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Policy Brief

Accelerating SDG Progress through Digital Transformation of Agri-Food Systems: A G20 Action Plan for Deep Sustainability

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Key Messages:

- Digital transformation is essential for building resilient, sustainable and equitable agri-food systems capable of meeting global food security needs.
- The G20 is uniquely positioned to champion a coordinated global agenda for digital agriculture, especially under the United States' second cycle of an SDG-focused presidency.
- A digital–innovation–sustainability nexus approach is needed to align infrastructure, data governance, and incentives for technological adoption.
- Smallholder farmers – especially women and youth – must be at the centre of digital capacity-building efforts to avoid widening digital divides.
- A digitally enabled virtual food reserve mechanism can strengthen crisis preparedness and global food system stability.
- Collective action through the G20 can accelerate agricultural digitalisation and revitalise progress towards SDG targets by 2030.

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Global agri-food systems are under acute pressure from climate change, conflict, persistent inequality, and continued population growth. The result is rising food insecurity and widening gaps in progress towards the Sustainable Development Goals (SDGs), particularly across the Global South. Digital transformation offers a powerful pathway to reverse these trends by increasing productivity, reducing environmental impacts, strengthening resilience, and improving food system governance. Building on commitments from the past four Global South G20 Presidencies – Indonesia (2022), India (2023), Brazil (2024), and South Africa (2025) – the United States G20 Presidency in 2026 has a unique opportunity to consolidate momentum through a coherent, forward-looking framework that links digitalisation with sustainability and SDG acceleration.

This policy brief proposes a G20 action plan grounded in a digital–data–innovation–sustainability nexus. It highlights five drivers of digital transformation: productivity gains, improved market access and inclusion, enhanced resilience, strengthened food and nutrition security, and data-driven policymaking. To realise these benefits, the G20 should expand rural digital infrastructure, promote responsible data governance, incentivise sustainable digital innovations, and build institutional and financial capacity, especially for women and youth. The brief also calls for establishing an international governance structure for digitally enabled virtual food reserves to support food security during crises. Together, these measures can help G20 members build more productive, sustainable, and equitable food systems and accelerate SDG achievement by 2030.

Introduction

Global food security is facing a pivotal moment. The compounding impacts of climate change, geopolitical instability, uneven post-pandemic recovery, and persistent structural inequalities have revealed the fragility of agri-food systems worldwide. As supply chains tighten and environmental pressures intensify, the world is veering off track from achieving multiple SDG targets by 2030. Agri-food systems – central to SDGs 1, 2, 3, 8, 12, 13, and 15 – require a fundamental transformation grounded in resilience, inclusivity, and sustainability. Digitalisation offers an urgently needed pathway to support this transformation. It can boost productivity, reduce environmental impacts, strengthen supply chains, empower marginalised groups, and enhance evidence-based policymaking.

Recognising this potential, Indonesia (2022), India (2023), Brazil (2024), and South Africa (2025) – through their G20 presidencies – have underscored the importance of leveraging digital technologies to strengthen food security and support sustainable development. The United States now has a unique opportunity to carry this agenda forward and shape a coherent global framework for digitally enabled, sustainable agri-food systems.

This policy brief outlines why digital transformation is essential and proposes an actionable plan for G20 leadership based on three pillars: advancing the digital–innovation–sustainability nexus; building capacity and expanding inclusion; and designing an international governance mechanism for digitally enabled virtual food reserves.

Why Digital Transformation Matters for Food System Resilience

Digitalisation in agriculture is not simply about modernising production techniques. It reshapes the entire value chain – from on-farm decision-making and climate-smart resource management to market linkages, financial inclusion, and policy

formulation (Falola and Adewumi, 2012). Nevertheless, five factors illustrate why digital technologies are indispensable for achieving food and nutrition security, especially across the Global South.

Enhancing productivity and efficiency

Digital tools empower farmers to make informed decisions on planting, fertiliser application, water management, and pest control. Precision agriculture technologies – such as soil sensors, drones, and satellite-based advisory systems – optimise resource use and reduce input costs. These innovations not only increase yields but also reduce environmental footprints by curbing fertiliser runoff, pesticide overuse, and water waste. These potential productivity gains are particularly significant for smallholders who face chronic constraints in access to inputs and extension services (ASEAN, 2022).

Improving market access and inclusivity

Digital platforms are transforming how farmers connect with markets. Mobile applications offering real-time price information, weather forecasts, and agronomic advice improve transparency and bargaining power. Women farmers – who often face mobility constraints – benefit from digital tools that provide market access, financial services, and knowledge without requiring physical presence in marketplaces. By reducing dependency on intermediaries, digitalisation can increase farmer incomes and strengthen rural livelihoods (FAO, 2022).

Advancing sustainability and climate resilience

Environmental sustainability is tightly linked to digital capabilities. Satellite monitoring can track land degradation, water stress, and crop health, enabling targeted interventions. Digital supply chains improve traceability and accountability, helping to reduce food loss and waste. Real-time environmental data also supports climate-smart practices such as integrated pest management and conservation agriculture. These shifts are essential for restoring soil health, preserving biodiversity, and reducing greenhouse gas emissions (ADB, 2022).

Strengthening food security and nutrition

Digitalisation enhances the availability, accessibility, and utilisation of food. From optimising production to reducing post-harvest losses, digital innovations strengthen food supply stability. Mobile platforms can also disseminate nutritional guidance and promote healthier consumption patterns. For countries facing recurrent climate shocks or conflict-driven disruptions, digital tools provide early warning systems for food shortages and support more effective emergency responses (WEF, 2024).

Enabling data-driven policymaking

Data is becoming a strategic resource for agriculture. High-quality, interoperable datasets allow policymakers to design better-targeted subsidies, insurance schemes, and climate adaptation strategies (BSCD, 2016). They also improve forecasting and risk management. Digital public infrastructure, including open data platforms, can encourage innovation by enabling agri-tech entrepreneurs to build new services built on shared datasets (Sołtysik-Piorunkiewicz, 2023).

Together, these factors underscore the urgency of building a coordinated global approach to digital agriculture. The G20 – comprising both major agricultural exporters and import-dependent economies – has the scale, resources, and political weight needed to drive this agenda.

A G20 Framework for Advancing the Digital–Innovation–SDG Nexus

The United States' G20 Presidency in 2026 should advance a multi-year action plan as illustrated in Figure 1, that systematically links digital transformation with sustainable food system development. A digital–innovation–SDG nexus approach recognises that infrastructure, data governance, technological innovation, and environmental stewardship must progress in tandem to generate lasting impact.

Expanding digital infrastructure for rural inclusion

Digital transformation cannot succeed without addressing persistent digital divides. Many rural communities across the Global South still lack reliable connectivity, affordable devices, and basic digital literacy. The G20 should champion investments in broadband infrastructure, satellite connectivity, and rural digital hubs. Innovative financing mechanisms – such as blended finance, public–private partnerships, and concessional lending – can accelerate the deployment of digital public infrastructure and improve affordability.

Establishing responsible data governance frameworks

Effective data governance must balance innovation with ethical safeguards. Farmers should retain agency over their data while benefiting from shared insights and digital services. The G20 should develop voluntary guidelines covering data privacy, security, interoperability, and the ethical use of artificial intelligence in agriculture. Greater alignment of data governance principles across major economies would facilitate cross-border data flows and support transparent, equitable digital ecosystems.

Incentivising digital innovation for sustainability

Technological innovation is central to achieving sustainable agri-food systems. The G20 should encourage research and development in climate-smart agriculture, regenerative farming practices, efficient water management systems, and biodiversity monitoring tools. Innovation sandboxes, challenge funds, and green investment incentives can help de-risk experimentation, support agri-tech start-ups, and mobilise private-sector engagement in emerging markets.

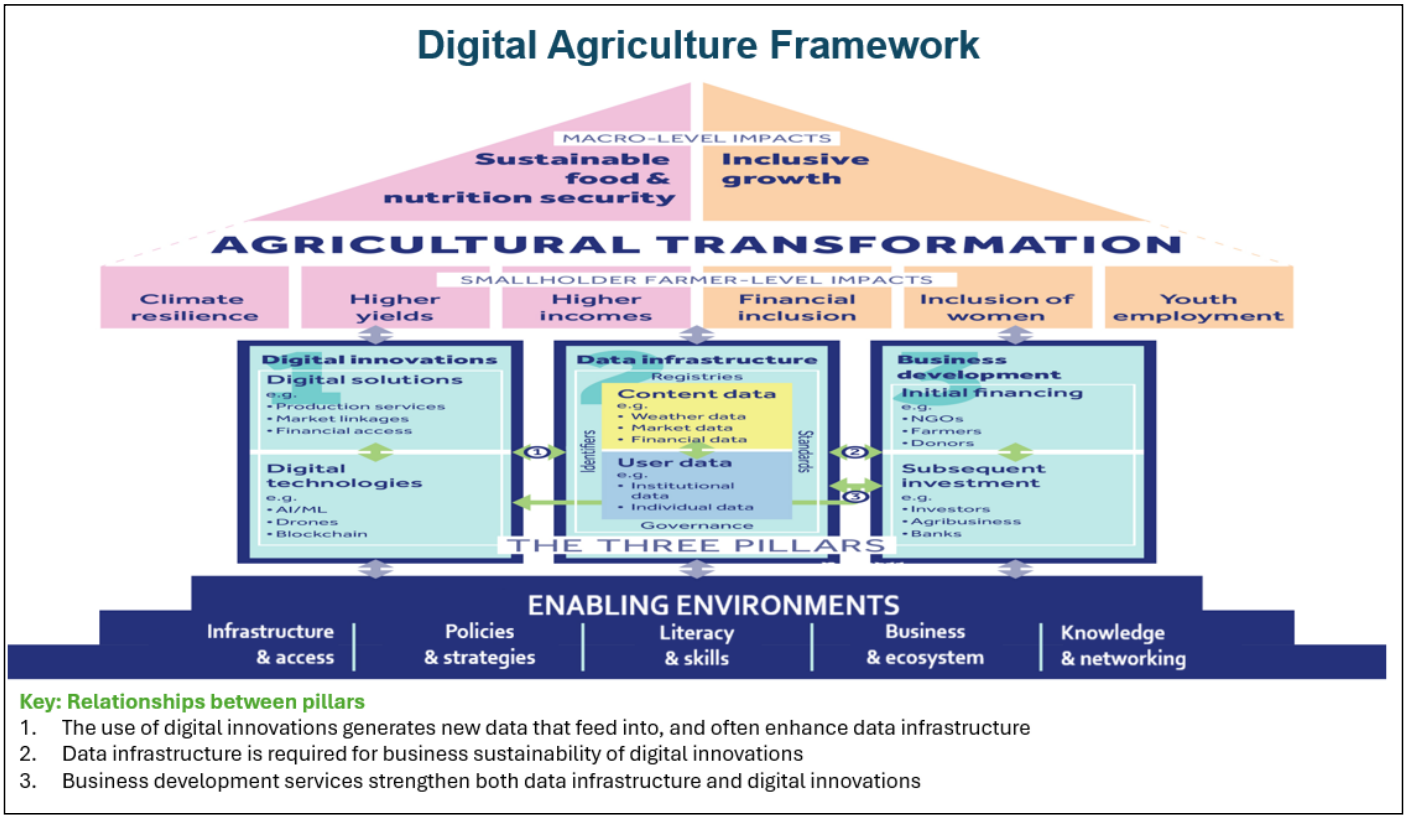
Strengthening knowledge exchange and cooperation

A dedicated G20 digital agriculture platform could facilitate the sharing of best practices, promote South–South and triangular cooperation, and support institutional and human capacity building. Such a platform could highlight scalable solutions from the Global South, including digital extension services, inclusive e-commerce platforms, early warning systems, and remote sensing applications.

Aligning digital agriculture with national SDG strategies

National development strategies should embed digital agriculture as a core instrument for achieving SDG targets. Aligning digital transformation initiatives with climate strategies, food security policies, and rural development programmes can reduce policy fragmentation and ensure more coherent and effective implementation.

Figure 1: Connected SDG Solutions for Improved Agricultural Productivity, Resilience, and Sustainability: A G20 Digital Transformation Framework



Key: Relationships between pillars

1. The use of digital innovations generates new data that feed into, and often enhance data infrastructure
2. Data infrastructure is required for business sustainability of digital innovations
3. Business development services strengthen both data infrastructure and digital innovations

Source: Authors.

Empowering Smallholder Farmers, Women, and Youth Through Capacity Building

Digitalisation can exacerbate inequalities if marginalised groups lack the skills, resources, or institutional support needed to participate. Smallholder farmers, women, and youth – who form the backbone of agricultural labour in many developing economies – must therefore be placed at the centre of G20 action.

Building digital literacy and technical skills

Governments should expand farmer-focused digital training programmes, including modules on the use of digital advisory tools, financial literacy, participation in digital marketplaces, and sustainable agricultural practices. Digital capacity building should be fully embedded within national agricultural extension systems and vocational education and training frameworks.

Co-designing user-centred digital tools

Digital solutions must be grounded in local realities. Engaging farmers in the design, testing, and adaptation of digital tools ensures usability, affordability, and relevance. Co-creation with rural communities can reduce barriers to adoption and help ensure that technologies address real constraints rather than assumed needs.

Strengthening extension and financial services through digitalisation

Agricultural extension systems should evolve to incorporate digital diagnostics, remote advisory services, and online training materials. In parallel, financial institutions should expand digital credit-scoring models, micro-insurance products, and mobile banking services to improve access to finance for underserved and informal farmers.

Supporting cooperatives and digital producer organisations

Farmer cooperatives and producer organisations can play a critical role in aggregating demand, lowering technology adoption costs, and strengthening farmers' bargaining power in digital marketplaces. Targeted public support can accelerate the diffusion of digital innovations while reinforcing collective action.

Addressing gender- and youth-specific barriers

Women farmers often face constraints related to mobility, access to finance, time burdens, and restrictive social norms, while youth encounter high entry barriers to agricultural entrepreneurship. G20 action should therefore promote dedicated programmes, including tailored training, technology vouchers, entrepreneurship incubators, and inclusive financing instruments for women and young agripreneurs.

Strengthening Food System Resilience Through a Digitally Enabled Virtual Food Reserve

Climate shocks, geopolitical tensions, and supply chain disruptions have underscored the need for stronger, more coordinated global mechanisms for food security crisis response. A digitally enabled virtual food reserve – supported by interoperable data platforms – can significantly enhance preparedness and response capacity while avoiding the financial and logistical costs associated with physical stockpiling.

A G20-led initiative could support the following actions:

- **Establishing common standards for food stock data**

  Harmonised methodologies for collecting and reporting data on production, storage, logistics, and market conditions would improve data quality, transparency, and comparability across countries.

- **Developing interoperable national and regional platforms**

  Linked digital systems would enable real-time monitoring of food availability and facilitate transparent, timely cross-border information sharing during periods of stress.

- **Deploying predictive analytics and early warning systems**

  AI-driven forecasting and risk assessment tools could identify emerging supply disruptions, price volatility, or climate-related shocks, enabling proactive and preventive policy responses.

Together, these elements would position a digitally enabled virtual food reserve as a landmark instrument for global food system risk management and accelerated progress toward the SDGs.

Conclusion

The global food system stands at a critical juncture. Mounting environmental, economic, and geopolitical pressures demand a fundamental transformation of agri-food systems to enhance resilience, sustainability, and inclusivity. When effectively governed, digitalisation offers a powerful catalyst for this transformation.

As the second cycle of the G20 begins under the United States' presidency in 2026, there is a unique opportunity to advance an ambitious, forward-looking agenda. By operationalising a digital–innovation–sustainability nexus, empowering women, youth, and smallholder farmers through targeted capacity building, and establishing a governance framework for digitally enabled virtual food reserves, the G20 can strengthen global food security and reinvigorate progress toward achieving the SDGs by 2030.

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