



Task Force 6  
Accelerating SDGs: Exploring New  
Pathways to the 2030 Agenda

# HARNESSING DIGITALISATION TO PROMOTE EQUITABLE AND SUSTAINABLE AGRICULTURE AND FOOD SYSTEMS: POLICY AND INVESTMENT PRIORITIES FOR THE G20

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# Abstract



**D**igitalisation promises to positively transform agriculture and food systems globally. However, its diffusion differs widely among the G20 countries. Adoption is hindered by a persistent digital divide related to digital skills and infrastructure, a highly heterogeneous sector that requires locally adapted solutions, and knowledge deficits about the benefits and risks of digital solutions. The hurdles are particularly high for small-scale producers who often do not have the required financial, technological, or

digital capacities to take advantage of digital opportunities.


The G20 can play a key role by encouraging and supporting their governments, in collaboration with other actors, to (1) commit to coordinated policy action for standard-setting, quality control, and data protection; (2) build digital capacities, in particular, among small-scale producers; (3) improve access to and the uptake of digital solutions in agriculture; and (4) invest in ecosystems to stimulate innovation and scaling of digital agriculture solutions.<sup>a</sup>

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a The policy brief is a multi-stakeholder and multi-country endeavour. It builds on insights of a working group comprising global experts, including representatives from academia, industry, civil society, and policy.



# **The Challenge**



# **1**



**D**igitalisation holds great potential to positively transform agriculture and food systems globally. It can enable the sustainable production of adequate and nutritious food for all. Through the facilitation of sustainable practices among small and large producers across the G20 member states and beyond, it can make substantial contributions towards achieving the Sustainable Development Goals (SDGs), especially ‘zero hunger’, ‘no poverty’, ‘good health and well-being’, ‘gender equality’, ‘decent work and economic growth’, ‘climate action’ and ‘life on land’.

The diffusion of digital solutions in food systems-related activities differs widely among the G20 countries. In the Americas and Europe, it is the larger agricultural producers that often lead the digital uptake. Particular attention should be paid to ensuring that small-scale producers are not excluded. Among the world’s 608 million farms,

510 million are less than 2 hectares but still generate over a third of the global food supply.<sup>1</sup> In the G20 context, many small farms like those in China, India, and Indonesia do not have adequate access to 3G networks (see Figure 1). While not exclusively so, small farms are found in significant numbers across the G20 countries, including higher-income ones like South Korea, Japan, and Saudi Arabia. While smaller farms in such countries generally have high levels of 3G connectivity, they lag behind their larger competitors when it comes to adopting digital technologies.<sup>2</sup>

Efforts to promote digitalisation for food security and income generation are incomplete without widespread adoption, particularly among small-scale producers, so that beneficiaries enjoy the resulting opportunities equitably. It is, therefore, imperative to address the following challenges: access and accessibility, functioning ecosystems, and impact-risk assessment.

**Figure 1: Prevalence of small farms and 3G coverage in croplands in G20 countries**



Note: Varying years. Values for countries with \* computed using FAO data (see endnote 1 for details). Sources: See endnotes 1 (farms) and <sup>3</sup> (3G coverage). For farms size data for Russia and South Africa, endnotes <sup>4</sup> and <sup>5</sup> apply, respectively.

## **Access and accessibility constraints remain unaddressed**

Access and accessibility to digital solutions are hindered due to uneven availability, quality, and utilisation of digital infrastructure, as well as high cost of technologies.<sup>6</sup> In many G20 countries, agricultural lands are underserved, so they may not enjoy fast and reliable mobile networks (i.e., 3G and above). In least-developed countries, particularly, the cost of digital technologies and mobile data remains high, rendering digital tools unaffordable to many small-scale producers. Even among larger farms, there is still a need to adopt costly technical upgrades. Connectivity problems are compounded by gaps in access to electricity for charging devices and functioning mobile network infrastructure. In higher-income countries, high upfront investment costs hinder smaller farmers from taking up more sophisticated digital solutions.


Women are particularly disadvantaged in their access to mobile phones and the internet.<sup>7</sup> In 2022, women in low- and middle-income countries were 19 percent less likely to use mobile internet and 17 percent less likely to use a

smartphone than men. This disparity has been growing since 2020 and progress to close the gap has stalled.

Current capacity-building and financing efforts are inadequate to facilitate accessibility.<sup>8</sup> Limited skills can pose high barriers to entry into the digitalisation of agriculture space. Considering literacy disparities, voice-based solutions can reach more people in the agriculture sector than text-based tools, but such solutions are costlier to operate and scale up. Yet, agricultural producers with low digital capabilities are given little opportunity to enhance their digital skills and knowledge. Often, producers are also not involved in the design process of digital applications, which should be a prerequisite to adequately respond to their needs.

## **Ecosystems do not yet exist or are not functional**

Heterogeneity in systems, institutions, and actors inhibits the scaling of digital solutions in the agri-food sector. First is economic heterogeneity. In the G20, the agriculture sector is characterised by a wide range of differently sized and specialised producers and businesses, with a high prevalence of small entities



in some countries (see Figure 1). Unlike large corporations, small-scale producers usually do not have a central IT support unit or specialist that can own and implement digital solutions for them, obstructing any potential systematic synergy-building efforts. Second is environmental heterogeneity. Agricultural production depends on diverse and varying parameters such as vegetation, soil, weather and season. Furthermore, these environmental conditions are impossible to control, making it even more challenging to build an all-encompassing ecosystem. Third is institutional heterogeneity. Due to a lack of coordination in the policy sphere, countries often follow a sectoral approach without a clear national strategy or policy coherence.<sup>9</sup> The issues of digitalisation in agriculture are also frequently seen as the domain of the private sector rather than the public.


Too many promising pilots are unable to scale up, in part because innovators, investors, and governments are not tapping into potential synergies—not for innovation nor for agricultural data.<sup>10</sup> For agricultural start-ups, data acquisition remains challenging. Resources are misallocated to the development of tools or algorithms that already exist or to find

data available elsewhere. Where there is an ecosystem in place, it fails to look at the entire innovation value chain. Focus is typically on innovation, research, or commercially viable products, but the link across all three is often missing. Thus, service providers miss prime opportunities to cooperate and offer bundled services to create large-scale benefits. Privately-organised online platforms can help create synergies and share data. In their absence, particularly in lower-income countries, it is arguably the government that needs to step in to create this opportunity.

### **Potential risks of digitalisation are not fully understood and managed**

A thorough understanding of the real benefits and possible risks of digitalisation in agriculture is often missing.<sup>11</sup> Depending on how technologies are applied, they can promote equity, productivity, and sustainability or further deepen inequalities and environmental degradation. Digital advisory services, for instance, may empower agricultural producers to increase their productivity through climate-smart and environmentally sustainable practices,





but these can also lead to unsustainable outcomes. Where there is uncertainty about the impact of digital solutions, there is a chance that the full potential of digital solutions cannot be realised. It is critical that pertinent evidence-based research is carried out and timely evaluation conducted, where the impact on marginalised groups, the environment, and productivity are equally weighed.

Quality control mechanisms for digital agricultural solutions are mostly unavailable. Government standards for evaluation, certification, and monitoring to ensure that digital solutions contribute to sustainable and

inclusive agriculture, have not been developed. This means the onus is on providers of digital agriculture services to demonstrate its practical impact and potentially be more transparent about their mode of action, data use, and automation methods. Only then will agri-food actors trust these solutions to make informed decisions and use them purposefully. While efforts are underway to develop standards for smart farming, facilitated by the International Organization for Standardization (ISO), these processes are not sufficiently inclusive of the diversity among digital agricultural applications found across the G20 countries.<sup>12</sup>



# **The G20's Role**

# **2**






**T**he G20 can—and should—take the lead in responding where there is a lack of digital governance frameworks. After all, it makes up 85 percent of global GDP, 75 percent of global trade, and is home to two-thirds of the world’s population. The G20 has demonstrated commitment to advancing digitalisation in agriculture and closing the gap between digitally advanced countries and those that still lag behind. At the 2022 G20 Agriculture Ministers’ Meeting, the G20 leaders agreed that collaboration was fundamental for international organisations and national governments, guided by principles of equity and sustainability, to secure our collective digital agriculture future.<sup>13</sup> The 2022 Joint Finance and Agriculture Ministers’ Meeting also saw support for complementary national-level actions so that efficient coordination at regional and global levels could be achieved to address food insecurity.<sup>14</sup> Moreover, the G20’s work in this area is augmented by the Think20’s research-based policy advice drawn from a global think tank community. The work of its engagement groups, especially the Think20, supplements the G20’s mandate to deliver concrete policy measures.

Specifically, it can:

### **Facilitate a global platform for cooperation and knowledge exchange**

The G20 brings together a diverse group of countries whose agriculture sectors have different levels of digital advancement. This diversity offers unique opportunities for mutual learning and exchange. Joint research and development activities could help assess how precision farming tools from industrialised farming systems could be adapted to small-scale production contexts. At the same time, adaptation of lower-tech solutions developed in lower-income countries with a vibrant start-up scene could be explored for application in higher-income countries. The G20 is also instrumental in galvanising international support to set technical standards for hardware and artificial intelligence/machine learning so that data and models are made shareable and interoperable. There was consensus at the recent G20 Meeting of Agricultural Chief Scientists (MACS) in India regarding scientists, researchers, businesses, and government



representatives collaborating for mutual learning and making responsible investments in digital solutions and approaches for agriculture.<sup>15</sup>


**Promote coordinated regulatory actions at multilateral levels to strike a balance between data use and protection**

As digital solutions in agriculture become more sophisticated, large amounts of diverse data, which can be used to offer improved and targeted services to producers, are collected. However, in the absence of effective data protection frameworks, data could be used without the knowledge or consent of those providing it. While there are regulations adopted to protect personal data, they are unevenly developed in the G20 countries and not always enforced. Furthermore, not all agriculture data is personal data, and requires different regulatory frameworks, such as contract and competition laws and intellectual property rights.<sup>16</sup> Data regulation must also ensure that sufficient exchange and analyses are achievable as a precondition to advancing reliable and tailor-made digital solutions. There has been repeated emphasis placed during the G20 agriculture ministers' meetings

in the years prior that coordinated data and digital regulatory actions are needed to strike an acceptable balance between data use and protection. The G20 has a key role in coordinating and promoting appropriate frameworks for data governance, including data protection and sharing, especially in the agriculture sector.

**Strengthen the enabling environment for digitalisation in agriculture within and across countries**

A functioning innovation ecosystem is necessary to develop infrastructure, content, services, and solutions that benefit the multiple players in the food system. Digital agriculture start-ups, corporate innovators, and governments need to be connected to vulnerable groups, including small-scale producers and businesses, to foster productive and inclusive innovation. While, at the national level, governments can create an enabling environment for digital agriculture, the G20 needs to encourage the private sector to take the development and promotion of digital solutions for agricultural producers and businesses forward. The G20 MACS gathering in India in 2023 found



that through private investments into research, design, and marketing of digital solutions, private companies can complement national action plans and considerably determine the extent to which digitalisation supports equitable and sustainable agriculture outcomes.<sup>17</sup>

The G20 can support their efforts by providing a conducive environment for private sector actors to thrive and deliver digital solutions for sustainable, resilient, and inclusive agriculture and food systems.



# **Recommendations to the G20**



# **3**

**T**he G20 should encourage and support its member countries' governments, in collaboration with other actors, to do the following:

### **Committing to coordinated policy action**

Coordinated action at national and international levels is needed to enshrine the contributions of digitalisation to agriculture and realise its holistic potential in a manner that equitably benefits people and the planet. The G20 can support national governments' efforts to design roadmaps for digitalisation in agriculture that will guide domestic action and feed into international processes.


- Commit to the adoption of national action plans for digitalisation in agriculture through the final G20 leaders' declaration.
- Fund and attract related investments to build national capacity to conduct assessments of digital readiness and evaluate the impact of digitalisation in agriculture.
- Collaborate to set up regulatory frameworks and enforcement

mechanisms at national and international levels to ensure the privacy, protection, and utilisation of agriculture data.

- Set and implement differentiated standards to ensure quality digital solutions.
- Establish enforcement mechanisms to monitor implementation of laws and standards to build trust and maintain accountability.
- Account for differentiated levels of digitalisation in agriculture in international standard-setting processes (such as the ISO)
- Offer incentives for the adoption of digital solutions that promote sustainable agriculture practices.
- Establish interoperability standards for digital solutions along agriculture value chains where needed. This will help seamlessly integrate and foster complementary services, and facilitate data flows for improved collaboration and efficiency.

### **Building digital capacities**

Creating opportunities for building digital capacities across stakeholder groups on all levels should be a priority for the G20. Digital skills are a



prerequisite to take advantage of digital solutions and small-scale producers are often relatively more disadvantaged. Not only do they have a lower skill level in general, but their digital skills are also particularly low.

- Take action to mainstream digital skills development at all levels of education, from primary to tertiary, with a focus on localities and communities with lower levels of digital skills.
- Provide lifelong learning opportunities, for instance, through farmer field schools, to ensure that producers have the opportunity to keep up with rapidly changing technologies.
- Offer specialised training for extension service providers, administrators, and value chain players to enable them to effectively use digital tools and assist producers to do the same.
- Build capacities by fostering collaboration and cooperation using innovative knowledge-sharing platforms, collaborative learning spaces, and open-data solutions.
- Require digital service providers to pay specific attention to the needs and abilities of disadvantaged

groups when building tools and capacities (e.g., small-scale producers and businesses, women, and the youth).

### **Improving access and accessibility**

As a prerequisite for digitalisation in agriculture, equitable access to digital solutions requires equitable access to mobile connectivity. Primarily, investments in infrastructure are needed to bridge digital divides (between urban and rural areas, among higher- and lower-income countries, and between different genders). While digital infrastructure is a necessary condition for this, it alone is not sufficient. In fact, accessibility relies on the ability of small-scale producers and other actors to pay for and put to practical use the digital solutions that are on offer.

### **Promote infrastructure financing through direct investments and related policies:**

- Expand mobile connectivity through public or private investments or as part of private-public partnerships.
- Guide private sector investments by requiring mobile network



operators to invest in connectivity for disadvantaged users or pay into Universal Service Funds<sup>b</sup> to finance equitable access.<sup>18</sup>

- Develop integrated infrastructure plans that link mobile connectivity with other types of infrastructure needed to boost the agriculture sector, such as electricity, irrigation, roads, and marketing infrastructure. This will help ensure that agricultural producers can take advantage of connectivity improvements.
- Harness the academic prowess of the Think20 to advise on ambitious but differentiated infrastructure development plans for a global community.


**Support producers to implement digital solutions:**

- Fund digital literacy programmes to enable access to the opportunities afforded by digitalisation (also see Recommendation 2).

- Make financial resources available (through redirection of subsidies) to achieve adoption of digital technologies and minimise entry barriers in the uptake of digital solutions with an emphasis on reaching small-scale producers.
- Invest in the dissemination of digital technologies (installing sensors) at the producer-level to collect and share relevant and precise data globally and regionally (productivity levels and climate conditions) while protecting the rights of data providers.
- Involve producers from the beginning to encourage the design of needs-based digital solutions.
- Work with intermediaries to support small-scale producers install and maintain digital applications and infrastructure (farmers' organisations, value chain players, and extension agents).
- Support the expansion of digitalised financial services (access to capital or insurance) to increase the purchasing power of producers.

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b A funding mechanism employed by public administrators to mobilise private finances to deliver universal telecommunication services.



## Investing and designing functioning ecosystems

Conducive framework conditions will be needed to foster the development and adoption of digital solutions in the agriculture sector. Innovations should be guided by a vision of agriculture that promotes the SDGs and not just profit maximisation. Thus, equity and sustainability considerations should become an integral part of digital innovation in the agri-food system.

- Provide sustained and committed investments to institutionalise learning and exchange networks at national and regional levels (and global, where feasible).
- Build exchange platforms and foster cooperation among think tanks, researchers, producers (ranging from small-scale producers to multinational corporations), businesses, and policy makers.
- Foster knowledge exchange across sectors and countries on best practices, know-how, and even instances of failure.
- Facilitate the creation of national, regional, and global start-up ecosystems that specialise in digitalisation for agriculture.
- Support public investments in core data assets (e.g., soil and water maps, weather data layers, and farmer registries) and data sharing mechanisms in accordance with data protection requirements.
- Incentivise collaborative innovation and data-sharing across the entire ecosystem (i.e., traders, companies, banks, insurance companies, producers).
- Strengthen the broader enabling environment for agriculture to equip producers to take advantage of digitally enabled advice and market linkages.

Attribution: Heike Baumüller et al., “Harnessing Digitalisation to Promote Equitable and Sustainable Agriculture and Food Systems: Policy and Investment Priorities for the G20,” *T20 Policy Brief*, June 2023.

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