DAKSHIN
Development and Knowledge Sharing Initiative
GLOBAL SOUTH CENTRE OF EXCELLENCE

RIS
Research and Information System for Developing Countries
विकासशील देशों की अनुसंधान एवं सूचना प्रणाली

CENTRE FOR DEVELOPMENT AND ENTERPRISES GREAT LAKES
THINK TANK

International Workshop on

Harnessing Digital Technologies for Climate-Resilient and Sustainable Agriculture in Global South

29 May 2026

(Hybrid)

Proceedings Report

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Published by

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Executive Summary

Agriculture remains the backbone of economies across the Global South, supporting the livelihoods of nearly two-thirds of the population and contributing significantly to employment, national income, and food security. Yet, the sector faces mounting challenges arising from climate change, land degradation, declining water resources, fragmented markets, inadequate extension services, and limited access to finance. These constraints disproportionately affect nearly 500 million smallholder farming households, which continue to experience limited access to timely information, quality inputs, markets, financial services, and climate-resilient technologies.

Simultaneously, rapid advances in digital technologies including Artificial Intelligence (AI), Remote Sensing, Geographic Information Systems (GIS), the Internet of Things (IoT), Digital Public Infrastructure (DPI), mobile-based advisory services, blockchain, digital financial services, and data analytics are transforming agricultural systems worldwide. These innovations offer unprecedented opportunities to enhance productivity, strengthen climate resilience, improve resource-use efficiency, expand market access, and support evidence-based policymaking.

Recognising these opportunities, DAKSHIN – Global South Centre of Excellence, Research and Information System for Developing Countries (RIS), in collaboration with the Centre For Development and Enterprises Great Lakes (CDE), Burundi, organised the International Workshop on "Harnessing Digital Technologies for Climate-Resilient and Sustainable Agriculture in Global South" on 29 May 2026 in a hybrid format connecting New Delhi, India, and Bujumbura, Burundi. The workshop brought together policymakers, researchers, development practitioners, think tanks, universities, regional organisations, and international institutions from Africa, Asia, and the Caribbean to exchange experiences, identify common challenges, and explore opportunities for strengthening South–South Cooperation in digital agriculture.

The deliberations reaffirmed that digital agriculture has evolved beyond isolated pilot initiatives to become a strategic policy priority for building climate-resilient, productive, and sustainable agricultural systems. Participants agreed that the success of digital transformation depends less on the sophistication of individual technologies than on the strength of the enabling ecosystem, encompassing Digital Public Infrastructure, effective extension systems, institutional coordination, research and innovation, financing mechanisms, digital connectivity, capacity building, and public-private partnerships. The discussions further underscored that digital agriculture must remain farmer-centric, inclusive, affordable, and locally relevant, ensuring that smallholder farmers, women, youth, and digitally underserved communities are able to benefit from emerging technologies.

A key takeaway of the workshop was recognition that many of the practical and scalable digital agriculture solutions are emerging from within the Global South itself. Experiences shared from Africa, Asia, and the Caribbean demonstrated that countries facing similar agro-ecological, socio-economic, and institutional realities can learn significantly from one another through knowledge exchange, technical cooperation, collaborative research, and policy dialogue. The workshop reaffirmed that South–South Cooperation provides a powerful mechanism for accelerating innovation, reducing the cost of learning, and adapting context-specific solutions to strengthen food security, climate resilience, and sustainable rural development.

The workshop concluded by reaffirming DAKSHIN's commitment to advancing digital agriculture through sustained policy dialogue, collaborative research, technical cooperation, institutional partnerships, and capacity-building initiatives. It underscored the importance of building a vibrant South–South knowledge-sharing ecosystem that can facilitate the adaptation and scaling of proven digital solutions, ultimately contributing to enhanced food security, climate resilience, sustainable rural livelihoods, and inclusive agricultural development across the Global South.

1. Introduction

1.1 Agriculture in the Global South: Context and Challenges

Agriculture continues to underpin economic growth, rural livelihoods and food security across the Global South. Nearly 65–70 per cent of the population in many developing countries depends directly or indirectly on agriculture, and the sector contributes approximately 15–20 per cent of national GDP in several low and middle income economies. Beyond its economic weight, agriculture remains central to poverty reduction, employment generation, nutritional security, ecosystem sustainability and social stability.

The sector is nevertheless confronting a convergence of unprecedented pressures. Climate variability is increasing the frequency and intensity of droughts, floods, erratic rainfall and extreme weather events. Land degradation, declining soil fertility, water scarcity, biodiversity loss, fragmented landholdings and rising production costs continue to constrain productivity. Smallholder farmers who account for nearly 80 per cent of farms in developing countries remain particularly vulnerable owing to inadequate access to extension services, markets, finance, crop insurance, quality inputs and timely climate information.

1.2 The Digital Opportunity

Agriculture is simultaneously undergoing a profound technological transformation. Advances in Artificial Intelligence, machine learning, remote sensing, Geographic Information Systems, drones, precision agriculture, mobile advisory services, digital financial services, blockchain, the Internet of Things, weather intelligence and big-data analytics are reshaping production systems, value chains and governance structures. These innovations give governments new means to raise productivity, reduce climate risk, optimize resource use, strengthen market integration, enhance transparency and deliver agricultural services more efficiently.

Workshop participants were consistent in cautioning that digital agriculture should not be understood merely as the application of digital tools to farming. It is, more accurately, the construction of integrated agricultural innovation ecosystems in which technology is embedded within appropriate institutions, Digital Public Infrastructure, policy frameworks, extension systems, financing mechanisms, research collaboration and human capacity. In the absence of these enabling conditions, digital technologies tend to remain confined to isolated pilots and fail to achieve meaningful scale or durability.

India's own experience was repeatedly cited as an illustration of how Digital Public Infrastructure comprising digital identity systems, interoperable platforms, digital payments, geospatial information and emerging agricultural platforms such as AgriStack, Bharat-VISTAAR, e-NAM, the Pradhan Mantri Fasal Bima Yojana (PMFBY) and the Soil Health Card Programme can substantially improve service delivery, transparency and evidence-based decision-making. Participants were careful to note that such experiences are best understood as reference models for adaptation rather than templates for replication, given the differing institutional capacities and priorities of individual countries.

Equally central to the discussion was the recognition that innovation is increasingly emerging from within the Global South itself. Countries across Africa, Asia, Latin America and the Caribbean are developing practical, homegrown responses to shared challenges of climate adaptation, digital inclusion, market access and institutional strengthening underscoring the value of South–South Cooperation as a platform for exchanging, adapting and co-creating solutions that are affordable, context-specific and scalable.

2. DAKSHIN and the Workshop Partnership

DAKSHIN – Global South Centre of Excellence at Research and Information System for Developing Countries (RIS) was established by the Ministry of External Affairs, Government of India, to promote demand-driven development cooperation among countries of the Global South. It functions as a platform for policy research, knowledge exchange, capacity building and institutional partnership across priority sectors including agriculture, climate resilience, health, digital transformation, education and sustainable development.

Guided by the principles of mutual respect, demand-driven cooperation and shared learning, DAKSHIN identifies, documents and facilitates the adaptation of successful development experience across the Global South. Rather than promoting uniform solutions, the Centre emphasizes context-specific approaches responsive to the diverse socio-economic, institutional and agro-ecological realities of partner countries. Agriculture constitutes one of DAKSHIN's principal thematic priorities, pursued through policy dialogue, collaborative research, technical exchange, training and partnership with governments, think tanks, research institutions and international organizations.

The present workshop, convened jointly with the Centre For Development and Enterprises Great Lakes (CDE), Burundi, forms part of this broader agenda to strengthen South–South Cooperation in digital agriculture and to facilitate collaborative learning on approaches capable of enhancing food security, climate resilience and rural livelihoods across the Global South.

3. Workshop Objectives and Guiding Questions

The workshop was organized with the following objectives:

- To examine the role of digital technologies in advancing climate-resilient and sustainable agriculture across the Global South.
- To facilitate the exchange of experience, innovation and best practice in digital agriculture among developing countries.
- To showcase digital agricultural initiatives, including Digital Public Infrastructure, artificial intelligence, remote sensing, geospatial technologies, digital advisory systems and market information platforms.
- To identify the institutional, policy, technological and capacity-building requirements for scaling digital agriculture beyond pilot projects.

- To strengthen South–South Cooperation through collaborative research, technical exchange, knowledge sharing and institutional partnership.
- To explore future collaboration between DAKSHIN, CDE Great Lakes and partner institutions across Africa, Asia, Latin America and the Caribbean.
- To generate actionable recommendations for inclusive, farmer-centric and climate-resilient digital agriculture ecosystems across the Global South.

These objectives were operationalized through four guiding questions that structured the technical discussions: how digital platforms can deliver timely, actionable agro-advisories and market intelligence for farmer decision-making; how data analytics, artificial intelligence, remote sensing, GIS and blockchain can strengthen digital extension and service delivery; what enabling infrastructure and policy frameworks are required to scale adoption; and what barriers and opportunities exist for scaling proven solutions across diverse agro-ecological contexts.

4. Opening Session: Framing Digital Agriculture as a Strategic Priority

The workshop opened with a session chaired by Professor Sachin Kumar Sharma, Director General, RIS, and featuring introductory remarks by Dr Rajan Sudesh Ratna, Coordinator, DAKSHIN, and a keynote address by Dr Rebbie Harawa, Director Africa & Kenya Country Representative, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Welcome remarks were also delivered by Mr Aimable Manirakiza, Chief Executive Officer, CDE Great Lakes, and the keynote address on behalf of the Government of Burundi was delivered by Mr Damien Macumi, Permanent Secretary of the National Land Commission, Ministry of Environment, Agriculture, and Livestock.

4.1 Digital Agriculture as a Response to Converging Pressures

Welcoming participants, Professor Sachin Kumar Sharma, Director General, RIS, observed that agriculture across the Global South is under mounting pressure from climate change, natural-resource degradation, rising production risk, fragmented markets and growing demands for sustainable food systems pressures that require approaches extending beyond conventional agricultural development strategy. He framed digital technologies not as isolated interventions but as enablers of a broader transformation: integrating artificial intelligence, remote sensing, geographic information systems, digital public infrastructure, data analytics, precision agriculture, mobile advisory services, digital finance and interoperable public platforms into comprehensive agricultural innovation ecosystems.

Professor Sharma emphasized that the principal opportunity before developing countries lies not merely in adopting individual technologies but in building the ecosystems combining digital infrastructure, institutional capacity, policy support, extension systems, research collaboration and investment capable of reaching millions of smallholder farmers. He cited

India's Digital Public Infrastructure experience as a demonstration of how interoperable digital platforms, digital identity, geospatial information and digital payments can strengthen public-service delivery; agricultural extensions of this model, including AgriStack, Bharat-VISTAAR, e-NAM, PMFBY and the Soil Health Card Programme, were presented as reference experiences available for adaptation by partner countries according to their own institutional priorities.

Professor Sharma further noted that digital agriculture contributes directly to several Sustainable Development Goals, in particular SDG 2 (Zero Hunger), SDG 9 (Industry, Innovation and Infrastructure), SDG 13 (Climate Action) and SDG 17 (Partnerships for the Goals), and that accelerating digital transformation in agriculture will be critical to building resilient food systems under conditions of rising climate uncertainty.

4.2 South-South Cooperation as an Organizing Principle

Introducing the workshop, Dr Rajan Sudesh Ratna, Coordinator, DAKSHIN, highlighted that South–South Cooperation offers developing countries an unparalleled opportunity to learn from each other's experiences, adapt successful innovations, and jointly address common challenges in agricultural sector. He noted that many of the solutions most relevant to developing-country contexts are themselves emerging from within the Global South; innovations developed under comparable socio-economic and agro-ecological conditions in Africa, Asia, Latin America and the Caribbean were, in his view, likely to possess greater adaptability and long-term sustainability than externally designed models. He described DAKSHIN's mandate to facilitate demand-driven cooperation through policy dialogue, knowledge exchange, collaborative research, technical partnership and capacity building as directly responsive to this opportunity, and thanked CDE Great Lakes for partnering with DAKSHIN in organizing the workshop.

Mr Aimable Manirakiza, Chief Executive Officer, CDE Great Lakes, reinforced this framing from a national perspective in his welcome remarks, recalling that agriculture remains the principal pillar of Burundi's economic and social development and a central element of the country's Vision 2040–2060, even as the sector confronts climate shocks, limited access to information, weak market access and financing constraints. He identified mobile platforms, digital weather services, artificial intelligence and market information systems as offering significant opportunities to address these challenges, while stressing that technology alone is insufficient and must be supported by knowledge production, appropriate public policy and strong partnership. In the keynote delivered on behalf of the Government of Burundi, Mr Damien Macumi, Permanent Secretary of the National Land Commission, Ministry of Environment, Agriculture, and Livestock, reaffirmed the Government's commitment to supporting digital innovation through infrastructure development, capacity building and an enabling environment for technology adoption.

4.3 Institutional and Farmer-Centred Foundations for Digital Transformation

Delivering the keynote address, Dr Rebbie Harawa, Director Africa & Kenya Country Representative, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), placed particular emphasis on the institutional and human foundations required for digital transformation to succeed. She noted that while technologies such as artificial intelligence, remote sensing, climate information services, mobile advisory platforms, geospatial analytics and digital financial services are already demonstrating measurable impact across developing countries, technology alone cannot deliver transformation unless supported by effective extension services, reliable data systems, strong institutions and continuous capacity development.

Drawing on ICRISAT's extensive research experience across Africa and Asia, Dr Harawa stressed the

importance of co-designing digital solutions with farmers to ensure that technologies remain practical, affordable and responsive to local agricultural realities. She identified building trust within farming communities, improving digital literacy, strengthening local innovation ecosystems, and ensuring equitable access for women, youth and marginalized communities as prerequisites for successful adoption, and underscored international collaboration and South–South Cooperation in particular as a means of accelerating innovation while reducing implementation costs and avoiding duplication of effort. She closed by observing that digital transformation should ultimately be judged not by the sophistication of the technologies deployed, but by their capacity to improve farmers' livelihoods, strengthen resilience, and advance inclusive and sustainable agricultural development.

5. Panel Discussion I – Digital Agriculture in the Global South: Sharing Innovations, Best Practices, and Lessons Learned

The first panel discussion examined practical country experience in digital agriculture and distilled institutional, technological and policy lessons of relevance to other developing countries. The session was moderated by Dr Pratap Singh Birthal, Distinguished Fellow, RIS, with panel contributions from Burundi, Morocco and Kenya.

5.1 Framing the Discussion: From Pilots to Scale

In framing the session, the moderator, Dr Pratap Singh Birthal, Distinguished Fellow, RIS, observed that digital agriculture has moved beyond the stage of isolated pilot projects: there is now substantial global evidence that digital technologies improve agricultural outcomes, and the central policy challenge is no longer whether but how to build institutional ecosystems capable of delivering timely, inclusive and sustainable impact at scale. He framed digital agriculture as an integrated development strategy rather than the simple adoption of new tools one that requires strong digital public infrastructure, responsive extension systems, institutional coordination, digital literacy, research partnership, financing mechanisms and enabling policy environments capable of reaching millions of smallholder farmers.

Dr Birthal argued that the Global South constitutes an extraordinary laboratory of innovation: countries across Africa, Asia and Latin America are experimenting with digital advisory systems,

geospatial technologies, artificial intelligence, digital market platforms, weather information services and digital financial systems, frequently under resource constraints comparable to those of other developing countries, making these innovations highly relevant for South–South learning. He accordingly encouraged panelists to move beyond showcasing successful technologies and to reflect on institutional design, scaling strategy, inclusion, governance, interoperability and long-term sustainability and, in particular, on why certain initiatives succeeded in scaling while others did not.

5.2 Country Experience: Institutional Readiness and the Early Stages of Digital Adoption

Opening the panel discussion, Dr Jean Claude Nyamweru, Head of Agricultural Policy, CDE Great Lakes, presented Burundi's experience as that of a country at an early stage of digital agricultural transformation but with meaningful underlying momentum. He noted that agriculture employs around 80 per cent of Burundi's workforce and generates around 70 per cent of the country's foreign exchange, yet the use of modern agricultural technologies remains limited. Key constraints he identified included weak use of modern agricultural formats and technologies, underutilization of mobile telephony in agriculture, very limited use of agricultural applications, rare use of drones, satellite data confined largely to meteorological services, weak rural connectivity, and high technical-maintenance costs for smallholders. Against these constraints, he pointed to growing youth engagement in agricultural applications, the gradual expansion of mobile-phone use, the

central place of agriculture in national policy, and the role of partnerships among think tanks, research centres, government institutions and international partners as factors capable of accelerating adoption despite persistent infrastructure gaps.

Dr Nyamweru cautioned, more broadly, that digital agriculture should not simply replicate technologies developed elsewhere, but should be adapted to local socio-economic conditions, farming systems and institutional capacities reinforcing South–South Cooperation as a mechanism for contextual adaptation through collaborative learning and technical exchange, underpinned by stronger partnership among governments, research institutions, universities, the private sector and development organizations.

5.3 Country Experience: Demonstrating Reliability to Build Farmer Trust

Professor Hicham El Moussaoui, of the Université Sultan Moulay Slimane de Béni-Mellal, Morocco, illustrated how sustained public investment and demonstrated reliability, rather than technological sophistication alone, drive farmer adoption. He presented five field-based case studies, a national smallholder-support programme, and an experiment across 1,000 plots for basic fertilization, underscoring the importance of using farmers' local languages rather than relying solely on English or French. He also discussed a digital market platform connecting farmers with buyers, illustrating both the promise and the risk of such tools: while capable of opening markets, such platforms also face problems of fraud and weak trust, for which he proposed blockchain as a means of improving transparency.

Professor El Moussaoui presented the Marrakech smart-irrigation initiative a free tool combining satellite data and SMS alerts as a clear illustration of adoption dynamics: farmer registration rose from around 10 per cent in the first year to 60 per cent in the second, with a further 70 per cent increase in active users, demonstrating that adoption accelerates once reliability is demonstrated over time. He concluded that several digital agriculture initiatives perform well at pilot stage but encounter difficulty scaling because of fragmented institutional responsibility, weak coordination among agencies, insufficient financing and uneven digital literacy underscoring the importance of scalable institutional models, and not only technological innovation, in determining outcomes.

5.4 Country Experience: Designing for Inclusion from the Outset

Professor Linda Kavuka Kiguhi, Founder of think tank - SUVIRA Africa, Kenya, centred her contribution on the imperative of designing digital agriculture around the daily realities

of smallholder farmers limited internet access, low digital literacy, high climate risk and weak infrastructure. She noted that digital agricultural services in Kenya currently reach more than one million farmers, even as the sector continues to contend with limited internet access, severe droughts, fuel shortages that raise input costs, and insufficient agricultural insurance against climate shocks.

Professor Kavuka Kiguhi recommended simple, multilingual, offline-friendly and farmer-centred technologies, arguing that digital innovation must reach communities through local languages such as Swahili and Kikuyu, and citing satellite-data-based advisory and financial-access platforms designed from the outset to serve women and marginalized communities. She observed that important digital divides persist even in relatively advanced digital-agriculture markets, particularly among women, marginalized communities and geographically isolated regions, and argued that inclusive design affordable access, local-language content, gender-responsive extension, digital-literacy programming and community-based facilitation must be built in from the beginning rather than added later. She emphasized that digital transformation should complement rather than replace existing extension systems: human interaction, trust and local facilitation remain indispensable, particularly for first-generation digital users.

Panel Discussion I Key Messages

- Digital agriculture has become a policy imperative across the Global South, with the focus shifting from piloting technologies to scaling proven, farmer-centric solutions.
- The success of digital agriculture depends on enabling ecosystems, including Digital Public Infrastructure (DPI), robust extension systems, institutional coordination, financing mechanisms, digital connectivity, and capacity building, rather than on technology deployment alone.
- South-South Cooperation provides a powerful platform for sharing practical innovations, institutional models, and implementation experiences among countries facing similar agro-ecological, socio-economic, and policy challenges.
- Farmer-centric and inclusive approaches are fundamental to digital transformation. Solutions must be accessible, affordable, locally relevant, and responsive to the needs of smallholder farmers, women, youth, and digitally underserved communities.
- Strong extension services, local facilitation, and stakeholder partnerships remain essential for building trust, encouraging adoption, and ensuring long-term sustainability.

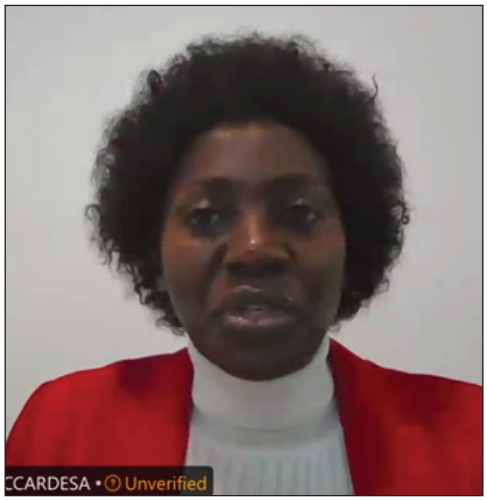
- Digital agriculture should be measured by its developmental impact its ability to improve agricultural productivity, farmers' incomes, climate resilience, food security, and sustainable rural livelihoods rather than by the sophistication of the technologies deployed.

6. Panel Discussion II: Exploring Opportunities for Collaboration and South-South Partnerships

The second panel discussion shifted the discussion from country-level innovation to the cooperation frameworks, institutional ecosystems and regional mechanisms required to accelerate digital agriculture adoption at scale. The session was moderated on the Indian side by Dr A. Sivasena Reddy, Advisor-Agriculture, DAKSHIN, RIS, and on the Burundi side by Professor Siméon Barumwete, Chairman of CDE Great Lakes, with panel contributions from Southern Africa, Southeast Asia, the Americas, and a dedicated segment on Burundi's trade, ICT and field-level innovation landscape.

6.1 Regional Coordination Mechanisms for Agricultural Research and Innovation

Dr Bridget Kakuwa-Kasongamulilo, Information Communication & Knowledge Management Manager, Center for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA), a sub-regional body of the Southern African Development Community (SADC) established by the region's Ministers of Agriculture and serving 16 member countries illustrated the value of regional coordination in addressing gaps in agricultural research and innovation. She described climate change as now a daily reality for farmers across Southern Africa, manifest in prolonged droughts, recurrent floods, pest invasions, livestock disease such as foot-and-mouth disease, soil-fertility degradation and mounting production uncertainty. She presented CCARDESA's Climate Smart Agriculture Mobile Learning Application developed jointly with the 16 SADC member states and co-designed with extension officers, IT specialists and farmers as a model for transferring research knowledge and good agricultural practice directly to farmers and other value-chain actors, narrowing the persistent gap between research institutions and field-level extension.



6.2 Lessons from Donor Dependency and the Case for Locally Owned Solutions

Dr Zaw Oo, Executive Director, Centre for Economic and Social Development (CESD), Myanmar, offered a cautionary account of digital initiatives financed and directed largely by partners from the North during the previous decade; he explained that, following political changes and the gradual withdrawal of some international partners, several projects and technological solutions could not be sustained. He presented this experience as illustrative of a broader challenge confronting developing countries excessive dependence on external financing and externally designed technology and argued for prioritizing solutions that are locally adapted and nationally owned. He proposed South–South Cooperation as a more promising route to technologies that are both locally relevant and durable, given that countries of the South frequently share comparable climatic, agronomic and soil conditions that ease adaptation and replication. Dr Zaw Oo further proposed a digital partnership corridor between India and Myanmar, focused on agricultural extension services, smallholder support, knowledge and technology transfer, and joint pilot projects, as a concrete pathway for translating this principle into practice.

6.3 Regional Digital Transformation Coordination: Lessons from the Americas

Mr Carlos Ruiz, Technical Specialist at the Agri-Food Digitalization Program, Inter-American Institute for Cooperation on Agriculture (IICA), described digital transformation as an unavoidable process reshaping societies, production methods, knowledge-dissemination systems and public-policy design, set against persistent challenges of territorial disparity, weak connectivity, digital-skills gaps and unequal access to technology in rural areas. He described IICA's regional coordination role working with more than 80 entrepreneurs and around 30 strategic partners to promote public-private dialogue illustrated through its Digital Agriculture Days, held across countries to identify territorial needs, and a Regional Digital Agriculture Week convening stakeholders to discuss solutions, public policy and collaborative projects. Mr Ruiz presented complementary work in solution-mapping, exchange-network building, technical studies, capacity strengthening through webinars and workshops, and awareness-raising as a template for adapting interventions to specific territories while building bridges among countries, regions and key actors to stimulate rural digital innovation.

6.4 Trade Integration and Digital Connectivity: The AfCFTA Dimension

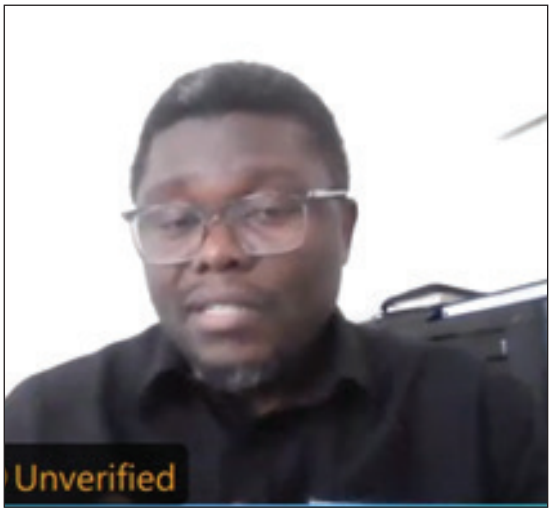
Dr Calliste Nizana, Executive Secretary of the National AfCFTA Committee, Ministry of Trade, Transport, Industry and Tourism, Burundi, highlighted the considerable potential of the African Continental Free Trade Area (AfCFTA) a market of one billion consumers to stimulate digital-technology adoption in African agriculture, noting that agriculture, long shielded from trade liberalization, is now fully integrated into the AfCFTA framework through mechanisms adapted to its realities. He presented a digital mechanism for reporting non-tariff barriers, enabling exporters and importers to report trade obstacles quickly, as particularly important for perishable agricultural products sensitive to delay. He also discussed the AfCFTA protocol on e-commerce, which encourages digital-infrastructure development in member states; the protocol on competition policy, which can help protect African producers from dumping linked to heavily subsidized production elsewhere; and the protocol on women and youth in trade, given their central role in agriculture. Dr Nizana's central message was that digital tools are, first and foremost, tools of connectivity: for Burundian producers to benefit from the AfCFTA, they must be able to connect to regional and international markets, share information, and adapt production to export requirements.

6.5 Local Innovation and the Challenge of Scale

Mr Fernand Matendo, President of the Sectoral Chamber of Information and Communication Technologies and the Digital Economy, Chamber of Industry and Trade, Burundi, presented a factual picture of the country's digital landscape, citing official regulatory statistics for the third and fourth quarters of 2025 showing nearly 3.6 million internet subscribers (an internet-penetration rate of 29.26 per cent) and more than 8.7 million mobile-telephone subscribers (a mobile-penetration rate of 71.01 per cent). He showed that local technological solutions already exist including an integrated system for agro-food and nutritional monitoring combining GIS, farm monitoring, soil analysis, weather alerts and stock management, and a digital agricultural exchange enabling real-time price publication, farmer registration, crop monitoring and integrated payment systems.

According to Mr Matendo, the principal challenge is not the absence of innovation but the transition to scale: start-ups often lack financing adapted to deploying solutions among small producers, and intangible assets such as software, platforms and intellectual property are generally not accepted as collateral by financial institutions, constraining the growth of digital enterprises. He cited Burundi's position as the top-ranked economy in the East African Community for structured institutional coordination in e-commerce with around twenty e-commerce platforms, nineteen payment providers and around twenty registered logistics actors as evidence of latent capacity requiring targeted financing instruments, including guarantee mechanisms adapted specifically to technology companies, to translate innovation into scaled impact.

6.6 Field-Level Digital Ecosystems and Community-Based Adoption



Mr Yannick Chokola, Director General, AUXFIN Burundi, drawing on more than ten years of experience in digital agriculture across Burundi and other African countries, stressed that digital technology and agriculture are now inseparable, though adoption remains a multidimensional challenge requiring tools that function under weak connectivity, limited digital literacy and the need for sustained community support. He presented illustrative field tools including more than 8,000 tablets introduced into rural Burundian communities since 2020, functioning both online and offline; community structures of 50 neighbouring households, known as G50 groups of which more than 10,000 are currently active designed to facilitate collective adoption; a satellite-data-driven advisory tool translating complex agronomic information into simple guidance, including short instructional videos; and an integrated platform combining farmer registration, agricultural advice, an input-ordering marketplace and a business centre connecting producers to structured economic circuits.

Mr Chokola's overarching recommendation was for a systemic, integrated approach: technology produces sustainable results only when embedded within a coherent agricultural value chain from production to market, with traceability, system interconnection, national food self-sufficiency, local agro-processing and structural cost-reduction reforms identified as essential priorities. His central message that technology creates lasting impact only when it starts from real farmer needs, fits within a broader ecosystem, and benefits from institutional, financial and community support closely echoed the cross-cutting lessons emerging from panel discussion I.

6.7 Concluding Remarks

Concluding the session, Dr A. Sivasena Reddy observed that the discussion had demonstrated that digital agriculture has evolved beyond the deployment of individual technologies: the real opportunity lies in building integrated and inclusive digital agriculture ecosystems combining Digital Public Infrastructure, research and innovation, extension systems, financing mechanisms, institutional coordination and farmer-centric service delivery. Despite the diversity of geographical contexts represented Southern Africa, Southeast Asia, the Caribbean and East Africa a striking convergence emerged: countries across the Global South continue to face comparable challenges of climate variability, fragmented agricultural systems, limited digital infrastructure, inadequate extension services and constrained institutional capacity, even as they generate innovative, context-specific digital solutions of clear relevance to one another.

South–South Cooperation was reaffirmed as the natural platform for accelerating digital agricultural transformation through knowledge exchange, collaborative research, technical cooperation, institutional partnership and capacity building with the emphasis on co-creating locally relevant, scalable and affordable solutions rather than one-way technology transfer. Successful digital transformation, it was concluded, requires strong Digital Public Infrastructure and interoperable digital ecosystems; effective public policy and institutional coordination; investment in digital skills, extension services and rural connectivity; closer collaboration among governments, research institutions, the private sector and development partners; and inclusive approaches ensuring that women, youth and marginalized farming communities are active beneficiaries of digital innovation. The experiences shared by CCARDESA, Myanmar, IICA and the Burundi panel were noted as illustrating, collectively, that digital agriculture is fundamentally about strengthening agricultural systems connecting technology with institutions, markets, finance, knowledge and governance rather than simply introducing new tools.

7. Closing Session and Key Strategic Lessons/Recommendations

The closing session was jointly led by Dr. A. Sivasena Reddy, Advisor (Agriculture), DAKSHIN–RIS, and Professor Siméon Barumwete, Chairman of CDE Great Lakesi, followed by concluding remarks from Dr Rajan Sudesh Ratna, Coordinator, DAKSHIN, RIS. The session synthesized the major insights emerging from the two technical sessions and reaffirmed the importance of strengthening collaboration among Global South countries to harness digital technologies for climate-resilient and sustainable agriculture.

In his key takeaways, Dr. A. Sivasena Reddy observed that the workshop had demonstrated that digital agriculture has evolved from isolated technological interventions into a strategic policy agenda for achieving food security, climate resilience, and inclusive rural transformation. While digital innovations continue to advance rapidly, their successful adoption depends fundamentally on enabling ecosystems comprising Digital Public Infrastructure (DPI), effective extension systems, institutional coordination, financing mechanisms, research partnerships,

and sustained capacity building. He emphasized that technology should be viewed as an enabler rather than an end in itself, with the ultimate objective being improved livelihoods and resilience of smallholder farmers.

Professor Siméon Barumwete highlighted that the workshop had provided an important platform for connecting experiences from Africa, Asia, and the Caribbean, enabling countries facing similar agricultural and climatic challenges to learn from one another. He reaffirmed CDE Burundi's commitment to strengthening partnerships with DAKSHIN and other institutions to promote digital innovation, policy dialogue, and collaborative research for sustainable agricultural development.

In his concluding remarks, Dr Rajan Sudesh Ratna expressed appreciation to all speakers, partner institutions, moderators, and participants for their valuable contributions. He noted that the workshop had gone beyond exchanging experiences by laying the foundation for stronger institutional collaboration under DAKSHIN's South–South Cooperation framework. He reaffirmed DAKSHIN's commitment to facilitating policy dialogue, technical exchanges, collaborative research, and capacity-building initiatives that support climate-resilient and digitally enabled agricultural transformation across the Global South.

The workshop concluded with a shared commitment to strengthen knowledge exchange, foster institutional partnerships, promote collaborative innovation, and develop practical cooperation initiatives that contribute to resilient, inclusive, and sustainable agricultural systems across developing countries.

The Key Strategic Lessons and recommendations are:

- Digital agriculture is now a strategic policy imperative for achieving climate resilience, food security, agricultural competitiveness, and sustainable rural development across the Global South.
- Successful digital transformation requires enabling ecosystems rather than technology alone. Digital Public Infrastructure, institutional coordination, effective extension services, financing mechanisms, digital connectivity, research partnerships, and human capacity determine long-term success.
- Farmer-centred design must remain the cornerstone of digital agriculture. Digital solutions should respond to farmers' practical needs by providing timely information on crop planning, weather, input management, pest and disease control, market opportunities, and financial services.
- Building trust is essential for technology adoption. Farmers are more likely to adopt digital tools when they observe tangible benefits, receive support from trusted extension workers or community institutions, and experience reliable service delivery over time.
- Inclusiveness should guide digital transformation. Digital agriculture initiatives must address the needs of smallholder farmers, women, youth, remote communities, and

digitally underserved populations through affordable technologies, local-language content, user-friendly interfaces, and offline functionality.

- Scaling digital innovation requires innovative financing mechanisms. Dedicated financial instruments, risk-sharing facilities, and support for agri-tech enterprises are essential to help digital innovations move beyond pilot projects and achieve sustainable scale.
- Digital agriculture must strengthen entire agricultural value chains. Beyond advisory services, digital solutions should facilitate market access, digital payments, traceability, crop insurance, financial inclusion, logistics, and regional trade opportunities.
- South–South Cooperation accelerates innovation and learning. Countries facing similar climatic, institutional, and socio-economic conditions can more effectively adapt successful practices from one another through technical cooperation, policy dialogue, collaborative research, and capacity building.
- Public-private partnerships are critical for sustainable digital agriculture ecosystems. Governments, research institutions, universities, private enterprises, development organizations, and farmers' organizations must work together to promote innovation, interoperability, and inclusive digital services.
- The success of digital agriculture should ultimately be measured by its developmental impact its contribution to enhancing productivity, increasing farmers' incomes, strengthening climate resilience, improving food security, and promoting sustainable livelihoods rather than by the sophistication of the technologies deployed.

Conclusion

The International Workshop on "Harnessing Digital Technologies for Climate-Resilient and Sustainable Agriculture in the Global South" reaffirmed that digital agriculture is no longer an emerging concept but a strategic imperative for achieving resilient, inclusive, and sustainable agricultural transformation across the Global South. As countries confront the growing impacts of climate change, resource degradation, market uncertainties, and increasing food demand, digital technologies offer unprecedented opportunities to strengthen productivity, improve decision-making, enhance market integration, and build resilient food systems.

A central message emerging from the workshop was that technology alone cannot transform agriculture. The effectiveness and scalability of digital agriculture depend on enabling ecosystems that integrate Digital Public Infrastructure (DPI), robust extension systems, research and innovation, institutional coordination, financing mechanisms, digital connectivity, capacity building, and supportive policy frameworks. Digital solutions must remain farmer-centric, affordable, locally relevant, and responsive to the diverse needs of smallholder farmers, women, youth, and digitally underserved communities.

The deliberations also highlighted the growing importance of South–South Cooperation as a catalyst for agricultural innovation. The rich experiences shared by participants from Africa,

Asia, and the Caribbean demonstrated that the Global South is no longer merely adapting technologies developed elsewhere; it is increasingly generating practical, affordable, and context-specific digital solutions capable of addressing common development challenges. These experiences underscore the value of collaborative learning, policy dialogue, technical exchanges, and institutional partnerships among countries with comparable agro-ecological and socio-economic realities.

The workshop further reaffirmed the strategic role of DAKSHIN – Global South Centre of Excellence, RIS, as a platform for promoting knowledge exchange, collaborative research, capacity building, and development cooperation across the Global South. The discussions generated valuable policy insights and laid the foundation for strengthening partnerships among governments, research institutions, think tanks, universities, the private sector, and development partners to accelerate the adoption of inclusive and climate-resilient digital agriculture.

Looking ahead, the workshop should serve not as the culmination of dialogue but as the beginning of a sustained collaborative process. DAKSHIN, RIS, CDE Great Lakes, and their partner institutions are well positioned to translate the ideas emerging from this workshop into concrete initiatives through joint research, technical cooperation, policy dialogues, pilot demonstrations, institutional capacity building, and South-South knowledge-sharing platforms. Such collaborative efforts will contribute significantly to strengthening food security, enhancing climate resilience, promoting digital inclusion, and advancing sustainable agricultural development across the Global South.

Ultimately, the success of digital agriculture will not be measured by the sophistication of technologies deployed, but by their ability to improve farmers' livelihoods, enhance resilience, reduce inequalities, and create more productive, sustainable, and inclusive agricultural systems for present and future generations.

Concept Note

In the Global South, agriculture remains central to livelihoods, with about 65-70% of the population depending directly or indirectly on the sector. Agriculture contributes roughly 15-20% of GDP, and nearly two-thirds of the population relies on it for their livelihoods. In the present era, the agricultural sector across the Global South is at a critical juncture, shaped by increasing climate variability, natural resource degradation, fragmented markets, rising non-tariff barriers, and persistent gaps in logistics and extension services.

Smallholder farmers, who form the backbone of food systems in the Global South, face significant challenges in accessing timely agro-meteorological information, market intelligence, price information, agronomic advisories, compliance-related guidance, and adequate financial support. The rapid emergence of digital technologies, including soft computing, remote sensing, mobile-based advisory services, data analytics, village kiosks, and artificial intelligence, offers significant opportunities to transform agricultural systems. Effective leveraging of these technologies can enhance market opportunities, improve productivity, promote the adoption of climate-resilient practices, and strengthen supply chains.

Recognizing these opportunities and challenges, the DAKSHIN, India aims to foster collaboration among countries of the Global South to identify scalable, context-specific solutions in digital agriculture through this event. This workshop will serve as a platform for identifying common challenges, sharing best and innovative practices for and exploring possible areas of cooperation amongst Global South. The workshop will focus on themes such as digital tools for promoting sustainable agricultural practices and how to address negative impact of climate change. The workshop will bring together think tanks, research institutions, and practitioners to explore synergies and discuss actionable strategies for inclusive and sustainable agricultural transformation.

This workshop will discuss specific experiences of Burundi which is predominantly agrarian economy and there is a need to strengthen agricultural productivity, supply chain and logistics systems, and climate resilient practices. The workshop will provide an opportunity to engage with stakeholders from Burundi to understand country specific challenges, share relevant global experiences, and explore potential areas of collaboration.

The Workshop aims to:

- Showcase innovative digital strategies and best practices for agricultural productivity and sustainability.
- Facilitate knowledge exchange and collaboration among stakeholders in use of digital tools for sustainable agriculture.
- Foster partnerships and networking opportunities for implementing digital and climate resilient solutions.

The workshop aims to answer key questions like:

- How can digital platforms deliver timely, actionable agro-advisories and market intelligence to improve farmer decision-making?
- How can data analytics, AI, Remote sensing & GIS and block chain strengthen digital extension systems and service delivery for farmers?
- What enabling infrastructure and policy frameworks are required to scale digital agriculture adoption effectively?
- What are the key barriers and opportunities for scaling proven digital agriculture solutions across diverse agro-ecological contexts in the Global South?

Agenda

Time (IST)	Details
2:00 pm – 2:45 pm	**Opening Session** **Welcome Remarks** • Professor Sachin Kumar Sharma, Director General, RIS • Mr Aimable Manirakiza, Chief Executive Officer, Centre For Development and Enterprises Great Lakes (CDE), Burundi **Setting the Context** • Dr Rajan Sudesh Ratna, Coordinator, DAKSHIN, RIS **Keynote Address** • Dr Rebbie Harawa, Director Africa & Kenya Country Representative, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) • Mr Damien Macumi, Permanent Secretary of the National Land Commission (Deputy Ministry) at the Ministry of Environment, Agriculture, and Livestock, Government of Burundi

2:45 pm – 3:35 pm	**Panel Discussion I** **Digital Agriculture in the Global South: Sharing Innovations, Best Practices, and Lessons Learned** **Moderator** • Dr Pratap Singh Birthal, Distinguished Fellow, RIS **Panelists** (5 minutes each) • Dr Jean Claude Nyamweru, Head of Agricultural Policy, Centre For Development and Enterprises Great Lakes (CDE), Burundi • Pr. Hicham El Moussaoui, Université Sultan Moulay Slimane de Béni-Mellal Maroc, Morocco • Pr. Linda Kavuka Kiguhi, LLM, Founder of Think Tank - SUVIRA Africa, Kenya **Interactive Discussion and Q&A Session**
3:35 pm – 4:35 pm	**Panel Discussion II** **Digital Agriculture in the Global South: Exploring Opportunities for Collaboration and South–South Partnerships** **Moderator** (Indian Side) • Dr A. Sivasena Reddy, Advisor-Agriculture, DAKSHIN, RIS **Panelists** (5 minutes each) • Dr Bridget Kakuwa-Kasongamulilo, Information Communication & Knowledge Management Manager, Center for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA), Botswana • Dr Zaw Oo, Executive Director, Centre for Economic and Social Development (CESD), Myanmar • Mr Carlos Ruiz, Technical Specialist at the Agri-Food Digitalization Program, Inter-American Institute for Cooperation on Agriculture (IICA), Saint Lucia **Moderator** (Burundi Side) • Professor Siméon Barumwete, Chairman, Centre For Development and Enterprises Great Lakes (CDE), Burundi **Panelists** (5 minutes each) • Dr Calliste Nizana, Executive Secretary of the National AfCFTA Committee, Ministry of Trade, Transport, Industry and Tourism, Burundi • M. Fernand Matendo, President of the Sectoral Chamber of Information and Communication Technologies and the Digital Economy, Chamber of Industry and Trade, Burundi • Ir. Yannick Chokola, Directeur Général d'AUXFIN, Burundi **Interactive Discussion and Q&A Session**

4:35 pm – 4:50 pm	**Closing Session** **Key Takeaways** • Dr A. Sivasena Reddy, Advisor-Agriculture, DAKSHIN, RIS • Professor Siméon Barumwete, Chairman, Centre For Development and Enterprises Great Lakes (CDE), Burundi **Concluding Remarks** • Dr Rajan Sudesh Ratna, Coordinator, DAKSHIN, RIS

RIS
Research and Information System for Developing Countries
विकासशील देशों की अनुसंधान एवं सूचना प्रणाली

RIS specialises in issues related to international economic development, trade, investment and technology. It is envisioned as a forum for fostering effective policy dialogue and capacity-building among developing countries on global and regional economic issues. The focus of the work programme of RIS is to promote South-South Cooperation and collaborate with developing countries in multilateral negotiations in various forums. Through its following centres/forums, RIS promotes policy dialogue and coherence on regional and international economic issues.

The word "DAKSHIN" (दक्षिण) is of Sanskrit origin, meaning "South." The Hon'ble Prime Minister of India, Shri Narendra Modi, inaugurated DAKSHIN – Global South Centre of Excellence in November 2023. The initiative was inspired by the deliberations of Global South leaders during the Voice of the Global South Summits. DAKSHIN stands for Development and Knowledge Sharing Initiative. Hosted at the RIS, DAKSHIN has established linkages with leading think tanks and universities across the Global South and is building a dynamic network of scholars working on Global South issues.

AIC at RIS has been working to strengthen India's strategic partnership with ASEAN in its realisation of the ASEAN Community. AIC at RIS undertakes research, policy advocacy and regular networking activities with relevant organisations and think-tanks in India and ASEAN countries, with the aim of providing policy inputs, up-to-date information, data resources and sustained interaction, for strengthening ASEAN-India partnership.

CMEC has been established at RIS under the aegis of the Ministry of Ports, Shipping and Waterways (MoPS&W), Government of India. CMEC is a collaboration between RIS and Indian Ports Association (IPA). It has been mandated to act as an advisory/technological arm of MoPSW to provide the analytical support on policies and their implementation.

FITM is a joint initiative by the Ministry of Ayush and RIS. It has been established with the objective of undertaking policy research on economy, intellectual property rights (IPRs) trade, sustainability and international cooperation in traditional medicines. FITM provides analytical support to the Ministry of Ayush on policy and strategy responses on emerging national and global developments.

BEF aims to serve as a dedicated platform for fostering dialogue on promoting the concept in the Indian Ocean and other regions. The forum focuses on conducting studies on the potential, prospects and challenges of blue economy; providing regular inputs to practitioners in the government and the private sectors; and promoting advocacy for its smooth adoption in national economic policies.

FIDC, has been engaged in exploring nuances of India's development cooperation programme, keeping in view the wider perspective of South-South Cooperation in the backdrop of international development cooperation scenario. It is a tripartite initiative of the Development Partnership Administration (DPA) of the Ministry of External Affairs, Government of India, academia and civil society organisations.

FISD aims to harness the full potential and synergy between science and technology, diplomacy, foreign policy and development cooperation in order to meet India's development and security needs. It is also engaged in strengthening India's engagement with the international system and on key global issues involving science and technology.

As part of its work programme, RIS has been deeply involved in strengthening economic integration in the South Asia region. In this context, the role of the South Asia Centre for Policy Studies (SACEPS) is very important. SACEPS is a network organisation engaged in addressing regional issues of common concerns in South Asia.

Knowledge generated endogenously among the Southern partners can help in consolidation of stronger common issues at different global policy fora. The purpose of NeST is to provide a global platform for Southern Think-Tanks for collaboratively generating, systematising, consolidating and sharing knowledge on South South Cooperation approaches for international development.

— Policy research to shape the international development agenda —

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