension officers from Laikipia and Nyeri counties were introduced to a suite of bean animations developed by the PABRA. These visually engaging, multilingual animations cover a wide range of topics, from land preparation and seed selection to post-harvest management and the nutritional benefits of beans. The extension officers are now better equipped to provide accessible, gender-responsive information to farmers, empowering them to make informed decisions and adopt improved agricultural practices. The adaptability and interactive nature of the bean animations have proven particularly valuable in overcoming literacy barriers and ensuring that critical knowledge reaches all members of the farming community, including women who have traditionally faced challenges in accessing extension services. As the use of these digital technologies continues to expand, the Alliance of Bioversity International & CIAT initiative stands as a model for how innovative, gender-responsive approaches can strengthen the capacity of agricultural extension systems and transform smallholder farming in Kenya.

**Malawi: Transforming seed systems in Malawi to respond to bean variety demand through multi-stakeholder platforms (MSPs) initiative, led by the Alliance of Bioversity International & CIAT through Pan-Africa Bean Research Alliance (PABRA)**

The "Transforming seed systems in Malawi to respond to bean variety demand through MSPs" initiative, led by the Alliance of Bioversity International & CIAT through PABRA, has made significant strides in promoting gender-responsive digital technologies in agriculture. The project has empowered women farmers in rural areas who lack smartphone access by developing a USSD platform in collaboration with Tradeline and Michigan State University. This technology allows them to buy and sell agricultural products directly, bypassing intermediaries and ensuring they receive fair prices. The initiative also focused

on capacity building, providing targeted training to women farmers, ensuring they could effectively use these digital tools. Moreover, the project emphasized the importance of stakeholder engagement through multi-stakeholder platforms (MSPs), ensuring women’s voices were central in decision-making processes. The initiative has not only enhanced their productivity and income but also promoted greater gender equality in Malawi’s agricultural sector by addressing the unique challenges women farmers face and involving them in developing digital solutions.

(<https://www.pabra-africa.org/digitalizing-malawis-common-bean-value-chain/>)

In addition, PABRA has national and regional multi-stakeholder WhatsApp groups comprising of researchers, bean seed multipliers, agro-input suppliers, farmers, facilitators, and mechanization service providers that are used to link farmers to various services related to seed sources, agro-input suppliers and mechanization service providers.

### Lessons learned

**Inclusive design:** Develop digital technologies accessible to all, especially women in rural areas. Using technologies such as USSD technology and offering training in local languages ensures that even those without smartphones or advanced digital literacy can engage with these platforms effectively.

**Addressing barriers:** Tackle structural barriers that prevent women from fully participating in digital agriculture, such as time constraints, limited mobility, and the need for spousal consent. Strategies like spousal engagement and flexible service offerings are essential to overcoming these challenges.

**Stakeholder engagement:** Engage women and other key stakeholders throughout the design and implementation of digital solutions. Multi-stakeholder platforms (MSPs) ensure that women’s voices are heard and that the technologies developed address their specific needs and challenges.

**Economic empowerment:** Digital inclusion initiatives should focus on providing women with the tools they need to enhance their economic

opportunities. This includes offering financial literacy training, access to mobile devices, and platforms that connect them to broader markets, collectively contributing to income growth and financial security.

**Sustainability:** Digital initiatives must include continuous support and adaptation for long-term success. Ongoing training, change management strategies, and community engagement are crucial to ensuring that women continue to benefit from these technologies.

**Integrated communication approach:** For a wider and inclusive reach, an integrated approach combining digital and non-digital approaches is needed. This community-based and driven approach considers the geographical, cultural, social, and institutional context of the community. It also engages church and traditional authorities, which are vital in changing social norms and can also be enablers or barriers to the sustainability of any project.

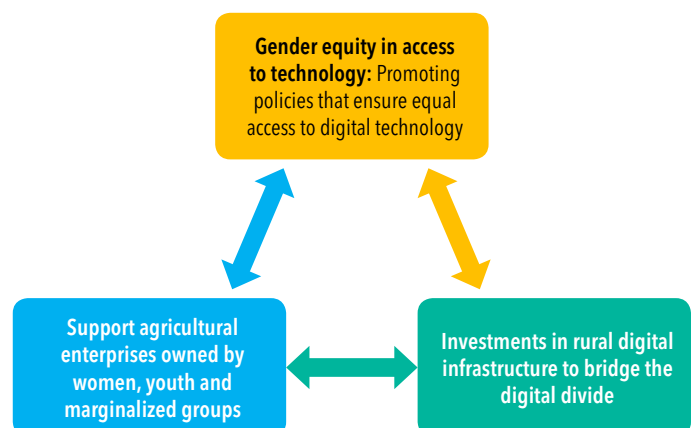
## POLICY AND ADVOCACY

### Policy frameworks for gender-responsive digital technologies

**Supportive policy environments** are essential to effectively leveraging digital technologies for agricultural development and gender equality. Key policy areas to focus on include:

#### Gender equity in access to technology:

Promoting policies that ensure equal access to digital infrastructure, devices, and training for women and men. This includes addressing affordability, digital literacy, and infrastructure gaps in rural areas.



### **Support agricultural enterprises owned by women, youth and marginalized groups:**

Creating enabling policies to support agricultural businesses owned by women, youth and marginalized groups, including access to finance, markets, and technology.

### **Investments in rural digital infrastructure:**

Prioritizing investments in rural broadband connectivity, digital infrastructure, and digital skills development to bridge the digital divide.

### **Recommendations:**

- Integrate gender perspectives into existing and emerging digital and agricultural policies.
- Ensure that all genders are represented in policy-making processes at all levels.
- Develop specific policies to address the unique challenges faced by men and women farmers in accessing and utilizing digital technologies.
- Promote public-private partnerships to accelerate the development and deployment of gender-responsive digital solutions.
- Develop gender-friendly digital technologies and tools and not try to change women, youths or marginalized groups to fit within the existing technologies
- An integrated approach is key

### **Advocacy strategies**

**Engaging stakeholders:** Building strong partnerships with government agencies, NGOs, private sector organizations, and community groups to advocate for gender-responsive digital agriculture.

**Promoting gender equity:** Raising awareness about the importance of gender equality in agriculture and the potential of digital technologies to empower women, youth and marginalized groups.

**Knowledge sharing:** Disseminating research findings, case studies, and best practices to inform policy discussions and decision-making.

**Capacity building:** Strengthening the capacity of civil society organizations and farmer groups to advocate for gender-responsive policies and programs.



### **Funding and resources**

**Identifying funding opportunities:** Exploring funding sources such as government grants, international development aid, and private sector investments.

**Leveraging partnerships:** Collaborating with technology companies, financial institutions, and development organizations to share resources and expertise.

**Building financial sustainability:** Developing sustainable business models for digital agriculture initiatives to ensure long-term financial viability.

**Monitoring and Evaluation:** Tracking the impact of investments and demonstrating the return on investment to secure continued funding.

## **CONCLUSION**

### **Summary of key points**

#### **Understanding the gender digital divide -**

The significant disparities in agricultural roles and responsibilities between men and women are underscored, noting that women often face additional domestic burdens and limited access to essential resources. In addition, women and youth's access to and use of digital technologies are limited due to historical and cultural realities that disfavour women. Addressing these disparities is crucial for equitable agricultural development.

**Leveraging digital technologies** - Digital tools such as mobile apps, IoT devices, and drones have the potential to enhance agricultural productivity and efficiency significantly. However, the guide acknowledges the existing digital divide, which disproportionately affects women and rural communities, and stresses the need to bridge this gap.

**Gender-responsive design** - It is vital to design digital technologies with women's, youths', and marginalized people's specific needs in mind. This involves actively involving women in the design process to ensure the technologies are accessible, relevant, and effective for their unique contexts.

**Capacity building** - Providing targeted training and support to women farmers is essential to equipping them with the necessary digital skills. This capacity-building effort is crucial for enabling women to utilize digital technologies in agriculture fully.

**Policy and advocacy** - Supportive policies and advocacy efforts are critical in creating an enabling environment for women in digital agriculture. The guide highlights the importance of policy frameworks that promote gender equity and encourage public-private partnerships to support women's participation in digital agriculture.

### Call to Action

**Policymakers** - To drive meaningful change in agricultural development, policymakers must prioritize the integration of gender perspectives into both existing and emerging digital and agricultural policies. This requires ensuring that all genders are represented in policy-making processes, allowing for diverse voices and experiences. Additionally, policymakers should develop targeted policies that address the challenges women, youth, and marginalized groups face in accessing and utilizing digital technologies. They should also accelerate the development and deployment of gender-responsive digital solutions through promoting public-private partnerships.

**Development practitioners** - Development practitioners should design and implement projects that are sensitive to the needs of both men and women farmers, ensuring that interventions are truly inclusive. Collaborating with local organizations is essential for providing training and support that facilitates the adoption of digital technologies across all genders. Furthermore, practitioners should use gender-sensitive indicators to monitor and evaluate the impact of these digital interventions, ensuring that they contribute to equitable and sustainable agricultural development.

**Technology developers** - Technology developers have a unique opportunity to create digital solutions that empower all genders in agriculture. They must focus on developing accessible and relevant technologies that meet the diverse needs of men, youth, and women farmers as well as value chain actors. They should engage all genders in the design process through focus groups, interviews, and participatory design workshops to ensure that the solutions are responsive to the realities of all users. Moreover, developers should prioritize creating user-friendly digital tools adaptable to local contexts and languages, making them more effective and widely adopted.

#### POLICYMAKERS

- Integrate gender perspectives into existing and emerging digital and agricultural policies.
- Ensure representation of all genders in policy-making processes.
- Develop specific policies to address the unique challenges faced by women, youth, and marginalized groups in accessing and utilizing digital technologies.
- Promote public-private partnerships to accelerate the development and deployment of gender-responsive digital solutions.

#### DEVELOPMENT PRACTITIONERS

- Design and implement gender-sensitive projects that address the needs of both men and women farmers.
- Partner with local organizations to provide training and support for the adoption of digital technologies.
- Use gender-sensitive indicators to monitor and evaluate the impact of digital interventions.

#### TECHNOLOGY DEVELOPERS

- Create accessible and relevant digital solutions tailored to the needs of all genders.
- Engage both men and women in the design process.
- Ensure digital solutions are user-friendly and adaptable to local contexts and languages.

## APPENDICES

### Glossary of terms

**Blockchain** - A decentralized digital ledger technology used to enhance supply chain transparency, traceability, and food safety by securely recording transactions ([Ghiro et al., 2021](#)).

**Digital literacy** - The ability to use digital devices, communication tools, and networks to access, manage, integrate, evaluate, and create information ([Osterman, 2013](#)).

**Digital technologies** - Innovative tools and solutions such as mobile applications, IoT devices, drones, and data analytics used to enhance productivity, efficiency, and sustainability in agriculture ([Duncan et al., 2021](#)).

**Gender-responsiveness** - An approach that considers the unique challenges and opportunities faced by men and women in agriculture. It involves designing technologies with gender-specific needs, preferences, and constraints in mind ([Alliance Bioversity & CIAT](#)).

**Gender-sensitive indicators** - Indicators that measure the impact of digital technologies on the lives of both men and women, including changes in income, productivity, and decision-making power ([FAO Climate-smart Agriculture Sourcebook](#)).

**Internet of Things (IoT)** - A network of physical devices embedded with sensors, software, and other technologies to connect and exchange data with other devices and systems over the internet ([Alliance Bioversity International & CIAT](#)).

**Participatory design** - A design approach that actively involves stakeholders, including end-users, in the design process to ensure that the final product meets their needs and preferences ([Steinke et al., 2022](#)).

**Precision agriculture** - A farming management concept based on observing, measuring, and responding to inter- and intra-field variability in crops. It uses technologies such as drones and IoT devices for data collection and analysis ([Alliance Bioversity International & CIAT](#)).

**Remote sensing** - The use of satellite or aerial sensor technologies to detect and classify objects on Earth. In agriculture, it helps monitor crop health, soil conditions, and environmental changes ([ICAR](#)).

**Unmanned aerial vehicles (UAVs)** - Commonly known as drones, UAVs are used for crop health monitoring, pest and disease detection, and precision spraying in agriculture ([Boursianis et al., 2022](#)).

### Additional resources

[Alliance Bioversity & CIA: Understanding Basic Gender Concepts](#)

[FAO Climate-smart Agriculture Sourcebook](#)  
[The Interaction Design Foundation](#)

[ICAR](#)

[Alliance Bioversity International & CIAT: Precision Farming](#)

[Alliance Bioversity International & CIAT: Internet of Things and Agricultural Technology](#)

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## Checklists, templates and guidelines

### Checklist for gender-responsive technology design

ELEMENTS	CONSIDERATION	STATUS
Conduct a gender analysis	Have you analyzed the specific needs of both women and men in the target agricultural community?	Yes/No
User involvement	Are women actively involved in the design and feedback processes of the technology?	Yes/No
Accessibility	Does the technology consider literacy levels, language, and time constraints of women?	Yes/No
Customization	Can the technology be adapted to different contexts, particularly those of women in rural areas?	Yes/No
Privacy and security	Does the technology ensure the privacy and security of women users?	Yes/No

### Template for gender-responsive digital technology project planning and evaluation

#### PROJECT PLANNING

Elements	Description	Guiding questions
Project objectives	Define the gender-responsive objectives of your project.	How will this project address the specific needs of women in agriculture?
Stakeholder engagement	Plan for the involvement of both men and women in the project.	How will you ensure the active participation of women stakeholders?
Resource allocation	Allocate resources with gender equity in mind.	Are sufficient resources dedicated to ensuring women's participation and benefit?
Implementation plan	Develop timeline that consider the schedules of women farmers.	How will the project timelines accommodate the daily routines of women?
Monitoring & evaluation	Establish M&E criteria that include gender-disaggregated data.	What indicators will you use to measure the project's impact on women?

#### PROJECT EVALUATION

Elements	Evaluation criteria	Consideration
Impact on women	Assess how the project has benefited women.	What positive changes have occurred for women as a result of the project?
Challenges and barriers	Identify challenges faced by women during the project.	What barriers did women encounter, and how were they addressed?
Feedback mechanisms	Ensure feedback is collected from both women and men.	Were women able to voice their opinions and suggestions effectively?
Sustainability	Evaluate the long-term sustainability of benefits for women.	How will the project continue to benefit women after its completion?
Lessons learned	Document key lessons for future gender-responsive projects.	What did the project reveal about gender dynamics in digital technology use?

## Best practices for inclusive technology implementation.

**Inclusive needs assessment:** Conduct thorough needs assessments that specifically include women to understand their unique challenges and opportunities in agriculture.

**Gender-sensitive design:** Design digital tools that are user-friendly for women, considering factors like literacy levels, language preferences, and cultural norms.

**Training and capacity building:** Provide tailored training programs for women, ensuring that they are designed to accommodate their time constraints and responsibilities.

**Engagement of women in decision-making:** Actively involve women in the decision-making

processes related to technology adoption and implementation in agriculture.

### **Monitoring & evaluation with gender focus:**

Use gender-disaggregated data to monitor and evaluate the impact of technology on both women and men, making adjustments as necessary to address any disparities.

### **Collaboration with gender-focused organizations:**

Partner with organizations that have expertise in gender issues to enhance the effectiveness of your gender-responsive technology initiatives.

**Continuous feedback loops:** Establish continuous feedback mechanisms to gather input from women users and adapt the technology as needed to better serve their needs.





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