Collaborative Research in Africa: Structures, Outcomes, and Lessons from (SGCI)-Phase II

Synthesis Report Submitted to International Development Research Centre (IDRC)

Authors

Kevin Ouko
Tom Ogada
Agnes Lutomiah
Nicholas Odongo
Alfred Oduor
Caroline Mbaya
Eunice Omwoyo
Clarisse Mideva

Synthesis Report
March 2026

ACKNOWLEDGMENT

The African Centre for Technology Studies (ACTS) sincerely appreciates the support of its funding partners: International Development Research Centre (IDRC), the UK's Foreign, Commonwealth & Development Office (FCDO), South Africa's National Research Foundation (NRF), the Swedish International Development Cooperation Agency (Sida), Deutsche Forschungsgemeinschaft (DFG) - German Research Foundation, and the Norwegian Agency for Development Cooperation (Norad).

We also thank the leadership and staff of the Science Granting Councils (SGCs) for providing the information that formed the basis of this synthesis and for their commitment to strengthening evidence-based national innovation systems. Appreciation is extended to the Collaborating Technical Agencies (CTAs) for their expertise in policy, monitoring and evaluation, research management, gender inclusion, science communication, and innovation, which greatly supported capacity building within the SGCs. We also acknowledge the researchers, innovators, policymakers, and private sector actors whose contributions demonstrate the impact of Science Grating Councils Initiative (SGCI) in advancing African science for sustainable development.

Finally, we thank the research team for their dedication in compiling this synthesis and its key lessons.

EXECUTIVE SUMMARY

The Science Granting Councils Initiative (SGCI)-Phase II, implemented between 2019 and 2023 across 12 African countries, supported 29 collaborative research projects aimed at enhancing research excellence, strengthening institutional capacities, and fostering regional and interdisciplinary collaborations. This synthesis report, prepared by the African Centre for Technology Studies (ACTS) for the International Development Research Centre (IDRC), critically examines the design, implementation, outputs, and outcomes of these projects. It focuses particularly on the effectiveness of cross-border and interdisciplinary research efforts in contributing to sustainable development, inclusive innovation, and knowledge integration across Africa.

Key Findings

SGCI-2 funded 20 bilateral and 9 trilateral research projects across sectors including agriculture, energy, health, and mining. Thematically, energy and health attracted nearly half of all collaborative efforts, followed by agriculture (21%) and mining (11%). The initiative prioritized integration across disciplines and institutions, pooling diverse expertise, resources, and knowledge systems—including indigenous knowledge. Collaboration models varied from national partnerships to regional consortia, supported by tools such as joint calls, Memoranda of Understanding (MoUs), and shared digital platforms like the Open Grant Management System (OGMS).

Countries such as Malawi, Mozambique, Zambia, and Zimbabwe led trilateral and bilateral collaborations that showcased strong interdisciplinary design and capacity-building outcomes. These included joint PhD/MSc supervision, local innovations (e.g., biogas systems, nano-reagents), community engagement, and institutional learning exchanges. Collaborations also reinforced resource-sharing, especially in cases like Botswana and Zimbabwe outsourcing laboratory analysis to South Africa due to local capacity gaps.

The projects contributed significantly to building sustainable research ecosystems in Africa. This was realized through institutional partnerships, inclusive innovation initiatives (such as Namibia's Women Innovators Programme), digitized research management systems, and the integration of traditional knowledge systems into formal R&D. Notable capacity gains included the training of over 100 graduate students and 90 researchers, with increased co-funding, equipment sharing, and development of national research agendas in several countries.

However, implementation was not without challenges. Cross-border collaborations faced regulatory misalignments, ethical approval delays, language barriers, and COVID-19-related restrictions. Capacity limitations in infrastructure and technical expertise also constrained the full operationalization of interdisciplinary projects, especially in resource-constrained or rural settings. Despite these, many teams demonstrated resilience by shifting to virtual platforms, adapting timelines, and leveraging regional support networks.

Lessons Learnt

Eight key lessons emerged from SGCI-2 that are crucial for informing future collaborative research efforts in Africa. First, clearly defined roles and signed Memoranda of Understanding (MoUs) significantly enhanced coordination and the effective delivery of collaborative research. However, language barriers and regulatory inconsistencies across regions remained substantial challenges to smooth cross-border implementation. While the use of digital tools enabled continuity of research through remote collaboration—especially during the COVID-19 pandemic—limited internet access in rural or under-resourced areas undermined their full potential. Regional complementarity was most effective when projects were designed around shared ecological or socio-economic priorities, enhancing relevance and scalability.

Projects that incorporated gender-responsive and inclusive designs demonstrated higher levels of

sustainability and community ownership. Moreover, the strategic leadership of Science Granting Councils (SGCs) proved vital in maintaining momentum, aligning stakeholders, and ensuring timely execution. The co-supervision and mobility of students further deepened institutional linkages and fostered long-term research ties. Finally, flexible funding modalities emerged as critical enablers of adaptive planning, allowing teams to respond effectively to unforeseen disruptions such as the pandemic. These lessons, along with identified best practices, offer a strong foundation for scaling and refining collaborative research models across the continent.

Best Practices Identified

Best practices included the use of formal MoUs, regional knowledge hubs, cross-institutional co-supervision, and integration of indigenous knowledge systems. Programs like joint MEL site visits, women-led innovation grants, and decentralized research embedding (e.g., field-based graduate research) showcased scalable and replicable models for other regions.

Policy Recommendations

Based on the evidence synthesized, detailed policy recommendations are proposed for two key stakeholder groups:

i. For Science Granting Councils (SGCs):

- Institutionalize research collaborations via formalized MoUs with clear roles and shared accountability.
- Align research calls with regional development priorities such as STISA-2034 and Agenda 2063.
- Promote interdisciplinarity through proposal evaluation criteria and matchmaking platforms.
- Establish frameworks for Public-Private Partnerships (PPPs) in research and innovation.
- Invest in gender-inclusive innovation programs and ring-fenced funding for marginalized groups.
- Adopt and maintain digital grant management platforms like OGMS to enhance transparency.
- Support co-supervision and mobility of graduate students across borders.
- Develop joint MEL frameworks and share infrastructure through pooled investments.

ii. For IDRC (Funder):

- Adopt flexible, context-responsive funding mechanisms that accommodate national cycles.
- Invest in harmonizing ethical and regulatory standards regionally (via AUDA-NEPAD, SADC, ECOWAS).
- Prioritize long-term institutional capacity building in grant management and interdisciplinary leadership.
- Support the development of regional innovation hubs and digital platforms.
- Mandate inclusive, gender-responsive designs in all funded projects.
- Promote open-access publishing and data interoperability across projects.
- Facilitate South-South and North-South research consortia for strategic knowledge transfer.
- Fund the synthesis, communication, and translation of research into policy and practice.

The next phase, SGCI-3, offers an opportunity to deepen these gains by institutionalizing best practices, adapting funding modalities, and reinforcing the capacities of councils and regional networks alike.

Contents

ABBREVIATIONS

SGCI	Science Granting Councils Initiative
SGCs	Science Granting Councils
IDRC	International Development Research Centre
ACTS	African Centre for Technology Studies
MoU	Memorandum of Understanding
MEL	Monitoring, Evaluation and Learning
OGMS	Open Grant Management System
PPP	Public Private Partnership
STI	Science, Technology and Innovation
STISA	Science, Technology and Innovation Strategy for Africa
SDGs	Sustainable Development Goals

1. INTRODUCTION

1.1 Background information

Collaborative and interdisciplinary research has increasingly been recognized as a critical strategy for addressing complex societal challenges, particularly in regions such as sub Saharan Africa, where resources, expertise, and institutional capacities are often unevenly distributed (OECD, 2020). Modern science systems are expected to transcend disciplinary and institutional boundaries to generate knowledge that is locally relevant, scientifically rigorous, and globally informed (Muuthe-Kaaria et al., 2022).

In this context, the Science Granting Councils Initiative (SGCI), launched in 2015 and now in its second phase (SGCI 2), funded by the Swedish International Development Cooperation Agency (SIDA), has emerged as a pivotal mechanism for strengthening research and innovation (R&I) ecosystems in Africa by building the capacity of national Science Granting Councils (SGCs). SGCI 2, implemented between 2019 and 2023, supported 29 collaborative research projects across 12 participating countries. These comprised 20 bilateral and 9 trilateral projects aimed at enhancing research excellence, capacity development, and policy alignment. The initiative's design emphasizes collaboration across borders, disciplines, and institutions as essential pathways for achieving the Sustainable Development Goals (SDGs), fostering innovation, and building resilient research infrastructures (African Union Commission, 2014; IDRC, 2021). The types of collaborations, participating partners, and approaches used under SGCI 2 are summarized in Table 1.

Table 1: National, Bilateral, and Trilateral Collaborations under SGCI 2

Type of Collaboration	Participating SGCs/Partners	Form of Collaboration	Aspects/Approaches Used
National	Local research institutions, private sector, and academia	National research calls, co funding schemes, innovation platforms	Stakeholder engagement, capacity building, inclusive research design, policy experimentation
Bilateral	Two SGCs (e.g., FONRID and FONSTI)	Joint calls for proposals, exchange of best practices, collaborative research funding	Co creation, knowledge exchange, cross border researcher mobility, mutual capacity building
Trilateral/Multilateral	Three or more SGCs with support from partners	Regional research consortia, joint policy dialogues, learning networks	Comparative research, regional peer learning, harmonization of research frameworks, regional agenda alignment (e.g., STISA 2024, SDGs)

Collaborative research under SGCI 2 enabled the pooling of diverse skills and resources, enhanced the visibility and credibility of national research systems, and built institutional trust in regions where fragmented research governance has historically impeded scientific progress (Mouton et al., 2015). Evidence from Africa highlights that partnerships among universities, government research bodies, and private stakeholders are critical for translating research into policy and practice (Boshoff, 2009; Tiyambe Zeleza, 2016). SGCI 2 leveraged this potential not only by funding joint research but also by promoting strategic tools such as Memoranda of Understanding (MoUs), digital grant management systems, and public private research partnerships to institutionalize collaboration.

Equally important is the recognition of interdisciplinary research approaches. Complex challenges such as climate change, food insecurity, pandemics, and energy transitions require integration of knowledge from natural sciences, social sciences, policy studies, and indigenous knowledge systems (Frodeman et al., 2010; Leach et al., 2020). SGCI 2 encouraged interdisciplinary designs by requiring project teams to integrate expertise across domains and institutions, thereby fostering inclusive knowledge production and innovation. This approach is particularly relevant in African contexts, where social, ecological, and technological systems are deeply interconnected (Clark et al., 2016).

Despite these benefits, implementing collaborative and interdisciplinary research in Africa faces persistent challenges, including institutional rigidity, coordination difficulties, funding constraints, language differences, and inconsistent ethical frameworks across countries (Tijssen et al., 2016; Owusu Nimo & Boshoff, 2017). SGCI 2's experience offers valuable lessons on mitigating these barriers through deliberate policy frameworks, joint funding mechanisms, cross border capacity building, and investments in digital infrastructure.

This synthesis report therefore evaluates the extent and impact of collaborative and interdisciplinary approaches within SGCI 2 funded projects. It examines how cross institutional partnerships and knowledge integration were designed and operationalized across countries, assesses measurable outcomes, and draws lessons for strengthening science systems in Africa. In doing so, it contributes to the evidence base on effective models for research collaboration and aligns with broader continental ambitions, including the African Union's Agenda 2063 and the Science, Technology, and Innovation Strategy for Africa (STISA 2024).

1.2 Purpose and Scope of the Report

The purpose of this synthesis report is to assess and document the extent, nature, and impact of collaborative and interdisciplinary research funded under the second phase of the Science Granting Councils Initiative (SGCI-2) across sub-Saharan Africa. Specifically, the report aims to provide a comprehensive analysis of how SGCI-2 projects fostered cross-border, cross-institutional, and interdisciplinary collaborations among African Science Granting Councils (SGCs), research institutions, and regional partners.

This report seeks to understand the strategic roles that collaborations have played in advancing science, technology, and innovation (STI) systems in Africa by integrating diverse disciplines, institutions, and knowledge systems—including indigenous knowledge. It captures the experiences, outputs, outcomes, and lessons learned from 41 collaborative projects, including both bilateral and trilateral research initiatives implemented between 2020 and 2023.

The scope of the report encompasses an examination of:

- The types and thematic focus areas of collaborative research funded under SGCI-2.
- The extent to which interdisciplinary and cross-institutional approaches were adopted.
- The nature of collaboration among national SGCs and their partners, including complementarities and potential duplication.
- The measurable contributions of SGCI-2 projects to national and regional research capacity and ecosystem sustainability.
- The mechanisms—such as Memoranda of Understanding (MoUs)—used to institutionalize collaborations.
- The challenges and opportunities encountered in implementing collaborative and interdisciplinary research.
- The emerging best practices and policy implications to inform SGCI-2+ and future initiatives.

By synthesizing insights across countries and projects, the report aims to inform strategic decision-making among funders, policymakers, and SGCs, and to guide the design and implementation of future research collaboration models that are impactful, inclusive, and sustainable in the African context.

1.3 Research Questions

This synthesis report was guided by the following research questions:

i. Overall Question

What specific roles did SGCI-2 play in fostering cross-border and interdisciplinary research collaborations within Africa?

ii. Specific Questions

1. Which thematic areas and aspects are being addressed through collaborative research under SGCI-2?
2. What measurable outcomes have demonstrated the contribution of these collaborations to strengthening local research capacity?
3. To what extent were interdisciplinary and cross-institutional approaches applied in SGCI-2-funded projects?
4. Do the roles played by collaborators reflect complementarity or duplication? Is there evidence of deepening collaborative research among councils (e.g., SGCI-Sida, RIM [IDRC-FCDO], IDRC/Norad), and how do these efforts relate to current collaborations under SGCI-2+, both direct and indirect?
5. In what ways did SGCI-2 projects contribute to the development of sustainable research ecosystems in Africa—for example, through Memoranda of Understanding (MoUs)?
6. What key challenges and opportunities arose during the implementation of interdisciplinary approaches in SGCI-funded projects, and how were these challenges addressed, or opportunities leveraged?

2. METHODOLOGY

2.1 Research Approach

This study employed a qualitative synthesis methodology based on a comprehensive desk-based review of secondary data sources. The approach was designed to systematically examine the scope, outcomes, and challenges of interdisciplinary and collaborative research funded under SGCI 2. By combining exploratory and interpretive techniques, the study aimed to capture both the measurable outputs and the nuanced contributions of SGCI 2 projects across participating countries.

A comparative case study design underpinned the synthesis, enabling cross-country and cross-institutional analysis. This design was particularly suited for identifying patterns, contextual differences, and emerging best practices across diverse Science Granting Councils (SGCs) in sub-Saharan Africa. Using a structured analytical framework, the study explored the alignment of collaborative research with national and regional development priorities, the integration of interdisciplinary methodologies, and the sustainability mechanisms embedded within SGCI 2 projects.

2.2 Data Sources

The analysis drew on a wide array of secondary data from the 12 African countries participating in SGCI 2. Key sources included final technical and financial reports submitted by principal investigators, project implementation and monitoring plans, memoranda of understanding and partnership agreements, as well as publications, communication materials, and other knowledge products generated by the projects.

Where available, supplementary materials such as national research agendas, policy documents, conference presentations, and policy briefs were reviewed to triangulate findings and assess the translation of research into policy and practice. Collectively, these sources provided a rich evidence base for evaluating both the operational and strategic dimensions of SGCI 2 collaborations.

2.3 Data Analysis

The collected data were analyzed through thematic content analysis employing both deductive and inductive coding. A coding framework was developed around six core themes: collaborative research focus areas, interdisciplinarity and cross-institutional approaches, research capacity outcomes, complementarities and duplications in roles, sustainability mechanisms, and implementation challenges and opportunities.

Data were categorized by country, project type (bilateral or trilateral), and sector (such as energy, agriculture, health, and mining). Within these categories, the analysis assessed the degree of interdisciplinarity by examining the diversity of disciplines integrated, the depth of institutional collaboration through joint leadership, shared infrastructure, and co-supervision of students, as well as quantifiable capacity outcomes, including students trained, institutions engaged, and knowledge products produced.

Qualitative insights were also extracted to highlight governance arrangements, implementation challenges, and emerging best practices. A comparative matrix facilitated identification of cross-country similarities, differences, and overarching trends. Examples from project reports were used to illustrate key findings and reinforce lessons learned.

2.4 Limitations of the Synthesis

While the methodology provided robust insights, two main limitations are acknowledged. First, variability in reporting formats and the completeness of data across countries occasionally constrained direct comparisons. Some reports lacked detailed quantitative information on outputs and outcomes, which limited the precision of comparative analyses. Second, the study relied entirely on secondary data and did not involve primary data collection such as interviews or surveys, meaning the findings depend on the accuracy and comprehensiveness of existing documentation.

Despite these limitations, the chosen methodology was sufficient to generate meaningful insights into the nature, contributions, and sustainability of SGCI 2 collaborations across sub-Saharan Africa, offering a strong evidence base for understanding how collaborative and interdisciplinary research can strengthen regional science systems.

3. FINDINGS

3.1 Areas of Collaborative Research

Finding 1: ***SGCI 2 successfully fostered collaborative research across 12 African countries, with a clear concentration of multi-country projects in Southern Africa. While national-level collaborations dominated in East and West Africa, Southern African SGCs led in bilateral and trilateral initiatives, particularly in sectors aligned with regional priorities such as energy, health, and agriculture. These collaborations not only pooled expertise and resources but also strengthened institutional networks, capacity development, and cross-border learning, highlighting the strategic value of structured multi-institutional partnerships.***

3.1.1 Collaborations at SGC level

Table 2 on Collaborations at SGC Level provides a quantitative snapshot of the extent and types of research collaborations undertaken by the 12 participating Science Granting Councils (SGCs) under the Science Granting Councils Initiative (SGCI)-Phase II. It categorizes projects by country, council, region, and type of collaboration—national, bilateral, or trilateral—offering insights into the geography and intensity of collaborative research efforts in sub-Saharan Africa.

Table 2 presents a quantitative overview of research collaborations at the SGC level under SGCI 2, categorizing projects by country, council, region, and type of collaboration—national, bilateral, or trilateral. Southern Africa emerged as the most collaborative region, with Malawi, Mozambique, Zambia, and Zimbabwe collectively accounting for the majority of bilateral and trilateral projects. For instance, Zambia led with 10 projects (4 national, 3 bilateral, 3 trilateral), followed closely by Malawi with 9 projects (2 national, 4 bilateral, 3 trilateral). By contrast, East and West African countries primarily implemented national projects, suggesting underutilized opportunities for regional collaboration.

Countries such as Mozambique strategically emphasized cross-border research, engaging in 4 bilateral and 3 trilateral projects without funding national initiatives, whereas Burkina Faso and Senegal focused predominantly on national projects. Institutions like Malawi's NCST and Zimbabwe's RCZ played pivotal roles in coordinating multi-country initiatives, particularly in agriculture and renewable energy, highlighting the importance of strong institutional leadership for facilitating regional engagement.

Table 2: Extent and Types of Research Collaborations by Science Granting Councils under SGCI 2

	Country	SGC	Region	National	Collaborative		Total
					Bilateral	Trilateral	
1	Botswana	Botswana Digital Innovation Hub (BDIH)	Southern Africa	1	2	0	3
2	Burkina Faso	National Fund for Research and Innovation Development (FONRID)	West Africa	9	0	0	9
3	Cote d'Ivoire	Fund for Science, Technology and Innovation (FONSTI)	West Africa	6	0	0	6
4	Malawi	National Commission for Science and Technology (NCST)	Southern Africa	2	4	3	9
5	Mozambique	Fundo Nacional de Investigacao (FNI)	Southern Africa	0	4	3	7
6	Namibia	National Commission on Research, Science and Technology (NCRST)	Southern Africa	4	1	0	5
7	Rwanda	National Council for Science and Technology (NCST)	East Africa	8	0	0	8

	Country	SGC	Region	National	Collaborative		Total
8	Senegal	Ministry of Higher Education, Research and Innovation (MESRI)	West Africa	6	0	0	6
9	Tanzania	Commission for Science and Technology (COSTECH)	East Africa	5	0	0	5
10	Uganda	Uganda National Council for Science and Technology (UNCST)	East Africa	7	0	0	7
11	Zambia	National Science and Technology Council (NSTC)	Southern Africa	4	3	3	10
12	Zimbabwe	Research Council of Zimbabwe RCZ)	Southern Africa	2	6	0	8
		TOTAL		54	20	9	83

Key Observations and Analysis

i. Strong Participation from Southern Africa

The findings clearly shows that Southern Africa was the most collaborative region, with countries like Malawi, Mozambique, Zambia, and Zimbabwe collectively accounting for the majority of bilateral and trilateral projects. For instance, Zambia led with 10 collaborative projects (4 national, 3 bilateral, and 3 trilateral), followed closely by Malawi, which had 9 projects (2 national, 4 bilateral, and 3 trilateral). This regional dominance underscores the existing networks, mutual research priorities (such as renewable energy and agriculture), and shared institutional frameworks that facilitate regional collaboration.

ii. Bilateral and Trilateral Leadership

Only a few countries participated in trilateral collaborations, with Malawi, Mozambique, and Zambia each contributing to three trilateral projects. These trilateral projects primarily targeted shared development challenges such as post-harvest losses, renewable energy access, and health systems, reflecting strong regional alignment and problem-driven cooperation. Notably, Mozambique did not fund any national projects but was heavily involved in regional partnerships (4 bilateral and 3 trilateral), showing a strategic emphasis on cross-border research over domestic-only initiatives.

iii. Low Collaboration in West and East Africa

By contrast, West African and East African countries were mostly involved in national-level projects, with little to no bilateral or trilateral engagement under SGCI-2. For example, Burkina Faso and Côte d'Ivoire each had multiple national projects (9 and 6 respectively) but no regional collaborations, indicating either limited capacity, policy barriers, or insufficient alignment with regional priorities. Similarly, Rwanda, Uganda, and Tanzania, all from East Africa, implemented national projects exclusively, suggesting potential missed opportunities for cross-border learning and integration.

iv. Centrality of Institutions like RCZ, NCST, and FNI

The Research Council of Zimbabwe (RCZ) and National Commission for Science and Technology (NCST) Malawi stand out as regional collaboration champions. RCZ, for instance, participated in six bilateral projects, often with Malawi and Botswana, and provided leadership in multi-country research in agriculture and biotechnology. Meanwhile, Malawi's NCST also played a central coordinating role in trilateral collaborations, often acting as a bridge between institutions in Mozambique and Zambia.

v. Asymmetry in National vs. Collaborative Focus

Some SGCs, such as Burkina Faso's FONRID and Senegal's MESRI, focused almost exclusively on national projects. This could reflect internal policy priorities or limited cross-border coordination frameworks. On the other end of the spectrum, countries like Mozambique and Zimbabwe invested disproportionately in collaborative research, indicating strong institutional mandates or incentives to engage beyond national borders.

Implications for SGCI- 3

This distribution reveals the need for targeted policy interventions to balance regional engagement across Africa. There is a clear opportunity to strengthen cross-regional collaboration—especially involving East and West African SGCs, which were underrepresented in bilateral and trilateral projects. IDRC and other funders should support mechanisms that build institutional capacity for cross-border collaboration, harmonize regulatory environments, and provide incentives for shared infrastructure and co-supervision.

Moreover, the success of trilateral models in Southern Africa suggests that replicating these designs in other regions could enhance knowledge pooling, cost-sharing, and scalability of research innovations. Strengthening the coordination role of effective SGCs—like Malawi's NCST or Zimbabwe's RCZ—could also catalyze more inclusive, multi-country initiatives aligned with Africa's STI and development agendas.

3.1.2 Collaborations across SGCs with a focus on sectors

Figure 1 illustrates sectoral distribution of SGCI 2 collaborative projects, revealing that energy and health dominated cross-SGC research, accounting for 48% of projects. These sectors addressed urgent continental challenges, including energy access, renewable alternatives, and public health threats such as COVID-19, aligning closely with continental strategies like Agenda 2063 and STISA 2034.

Agriculture represented 21% of collaborations, integrating biotechnology, climate resilience, indigenous knowledge, and gender inclusion. Examples include bio-fertilizer development projects in Malawi and Zimbabwe and crop and livestock improvement initiatives. Mining, despite its economic importance in Botswana, Zimbabwe, and Zambia, featured in only 11% of projects, often reflecting specialized infrastructure needs or regulatory constraints.

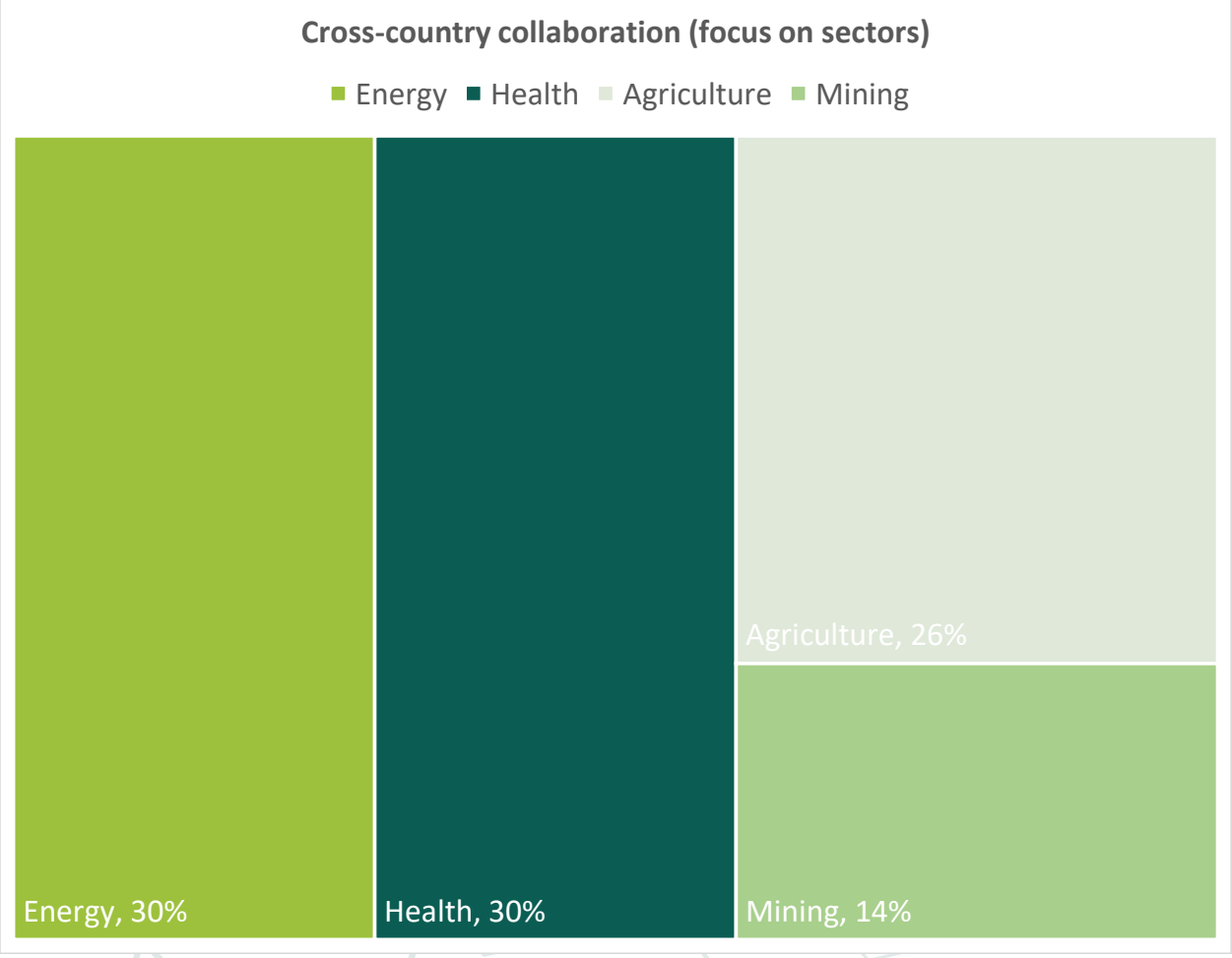

Figure 1: Collaborations across SGCs with a focus on sectors

Figure 2 maps SGCs and their collaboration partners, highlighting cross-sector and multi-country linkages. The findings underscore the strategic alignment of SGCs with continental development priorities and reveal areas—particularly mining—for potential expansion in SGCI 3.

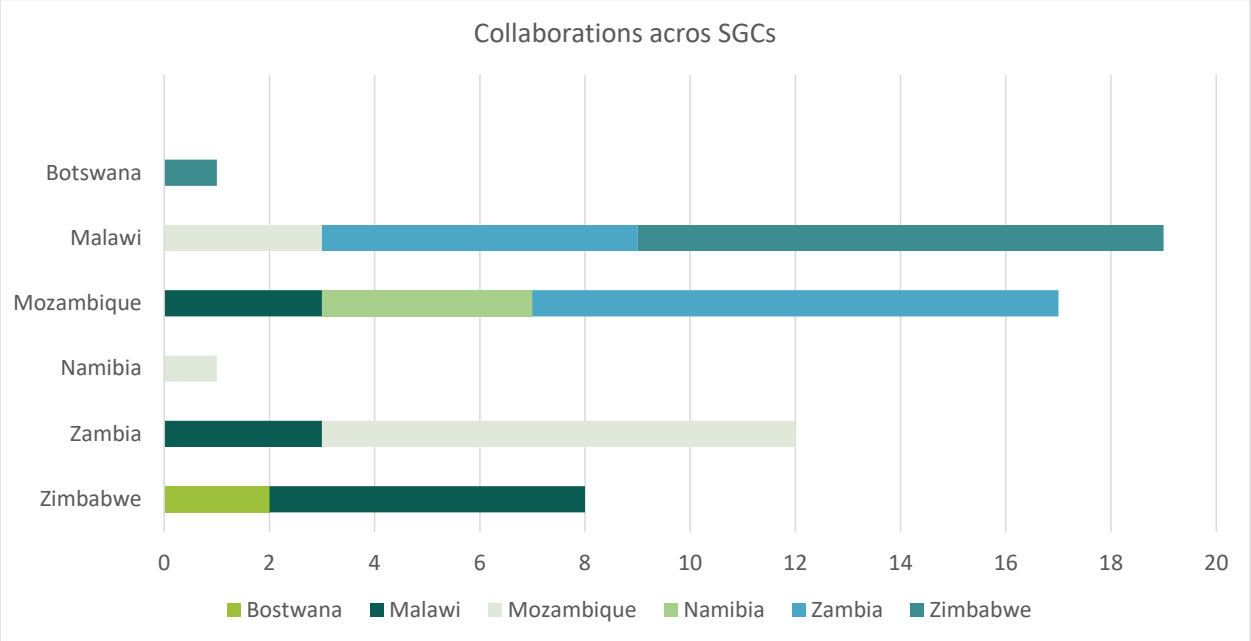

Figure 2: SGCs and their collaboration partners

Key Observations and Sectoral Trends

i. Dominance of Energy and Health in Collaborative Research

The findings reveal that energy and health collectively accounted for 48% of all cross-SGC collaborations, making them the most prominent sectors of focus. This dominance is not surprising given the shared urgency across African countries to address energy access, renewable alternatives, and public health threats, especially in the wake of the COVID-19 pandemic. For example, trilateral projects between Mozambique, Malawi, and Zambia addressed both renewable energy innovation—like solar drying technology and biogas generation—and health system resilience through COVID-19 surveillance and treatment research. These sectors also align strongly with continental priorities such as Agenda 2063 and STISA-2034, which emphasize energy transformation and health security.

ii. Agriculture as a Consistent Regional Priority

Agriculture emerged as the third most common focus area, accounting for 21% of collaborative projects. While slightly behind energy and health in volume, agriculture projects had deep interdisciplinary integration, often combining biotechnology, climate resilience, indigenous knowledge, and gender inclusion. Examples include the bio-fertilizer development projects in Malawi and Zimbabwe, as well as research on crop and livestock improvement. These collaborations had strong links to livelihoods, food security, and rural innovation, which are critical issues across many African contexts.

iii. Limited Focus on Mining Despite Strategic Importance

Although mining represents a significant economic sector in countries like Botswana, Zimbabwe, and Zambia, it featured in only 11% of collaborative projects, making it the least emphasized among the four key sectors. Nonetheless, where mining-related research did occur—such as in the nano-flotation and coal beneficiation projects between Botswana and Zimbabwe—it showcased cutting-edge interdisciplinary work, combining geosciences, chemical engineering, and environmental science. The relatively lower representation of mining may reflect specialized infrastructure needs, regulatory constraints, or fewer

cross-border research synergies compared to health and agriculture.

Interpretation and Strategic Implications

This sectoral distribution offers a lens into how SGCs are responding to continent-wide and country-specific development imperatives. The concentration of efforts in energy and health indicates responsiveness to urgent, high-impact issues, while agriculture's presence underscores the need to address sustainable food systems. The lower proportion of mining-related projects suggests an area for potential future investment, particularly in the context of green transitions, critical minerals, and environmental management.

For future programming under SGCI- 3, the findings highlight the need to:

- Build on momentum in energy and health by investing in scalable innovations and encouraging cross-sector linkages (e.g., energy for health infrastructure).
- Elevate agriculture as a platform for testing inclusive, climate-smart solutions that blend technology with local knowledge.
- Explore untapped opportunities in mining, especially those related to value addition, environmental remediation, and resource governance.
- Encourage balanced thematic calls that promote cross-sectoral integration—for example, linking energy and agriculture through agri-tech or health and environment through sanitation and water management research.

3.1.3 Joint Meetings and Coordination Structures

Across several countries, joint meetings and structured engagements were fundamental in enhancing coordination and transparency in research collaboration. In Senegal and Burkina Faso, joint workshops organized by DFRSDT brought together researchers from both countries and the International Development Research Centre (CRDI), enabling shared reflections on progress, challenges, and future planning. Similarly, Botswana and Zimbabwe operationalized their institutional collaboration through regular joint evaluations, coordination meetings, and reciprocal site visits, facilitated by an MoU between the Botswana Digital and Innovation Hub (BDIH) and the Research Council of Zimbabwe (RCZ). Even during COVID-19 restrictions, researchers from both countries maintained regular virtual meetings to sustain momentum. At a broader level, Namibia participated in multi-stakeholder coordination platforms with institutions such as ACTS, CeSTII, and UCAD through the Evipol initiative to align Monitoring, Evaluation, and Learning (MEL) systems. These meetings provided ongoing oversight and ensured harmonization of implementation strategies across partner countries and institutions.

3.1.4 Supervision and Capacity Development

Collaboration also extended into co-supervision of research students and shared mentorship arrangements, directly contributing to human capital development. In Namibia, joint projects with national institutions like the University of Namibia (UNAM), Namibia University of Science and Technology (NUST), and the Namibian Chamber of Environment involved co-supervision of graduate students who were embedded in ongoing research activities. For instance, the OFULA project on succulent-based fodder included a Master's student conducting field-based research, offering a hands-on learning experience while contributing to the broader project objectives. In Mozambique, trilateral collaborations with Zambia and Malawi saw academic institutions such as Eduardo Mondlane University, University of Zambia, and Malawi University of Science and Technology co-implement projects in renewable energy and post-harvest technologies, often involving joint academic oversight. Similarly, in Côte d'Ivoire, the focus on capacity building was evident through the training of local scientists—especially women—in areas like ethnobotany and biomedicine as part of interdisciplinary research efforts, contributing to more inclusive and skilled scientific communities.

3.1.5 Nature of collaborations

The nature of collaboration varied across countries but was uniformly strategic and multi-layered, reflecting national and regional priorities. In Uganda, the creation of TECHNOMART fostered private-academic linkages by serving as a matchmaking hub for researchers and entrepreneurs interested in commercializing R&D products. This initiative supported technopreneurship and access to shared research infrastructure.

Rwanda mandated private sector participation in all funded projects, ensuring real-world applicability of research outcomes, while enabling shared use of purchased equipment to improve productivity and innovation. In Zambia, collaboration was institutionalized through a dedicated call for Public-Private Partnerships (PPP), showcasing deliberate efforts to operationalize cooperation in research and development. In Namibia, collaboration spanned national (with UNAM, NUST) and regional levels (with Mozambique and South Africa), and even extended into digital system adoption through the Open Grant Management System developed jointly with Uganda and the Association of African Universities (AAU). Notably, gender-focused collaboration emerged through Namibia's Women Innovators Programme, implemented with GenderatWork to support female-led STI ventures. In Mozambique, trilateral collaborations tackled renewable energy challenges through projects like solar cooling and biogas production, engaging universities across borders to address regionally relevant development problems. These initiatives demonstrate that collaboration was not only about joint work but also about mutual learning, shared infrastructure, policy alignment, and long-term capacity strengthening.

3.2 Measurable Outputs and Outcomes and Their Impacts on Local Research Capacity

Finding 2: ***Strategic collaborations—both cross-border and institutional—were central to the success of SGCI initiatives. These partnerships led to the training of over 150 students and researchers across 10 countries, including 47 in Zambia, 21 in Mozambique, and 15 in Uganda. Collaborations enabled joint technology development, such as solar drying systems and herbal remedy processing, and supported the operationalization of research funds, like Malawi's MK 450 million allocation in FY 2022/23. Ultimately, SGCI's collaborative approach strengthened STI ecosystems by linking academia, government, industry, and communities to deliver measurable policy and development impacts.***

3.2.1 Strengthening Human Capital through Collaborative Training Programs

SGCI-2 project investments significantly enhanced the training of students and researchers across the participating countries, underpinned by strong institutional and regional collaborations. Zambia's training of 47 students (33 BScs, 11 MScs, and 3 PhDs) was embedded within a broader framework of collaboration involving public research institutions and industry, notably through the Public-Private Partnership (PPP) model in R&I. In Malawi, training of 10 students was complemented by internships and mentorship facilitated through partnerships with institutions like ICRISAT, the University of Ghent, and ISPA Research Institute in Italy. These international collaborations not only enhanced the quality of supervision but also exposed students to global research environments. Botswana's postgraduate training program in mining and value addition benefitted from a cross-border research collaboration with Zimbabwe, offering students access to a wider scientific community and shared infrastructure. Additionally, Senegal's specialized training of researchers in biotechnology and food safety was a result of institutional partnerships within the EPIVHE II Project and other collaborative research initiatives. Thus, human capital development was not just a result of national effort but a product of deliberate, structured, and mutually beneficial collaborations among academic, governmental, and international actors.

3.2.2 Cross-border Collaborations Enhancing Technological Innovation

SGCI 2 project catalyzed significant technological innovations that were shaped and amplified through regional collaboration. A leading example is the joint deployment of solar drying technologies in Mozambique, Malawi, and Zambia—a trilateral effort that combined technical expertise, resource sharing, and localized adaptation of postharvest solutions. These innovations were not only co-developed but also co-disseminated through partnerships among science granting councils and research teams in the three countries. In Zambia, the optimization of local beverage production processes and the development of a collaborative model linking government, academia, and industry were rooted in consultative partnerships with Mozambique and Malawi. The model and accompanying PPP framework facilitated effective implementation of R&I priorities. Similarly, Uganda's collaboration with Kenya's NRF and Côte d'Ivoire's FONSTI opened pathways for harmonized standards and joint research planning. These examples highlight

how cross-border collaborations accelerated technological advancements by enabling knowledge pooling, harmonized approaches, and shared learning.

3.2.3 Inclusive Innovation through Community-Based Collaborations

Collaborations were not limited to formal institutions but extended meaningfully to community groups, enabling inclusive innovation and grassroots impact. In Mozambique, researchers partnered with traditional practitioners and farmer groups to co-create and disseminate indigenous knowledge-based solutions. For example, 31 traditional healers were trained in herbal remedy development for commercialization—a unique integration of cultural knowledge into formal R&I frameworks, made possible through collaborative approaches. Likewise, the training of 58 milk producers (including 36 women), 20 small fruit suppliers, and 40 hospitality workers was achieved through multi-stakeholder partnerships between universities, local governments, and community-based organizations. In Malawi, the collaboration between Mzuzu University, the Department of Fisheries, and local cooperatives facilitated technology transfer, particularly the solar vegetable dryer project co-implemented with the German Technical Cooperation and LUANAR. These collaborations exemplify how inclusive, community-grounded partnerships ensure research outputs are directly applied to improve rural livelihoods and promote gender inclusion.

3.2.4 Institutional Collaborations Facilitating Policy and Systems Strengthening

Several countries used SGCI support to foster collaborations that strengthened institutional systems and policy environments. Uganda's UNCST, for instance, engaged in joint training with other science councils on grant management, policy translation, and project delivery using the PRINCE2 methodology—capacity built through inter-council collaboration and learning. Malawi's Science and Technology Fund, which saw increased treasury allocations over two financial years (MK 291M in 2021/22 and MK 450M in 2022/23), was revitalized in part due to SGCI-facilitated partnerships with continental technical agencies (AAU, HSRC, ACTS). These actors provided strategic technical assistance to guide fund operationalization and the development of a National Research Agenda. Similarly, Rwanda's mobilization of over 1 billion Rwf in research financing was supported by collaborative frameworks with regional stakeholders and strategic private sector partners. These efforts demonstrate that institutional strengthening in STI is most effective when rooted in knowledge-sharing collaborations that link policy actors, funders, and implementing agencies.

3.2.5 Catalyzing Public-Private and Academic Partnerships for Research Uptake

SGCI's support facilitated the formation of strategic partnerships across academia, industry, and government that advanced the uptake of research outputs. Tanzania's MoU between the Sokoine University of Agriculture and the Ministry of Livestock and Fisheries formalized collaboration for joint R&D and technology transfer, demonstrating effective science-policy-practice linkages. The partnership was instrumental in increasing engagements between universities and the private sector,and even attracted attention from high-level political leaders such as the Deputy Minister of Agriculture. In Uganda, collaboration with the Uganda National Bureau of Standards allowed researchers and local bakers to co-develop and implement simplified baking standards, improving product quality and safety. Malawi's partnerships involving LUANAR, the Farmers' Co-operative, and GTZ promoted commercialization of solar dryer technology and served as models for integrating innovation into agricultural value chains. These examples show that SGCI didn't only fund research—it also created enabling ecosystems for its utilization

through well-structured and functional collaborations.

Table 3: Training, Community Engagement, and Collaborative Partnerships under SGCI 2

Country	Students Trained	Researchers Trained	Community Groups	Collaboration and additional funding
Tanzania	6 MSc students trained and graduated	15 technicians and 6 engineers trained		An MoU signed between Sokoine University of Agriculture (SUA) and the Ministry of Livestock and Fisheries in knowledge sharing, expertise and technology. Increased collaborations and interactions between Universities/ R&D institutions and industry/ private sector. The Deputy Minister for Agriculture visited Sokoine University of Agriculture to explore the possibility to transfer the technology
Mozambique	21 students: 1PhD, 4 MSc. & 16 BSc.		Solar drying technology was disseminated to a group of farmers 31 traditional practitioners trained in the development of herbal remedies for commercialization 58 milk producers and resellers (36 women)trained in milk processing using native fruits (maphilwa and masala) and financial management. 20 participants (14 women) small masala fruit suppliers trained in fruit quality criteria. 40 participants (22 women) from hospitality and agrarian extension trained in the use of native fruit pulp and juice in cooking.	
Botswana	3 female Master's students and 4 Ph.D. students.			Cross-border collaboration between Botswana and Zimbabwe through joint research in mining technology and value addition.
Cote d'Ivore	5 Msc students	Capacity-building workshops conducted for early-career researchers and research administrators, focusing on grant writing, research management, and innovation systems strengthening.	Engagement with local agricultural cooperatives and small-scale producers through knowledge transfer activities, including training on improved production practices, value addition, and technology adoption.	**Strengthened** collaboration with national research institutions and regional partners under SGCI frameworks, including linkages with West African research networks. **Partnership** development with government agencies and private sector actors to support research uptake and innovation scaling.
Namibia	Postgraduate students (including Master's level) were engaged through co-supervised, field-based research projects (e.g., OFULA project).	Researchers and grant managers trained through joint capacity-building initiatives with Mozambique (FNI), including proposal writing, ethics, and peer review processes.	Local communities engaged through projects integrating indigenous knowledge systems, including traditional practitioners contributing to biodiversity conservation and land management research.	**Participation** in regional platforms such as SANBio and Evipol for policy and research alignment. **Implementation** of the Open Grant Management System (OGMS) to strengthen research governance.

Country	Students Trained	Researchers Trained	Community Groups	Collaboration and additional funding
Senegal		EPIVHE II Project trained 18 researchers on PCR-based pathogen detection and bioinformatics tools . Fertilisation Innovante par Rhizo-Inoculation trained 20 agricultural scientists on symbiotic nitrogen fixation and bio-fertilizer application . Salt Quality Project trained 12 chemists and food safety experts on heavy metal analysis and iodine quantification .		
Burkina Faso	8 students supported *(5 MSc and 3 BSc)*	22 researchers and technical staff trained in research proposal development, project implementation, and monitoring and evaluation	· 50 smallholder farmers and local producers engaged in training on improved agricultural practices and value addition · 18 community-based actors (including cooperatives and extension agents) involved in knowledge dissemination and local innovation uptake	3 institutional collaborations reinforced at national level (universities–research institutes–ministries)
Malawi	8 BSc (3 F and 5M), 1 MSc (M), and 1 PhD (M) completed their dissertations. 3 MSc each completed 1-year internship program at Mzuzu Uni	46 researchers trained in research proposal writing Several capacity building workshops and trainings for NCST staff by SGCI CTAs (AAU, HSRC, and ACTS)		The SGCI -2 project implementation stimulated the operationalisation of the Science and Technology Fund (In FY 21/22 MK 291M and in 22/23, MK 450M released by treasury) Development of a National Research Agenda Research grants of est MK200million secured by various researcher from the Malawi govt Partnership between Natural Resources College of Lilongwe University of Agriculture and Natural Resources (NRC) and ICRISAT Malawi. Partnership between NRC, University of Ghent and ISPA Research Institute in Italy Mzuzu University has entered into a partnership with the Malawi Department of Fisheries to support further research and uptake of research results Partnership for technology transfer and commercialization for vegetable solar drier with the Farmers Co-operative, German Technical Co-operation (Lilongwe) and Lilongwe University of Agriculture and Natural Resources was established.
Rwanda	7 masters and 1 PhD students mentored under this project	Capacity building and Mentorships of students and junior researchers		NCST has mobilized over 1 billion Rwf towards efforts on funding research and innovation
Uganda	6 students trained (4 MSc and 2 BSc). 5 female and 1 male.		Bakers were trained in the implementation of simplified cake and bread standards.	Collaboration with the Uganda National Bureau of Standards (UNBS) UNCST entered into cross border collaborations with NRF Kenya, FONSTI Cote d'Ivoire

Country	Students Trained	Researchers Trained	Community Groups	Collaboration and additional funding
Zambia	47 students trained (24 males and 23 females) 3 PhDs, 11 MScs, and 33 BScs			A framework for Public Private Partnerships (PPPs) in Research and Innovation (R&I) was developed to ensure effective identification and implementation of PPP in research and innovation
Zimbabwe	12 students trained *(2 PhD, 6 MSc, and 4 BSc)*	28 researchers and research support staff trained in proposal writing, research management, innovation, and knowledge translation	· 65 smallholder farmers and agri-entrepreneurs trained in sustainable production practices and value addition · 20 community-based practitioners engaged in technology adoption and dissemination initiatives	· 4 institutional partnerships established between universities, research institutes, and industry · Participation in 2 cross-border collaborations, including joint research with Botswana on mining and mineral value addition

3.3 Extent and Impact of Interdisciplinary and Cross-Institutional Approaches in SGCI-Funded

Finding 3: ***SGCI-2 projects integrated interdisciplinary and cross-institutional approaches across countries like Mozambique, Zambia, and Malawi in renewable energy, and Namibia and Mozambique in indigenous health research. Botswana and Zimbabwe collaborated on mining innovations using nanotechnology, while Senegal and Burkina Faso combined microbiology and agriculture in biofertilizer projects. These partnerships enhanced student training, institutional capacity, and regional policy alignment. Overall, SGCI-2 showcased how collaborative, context-driven research accelerates sustainable development across Africa. SGCI-2-funded projects demonstrate a significant and deliberate application of interdisciplinary and cross-institutional approaches as a strategic pathway for tackling complex development challenges. These approaches not only enhanced scientific innovation but also contributed to building sustainable, inclusive, and locally relevant research ecosystems across participating African countries.***

3.3.1 Integration of Diverse Disciplines

Interdisciplinary research under SGCI-2 involved the blending of various knowledge domains—ranging from agriculture, energy, environmental science, biotechnology, health sciences, epidemiology, to indigenous knowledge systems. This fusion allowed for holistic problem-solving and contextually grounded innovations.

- Mozambique, Zambia, and Malawi collaborated on renewable energy projects that integrated environmental science, engineering, and economics. For example, the project *"Invasive Alien Plants for Eco-Friendly Energy"* engaged universities across the three countries, transforming environmental liabilities into biomass energy solutions—a case of ecological and economic disciplines working together.
- In Namibia, the research on smart agricultural technologies combined agronomy, space technology, and social sciences to develop climate-resilient farming systems. The inclusion of traditional ecological knowledge further emphasized the role of indigenous systems in scientific research.
- Côte d'Ivoire combined ethnobotany, phytochemistry, and biomedical sciences in investigating traditional treatments for tropical diseases. This triangulation enriched scientific rigor while validating community-based knowledge.

3.3.2 Institutional Collaboration Across Borders and Sectors

SGCI-2 projects fostered collaboration among universities, research institutes, government agencies, private sector entities, and regional networks. These partnerships enhanced research design, resource sharing, and regional policy harmonization.

- Botswana and Zimbabwe exemplified institutional collaboration in mineral technology research. The *Nano-Flotation Project* involved the Botswana Digital Innovation Hub, University of Botswana, and Zimbabwe's Research Council. Laboratories in South Africa also supported advanced analyses—showcasing regional infrastructure sharing.
- Namibia and Mozambique partnered on the *Application of Indigenous Knowledge in Disease Management* project, involving universities, science councils, and the SANBio regional network. Thirty-one traditional healers were trained, and the project documented herbal remedies for diseases like COVID-19 and malaria.
- In Rwanda, the mandatory inclusion of private sector partners in research proposals fostered strong academia-industry linkages. Seven industries participated directly in research, enhancing commercialization and practical uptake.

3.3.3 Capacity Building and Knowledge Transfer

SGCI-funded interdisciplinary and institutional collaborations were instrumental in building human capital and institutional capacity.

- In Zambia, 47 students were trained (including 3 PhDs and 11 MScs) under projects that integrated public-private partnerships. A framework was developed to institutionalize PPPs in research and innovation, contributing to systemic change.
- Malawi reported partnerships between its universities and international institutions (e.g., University of Ghent and ISPA in Italy), alongside the development of a National Research Agenda and increased government funding toward science.
- In Uganda, cross-institution collaborations facilitated the creation of TECHNOMART, a digital platform linking researchers with investors and entrepreneurs, reinforcing national innovation ecosystems.

3.3.4 Policy and Governance Impact

Interdisciplinary and cross-institutional research translated into policy-relevant outputs and system modernization.

- Namibia, in partnership with UNCST Uganda and the Association of African Universities, adopted the Open Grant Management System (OGMS), digitizing its grant administration and improving transparency and efficiency.
- In Senegal, interdisciplinary biofertilizer projects trained researchers in molecular biology and agronomy, influencing peanut farming practices in specific agroecological zones.

3.3.5 Cross-Country Learning and Resilience

The projects displayed remarkable adaptability, especially during the COVID-19 pandemic, leveraging digital platforms and remote collaboration to maintain progress.

- For example, Botswana and Zimbabwe sustained research through virtual coordination, while Burkina Faso and Namibia adjusted work plans and project timelines to accommodate disruptions.
- Multidisciplinary research in Burkina Faso, such as combining IT tools with public health and agriculture to develop mobile surveillance apps (e.g., APURMED), showcased resilience and innovation.

3.4 Complementing and Duplicating Roles of the Collaborators

Finding 4: ***The analysis shows that the collaborators in the different countries and institutions are duplicating in relation to the areas of focus: renewable energy, health and indigenous. What is mostly seen in that collaborators in each of these three countries (Mozambique, Malawi, Zambia) implemented three trilateral projects in renewable energy. These projects had the same focus. Similarly, the three bilateral projects in health were implemented in both Mozambique and Zambia, while the bilateral project on indigenous knowledge systems was implemented both in Mozambique and Namibia. In as much as the collaborators could be playing the duplicating role, it can be argued that there could be contextual differences in relation to renewable energy needs and the health needs.***

3.4.1 Botswana

The collaborative roles of the partners in the SGCI-2 funded projects were primarily **complementing** rather than duplicating.

- **Complementing Roles:** The projects involved partners working on specific, distinct aspects of the research. For instance, the Botswana Geoscience Institute focused on geoscientific characterization of coals, while academic institutions like the University of Botswana concentrated on developing nano-engineered reagents and beneficiation techniques. These roles complemented each other later in the research process, culminating in integrated outcomes such as optimized beneficiation processes informed by detailed geoscience data.
- **Avoidance of Duplication:** There was no evidence of three partners performing the same tasks in parallel. Instead, each partner contributed unique expertise aligned with their strengths, ensuring a synergistic approach.

The collaboration effectively utilized a complementary model, with each partner focusing on specific aspects of the research, which then integrated to achieve common project objectives. This approach maximized resource efficiency and enriched the overall research outputs.

3.4.2 Namibia

Based on the information provided, the collaborative roles of the partners in the SGCI 2-funded projects appear to be predominantly complementing rather than duplicating.

- **Complementing Roles:** The projects involved partners with distinct but interconnected responsibilities. For example, NCRST coordinated overall project management and strategic oversight; FNI Mozambique contributed regional insights and facilitated cross-border collaboration; SANBio provided scientific and technical expertise, particularly in biosciences and biotechnology; and universities or research institutions brought in specialized research and innovation activities. These roles collectively address different facets of the project objectives, such as indigenous knowledge safeguarding, biotechnology development, water management, and climate-smart agriculture. Their inputs build upon each other, ensuring a cohesive progression toward common goals.
- **Avoidance of Duplication:** The documentation highlights clear division of responsibilities, such as developing call documents, managing grants, conducting specific research studies, and organizing workshops. The strategic planning and role assignment seem designed to prevent overlap, with each partner focusing on their core competencies and contributions.
- **Mechanisms Ensuring Complementarity:** The formal agreements, clear workplans, and defined deliverables foster coordination and delineation of roles. The collaborative activities, such as joint workshops and shared dissemination, further reinforce a complementary dynamic where each partner's work enhances and supports the others' efforts.

In conclusion, the roles of the collaborators are crafted to be complementary, leveraging each organization's strengths and expertise, thereby avoiding unnecessary duplication and promoting efficient, synergistic

progress toward project objective

3.4.3 Burkina Faso

The collaborative roles of the partners in the SGCI 2-funded projects generally appear to be complementing rather than duplicating.

For example, in the biofertilizer project, local cooperatives are responsible for producing inocula, while research institutions conduct tests and provide technical training. This division of roles—where production and testing are handled by different partners—indicates a complementary approach, with each partner focusing on specific aspects of the project, and their work being integrated to achieve common goals.

Similarly, in the erosion control project, technical capacity building and demonstration activities are conducted by research institutions, while local producers implement and benefit from these techniques, suggesting a complementarity of roles rather than duplication.

There is no evidence from the provided excerpts suggesting that three partners are performing the same tasks simultaneously, which would indicate duplication. Instead, the roles seem to be well delineated and cooperative, contributing different expertise and functions towards shared objectives.

In summary, the collaborative roles among partners in these projects tend to be complementary, with each partner contributing distinct functions that together support project success, rather than overlapping or duplicating efforts.

3.5 Contributions of SGCI-2 Projects to Building Sustainable Research Ecosystems in Africa

Finding 5: ***SGCI-2 strengthened sustainable research ecosystems through strategic MoUs like the Botswana-Zimbabwe minerals partnership and Senegal's regional STI alliances. Capacity building was evident in Namibia and Mozambique's joint trainings, Botswana's support for female scientists, and Burkina Faso's farmer empowerment in biofertilizer use. Locally driven innovations—such as Gomponsom's land restoration and Namibia's integration of indigenous knowledge—demonstrated community-rooted scalability. Finally, governance systems were modernized through digitized grant platforms in Namibia and Senegal, enhancing transparency and long-term institutional resilience. The Science Granting Councils Initiative (SGCI)-Phase II has made significant strides in fostering sustainable research ecosystems across Africa. This transformation has been anchored on five key pillars: institutional partnerships, capacity strengthening, inclusive innovation, system modernization, and policy alignment. The following thematic analysis integrates cross-country experiences, offering specific examples from Botswana, Namibia, Burkina Faso, and Senegal.***

3.5.1 Institutionalizing Research Collaboration through Strategic Partnerships

A sustainable research ecosystem requires robust, legally binding, and mutually beneficial collaborations. SGCI-2 facilitated the signing of Memoranda of Understanding (MoUs) that formalized inter-agency and cross-border partnerships.

- In Botswana, the MoU between the Botswana Digital and Innovation Hub (BDIH) and the Research Council of Zimbabwe (RCZ) enabled long-term cooperation on minerals research and technology development. This partnership moved beyond ad hoc collaboration, anchoring the relationship institutionally and aligning research with national mineral beneficiation strategies.
- In Senegal, MoUs signed by the Ministry of Higher Education, Research, and Innovation (MESRI) with actors such as ENABEL, UNESCO, and ECOWAS embedded Senegal's research ecosystem in global and regional knowledge and funding networks. These frameworks provided strategic direction for national science, technology, and innovation (STI) efforts.

These partnerships created channels for joint research calls, technology transfer, and human resource

development, contributing to system resilience and long-term collaboration.

3.5.2 Strengthening Research Capacity and Inclusion

Capacity building—particularly of early-career scientists, women, and local institutions—was a foundational component of SGCI-2. The initiative enhanced research skills and created supportive environments for scientific inquiry.

- Namibia utilized its partnership with Mozambique's Fundo Nacional de Investigação (FNI) to conduct joint training sessions for researchers and grant managers. These included topics such as proposal writing, ethics, and peer review. Young scientists benefited from mentorship and exposure to regional expertise.
- Botswana's mineral research initiative engaged PhD students and early-career female scientists, who received hands-on training in nanotechnology and environmental engineering. This not only contributed to individual capacity but also built institutional memory.
- In Burkina Faso, farmers and cooperative members were trained in the use of biofertilizers and biological erosion control techniques. Importantly, this training went beyond dissemination—it empowered locals to replicate and scale research outcomes autonomously.

These examples show that human capital development, when inclusive and well-structured, strengthens the foundation for long-term research productivity and social impact.

3.5.3 Promoting Locally Driven, Inclusive, and Scalable Innovation

SGCI-2 supported research that addressed local challenges with locally derived solutions, ensuring contextual relevance and community uptake.

- Burkina Faso's biological soil preservation techniques in Gomponsom district emerged from co-creation processes involving researchers and smallholder farmers. This bottom-up innovation, driven by real-world needs, resulted in sustainable land management practices that are being replicated independently by trained communities.
- In Botswana, researchers developed non-toxic nano-reagents for mineral beneficiation and innovative coal processing technologies tailored to the country's industrial and environmental context. These innovations, once commercialized, can strengthen local economies while preserving ecosystems.
- Namibia's emphasis on integrating indigenous knowledge systems into research ensured that scientific outputs resonated with community practices. For instance, traditional ecological knowledge was incorporated into land management and biodiversity conservation studies.

These cases underscore that innovation ecosystems thrive when grounded in local realities and supported by mechanisms for inclusive participation and scalability.

3.5.4 Modernizing Systems for Sustainable Research Governance

SGCI-2 helped improve the operational efficiency and transparency of national research systems through digitalization and administrative reform.

- Namibia transitioned from manual to digitized grant management systems, resulting in improved application processing, monitoring, and reporting. This change enhanced credibility among funders and reduced bottlenecks, laying the groundwork for long-term sustainability.
- Senegal adopted digital tools to streamline competitive grant management processes. These included platforms for proposal submission, peer review, and feedback tracking, enabling efficient allocation of resources and reducing bias.
- Burkina Faso identified and addressed key challenges in financial disbursements and fund accountability. With support from SGCI-2, revised financial management processes were instituted, enabling more predictable and transparent project funding.

These governance improvements enhanced institutional readiness, accountability, and confidence in national research systems, making them more attractive to both public and private funders.

3.6 Challenges and Opportunities

Finding 6: Structured research collaboration under SGCI-2 significantly strengthened Africa's science and innovation systems by enabling cross-border knowledge exchange, resource sharing, and institutional partnerships. The initiative supported 29 collaborative projects across 12 countries, with strong regional leadership emerging in Southern Africa. These collaborations contributed to measurable capacity gains, including the training of over 150 students and researchers and the co-development of contextually relevant technological innovations. Overall, collaboration proved to be a critical driver of research excellence, policy relevance, and sustainable impact across participating countries.

Key Cross-Cutting Challenges

i. Cross-Border and Logistical Constraints

The COVID-19 pandemic exacerbated pre-existing issues related to cross-border collaboration, particularly affecting interdisciplinary projects that required sample exchange, shared infrastructure, and joint research activities.

- Botswana experienced severe delays due to restrictions on the movement of samples from Zimbabwe, with logistical processes on the Zimbabwe side taking significantly longer than within Botswana.
- In Zambia, regulatory misalignments and language barriers prevented effective collaboration with Mozambique, halting a planned interdisciplinary partnership.
- Mozambique also faced delays due to prolonged bioethical approval processes, which stalled interdisciplinary projects on COVID-19 immunological profiling.

ii. Capacity and Infrastructure Limitations

Several countries faced institutional or technical capacity constraints that affected the effective integration of interdisciplinary teams.

- In Senegal, the UCAD-led project lacked local capacity for high-throughput sequencing, forcing reliance on Canadian institutions for metagenomic analysis.
- Burkina Faso encountered technical gaps in integrating digital tools (e.g., Go.Data for health surveillance), especially in rural regions with poor internet connectivity.
- Uganda highlighted weak intersectoral linkages and fragmented R&I systems, which limited opportunities for cross-agency interdisciplinary collaboration.

iii. Administrative, Ethical, and Financial Hurdles

Inefficient funding mechanisms and legal barriers also impacted interdisciplinary project implementation.

- In Burkina Faso, mismatches between national and donor disbursement cycles delayed project kick-offs, requiring no-cost extensions and realignment.
- Botswana cited significant delays in payments between partner institutions, which disrupted ongoing research.
- Ethical review timelines in Mozambique slowed down collaborative studies, reflecting broader regulatory challenges in multi-country interdisciplinary research.

iv. Limited Inclusivity and Participation

Interdisciplinary research often requires inclusive team structures, but gaps in gender and leadership representation persist.

- In Burkina Faso, despite gender-responsive evaluation criteria, only one out of five national projects was led by a woman, pointing to persistent leadership imbalances in interdisciplinary R&D.

v. Virtual Platforms and Remote Collaboration

Amid COVID-19 restrictions, virtual tools emerged as vital enablers of interdisciplinary dialogue and coordination.

- Botswana and Namibia successfully shifted to online platforms, allowing regular coordination and minimizing project disruption.
- In Namibia, virtual workshops facilitated by the African Academy of Sciences broadened access to diverse expertise across disciplines.

vi. Cross-Sectoral and Policy-Relevant Innovation

Interdisciplinary approaches led to novel, locally grounded innovations with real-world application.

- In Senegal, integrating agronomy, microbiology, and molecular biology resulted in biofertilizer solutions tailored to peanut farming in agroecological zones.
- Côte d'Ivoire's interdisciplinary projects led to tangible outputs like biogas purification, medicinal plant identification, and public health recommendations—all rooted in both scientific and indigenous knowledge systems.
- Burkina Faso's projects used a mix of IT, public health, and agronomy to develop mobile apps (e.g., APURMED), malaria surveillance tools, and agroecological innovations.

vii. Strategic Flexibility and Adaptive Planning

Project teams demonstrated resilience through adaptive planning and strategic adjustments.

- Senegal expanded its scientific scope mid-project (e.g., adding metagenomic analysis), showcasing the ability to adapt to emerging research needs while maintaining interdisciplinary rigor.
- Namibia and Burkina Faso adjusted timelines and workplans to accommodate pandemic-related disruptions, ensuring the continuity of research efforts.

viii. Strengthened Regional and International Partnerships

Interdisciplinary projects nurtured new collaborations that enhanced knowledge sharing and resource pooling.

- Burkina Faso collaborated with Senegal on cross-border research in climate and health, facilitating regional learning and the co-creation of solutions.
- Senegal's UCAD project partnered with Université Laval for advanced genomics work, blending local contextual relevance with global scientific standards.

ix. Capacity Building and Human Capital Development

Many projects invested in developing interdisciplinary skills through academic supervision, training, and institutional strengthening.

- Senegal supported MSc and PhD research, building a new generation of interdisciplinary scholars focused on sustainable agriculture.
- Burkina Faso developed M&E systems within FONRID and trained project investigators and finance officers, enhancing overall project governance.

4. LESSONS LEARNT AND BEST PRACTICES

4.1 Lessons Learnt for Improving Inter-Africa Collaborations

The SGCI-2 initiative, through its support of 41 bilateral and trilateral collaborative research projects across 12 African countries, provided a unique platform for understanding how African institutions can work together to generate knowledge, build capacity, and respond to development challenges. The following are the key lessons learnt from the implementation of these projects that can inform future intra-African research collaboration efforts:

Lesson 1: Clearly Defined Roles and Responsibilities Are Essential to Successful Partnerships

One of the most consistent success factors observed across well-performing projects was the early clarification of roles, responsibilities, and deliverables among collaborating institutions. Projects that had signed and operationalized Memoranda of Understanding (MoUs)—such as those between the Botswana Digital Innovation Hub (BDIH) and Zimbabwe's RCZ—demonstrated stronger alignment, better task allocation, and smoother coordination.

Recommendation: Future collaborations should prioritize formalized agreements with specific work plans and mechanisms for regular review and mutual accountability.

Lesson 2: Language and Regulatory Harmonization Remains a Major Barrier to Cross-Border Collaboration

Language barriers (e.g., Lusophone-Francophone-Anglophone divides) and inconsistent ethical approval processes and research regulations across countries delayed or even derailed some collaborations. For example, a project between Mozambique and Zambia was stalled due to incompatible ethical and regulatory frameworks.

Recommendation: There is a need for regional bodies (e.g., AUDA-NEPAD, SADC, ECOWAS) to develop regional guidelines for ethical and regulatory harmonization in cross-border research.

Lesson 3: Digital Tools Enhance Collaboration but Require Capacity and Infrastructure

The shift to virtual platforms during the COVID-19 pandemic revealed both the value and limitations of digital collaboration. While online tools helped maintain continuity in Botswana-Zimbabwe collaborations, limited internet connectivity in rural areas (e.g., parts of Burkina Faso and Cote d'Ivoire) hindered consistent participation.

Recommendation: Future projects should include budget lines for digital infrastructure, training, and support to ensure inclusive and effective virtual collaboration.

Lesson 4: Regional Complementarity Is Strongest When Projects Build on Shared Contexts

Trilateral collaborations among countries with similar socio-ecological or technological contexts—such as Malawi, Zambia, and Mozambique in renewable energy—demonstrated strong alignment and mutual learning. These projects benefited from regionally shared challenges (e.g., invasive plant management, post-harvest losses) and adapted solutions more easily across borders.

Recommendation: Regional calls for proposals should be designed around shared development priorities and environmental contexts to ensure the relevance and transferability of research outputs.

Lesson 5: Gender-Responsive and Inclusive Collaboration Enhances Sustainability

Projects that integrated gender and inclusivity into their research design—such as Namibia's Women Innovators Programme and Senegal's biofertilizer initiative—increased local ownership and relevance. Inclusivity also supported more diverse innovation ecosystems, particularly where women and youth were engaged in entrepreneurship or indigenous knowledge research.

Recommendation: Collaboration frameworks should include gender-sensitive indicators and inclusive capacity-building to ensure broader participation and impact.

Lesson 6: Coordination by National SGCs is Critical to Sustaining Collaborations

Effective leadership by national Science Granting Councils (SGCs), such as Namibia's NCRST or Malawi's NCST, was found to be a critical success factor in sustaining cross-border partnerships. SGCs played key roles in coordinating timelines, facilitating resource sharing, managing reporting, and building trust between partners.

Recommendation: SGCI and similar programs should continue to strengthen the institutional capacity of SGCs to lead and manage regional research partnerships.

Lesson 7: Co-Supervision and Mobility of Students Strengthen Long-Term Research Ties

Several SGCI-2 projects demonstrated that joint supervision of graduate students, staff exchanges, and internships are highly effective tools for building trust, embedding partnerships in institutions, and developing a pipeline of collaborative researchers. This was notably practiced in projects in Zimbabwe-Malawi and Namibia-Mozambique.

Recommendation: Future projects should integrate co-supervision, joint degrees, and student mobility schemes into collaborative research models.

Lesson 8: Flexibility in Funding Modalities Improves Responsiveness

Rigid funding cycles, disbursement delays, and mismatched timelines between donor and national systems (as seen in Burkina Faso) created challenges for project implementation. Projects that allowed adaptive planning and flexible disbursement managed to navigate delays caused by COVID-19 and other disruptions more effectively.

Recommendation: Regional programs should adopt flexible funding frameworks that can adapt to evolving project needs and local realities.

4.2 Best Practices Identified Across SGCI-2 Collaborations

- **Use of MoUs and Formal Agreements**: Legal instruments helped formalize collaboration, clarify roles, and secure long-term partnerships (Botswana-Zimbabwe, Namibia-Mozambique).
- **Trilateral Knowledge Hubs**: Cross-border, multi-country projects (e.g., in renewable energy) served as platforms for shared learning and pooled infrastructure.
- **Regional Technical Support Networks**: Outsourcing advanced laboratory work (e.g., from Botswana and Zimbabwe to South Africa) exemplified regional resource sharing.
- **Integration of Indigenous Knowledge Systems**: Namibia and Mozambique successfully blended traditional knowledge with scientific methods, increasing relevance and cultural resonance.
- **Decentralized and Embedded Research**: Embedding researchers and students within local implementation sites (e.g., OFULA project in Namibia) strengthened local capacity and practical outcomes.
- **Joint Monitoring, Evaluation, and Learning (MEL)**: Joint MEL visits, as seen in Zimbabwe and Malawi, improved real-time learning and accountability between councils and project teams.
- **Inclusivity in Innovation**: Programs such as Namibia's Women Innovators Initiative demonstrate how supporting underrepresented groups contributes to sustainability and local relevance.

5. CONCLUSION

The SGCI-2 initiative has demonstrated that well-structured, cross-border and interdisciplinary collaborations are a powerful mechanism for strengthening Africa's research and innovation ecosystems. By supporting 29 collaborative projects across 12 countries, the initiative not only enhanced research excellence but also fostered meaningful institutional partnerships, built human capital, and enabled the co-creation of contextually relevant solutions in key sectors such as energy, health, and agriculture. The evidence shows that collaboration—when anchored in clear frameworks such as MoUs, supported by digital tools, and aligned with regional priorities—can significantly improve research productivity, policy relevance, and innovation uptake. Moreover, the integration of indigenous knowledge systems, gender-responsive approaches, and community engagement has reinforced the inclusivity and sustainability of research outcomes.

However, the findings also highlight persistent structural and operational challenges, including regulatory misalignments, infrastructure gaps, and limited cross-regional participation, particularly in East and West Africa. Addressing these constraints will be critical for maximizing the impact of future initiatives. Moving forward, there is a strong case for scaling successful trilateral models, investing in harmonized policy frameworks, and strengthening the institutional capacities of Science Granting Councils to lead and sustain collaborations. As SGCI transitions into its next phase, embedding flexibility in funding, deepening interdisciplinary integration, and expanding equitable participation will be essential to consolidating gains and advancing a resilient, globally competitive African research landscape.

6. POLICY RECOMMENDATIONS

i. Policy Recommendations for Science Granting Councils (SGCs)

1. **Institutionalize Research Collaborations through Binding Frameworks**
   Science Granting Councils should formalize their partnerships through clearly defined and binding agreements such as Memoranda of Understanding (MoUs). These agreements should outline partner roles, deliverables, timelines, and conflict resolution mechanisms. Institutionalizing collaboration in this manner enhances accountability, facilitates smoother coordination, and strengthens the longevity and alignment of research partnerships. Councils like Botswana's BDIH and Zimbabwe's RCZ offer successful models where MoUs have anchored sustainable research engagement beyond individual project cycles.
2. **Align Collaborative Calls with Regional Development Priorities**
   SGCs should design their funding calls to reflect regional and national development frameworks such as the African Union's Agenda 2063, STISA-2024, and country-specific research agendas. By focusing on cross-border development challenges—such as renewable energy, food security, or health—SGCs can create more impactful and transferable research outcomes. For instance, trilateral collaborations in renewable energy among Malawi, Zambia, and Mozambique succeeded due to their shared environmental and economic challenges.

3. **Enhance Integration of Interdisciplinary Research Approaches**
   To solve complex societal issues, councils should encourage and reward interdisciplinary project designs that integrate social sciences, engineering, environmental studies, indigenous knowledge, and more. Proposal evaluations should include criteria that assess the quality of interdisciplinary integration. Councils could also support matchmaking forums to connect researchers from different disciplines and institutions prior to submission, increasing the quality and diversity of research teams.

4. **Strengthen Public-Private Research Partnerships (PPPs)**
   SGCs should promote the inclusion of private sector partners in research by creating enabling policies and financial incentives. This may include co-funding models, public-private research consortia, and mechanisms for shared ownership of intellectual property. Zambia and Rwanda demonstrated positive outcomes from projects where private sector actors were directly engaged in project implementation and commercialization of research outputs.

5. **Advance Gender Inclusion and Equity in Research Programming**
   Promoting inclusive innovation ecosystems requires deliberate support for women and marginalized groups in research. Councils should introduce gender-sensitive scoring criteria, encourage female leadership in project teams, and offer dedicated innovation grants for women. Namibia's Women Innovators Programme, for example, supported female entrepreneurs with funding, mentorship, and market linkages, showing the potential of targeted inclusion strategies.

6. **Digitize and Streamline Grant Management Systems**
   Adoption of digital tools such as the Open Grant Management System (OGMS) can enhance the transparency, efficiency, and accountability of research funding processes. SGCs should allocate resources to build internal digital capacity, train staff, and ensure infrastructure is in place, especially in under-resourced or rural areas. Namibia's successful deployment of OGMS with support from UNCST and AAU is a useful example.

7. **Promote Co-supervision and Student Mobility Across Borders**
   SGCs should encourage inter-institutional co-supervision of postgraduate students and support mobility schemes as a mechanism to deepen research collaboration and build the next generation of regional scholars. This has proven effective in projects between Zimbabwe and Malawi, and between Namibia and Mozambique, where students were embedded in field sites across countries, thereby gaining exposure and contributing to real-time research outcomes.

8. **Establish Joint Monitoring, Evaluation, and Learning (MEL) Frameworks**
   SGCs should coordinate MEL activities with collaborating councils and institutions to ensure joint learning, transparency, and accountability. Shared MEL tools and site visits—as seen in projects involving Zimbabwe, Malawi, and Botswana—can help track progress, resolve bottlenecks, and document lessons in a harmonized manner across partners.

9. **Invest in Shared Research Infrastructure and Resource Sharing**
   SGCs should pursue joint infrastructure investments or resource-sharing arrangements to overcome national capacity constraints. For instance, outsourcing advanced lab testing to South Africa was a practical solution for Botswana-Zimbabwe collaborations in mining. Institutionalizing such regional technical support networks can reduce duplication and build regional scientific competitiveness.

ii. Policy Recommendations for IDRC (Funder)

1. **Design Flexible and Context-Responsive Funding Mechanisms**
   IDRC should continue to champion funding models that are flexible and adaptable to country-specific realities. Many SGCI-2 projects encountered disbursement delays due to donor and national funding cycle mismatches. Future grants should allow for budget reallocations, timeline extensions, and mid-term redesigns to accommodate evolving circumstances, particularly during crises like COVID-19.
2. **Support Ethical and Regulatory Harmonization Across Regions**
   Cross-border research under SGCI-2 faced delays due to differing ethical approvals and research regulations. IDRC, working with AUDA-NEPAD and regional economic communities, should fund initiatives that develop harmonized ethical, data-sharing, and regulatory frameworks. This would ease the burden on researchers and enhance the pace and quality of collaborative studies.
3. **Invest in Long-term Institutional Capacity Strengthening**
   Beyond project-level support, IDRC should prioritize long-term investments in strengthening the institutional capacities of Science Granting Councils. This includes training in grant management, MEL, policy engagement, and interdisciplinary research leadership. Programs like joint training between Namibia and Mozambique on grant processes should be scaled up across other SGCI countries.
4. **Establish and Scale Regional Knowledge Infrastructure**
   IDRC should support the creation and upgrading of regional research infrastructure, such as genomics labs, digital innovation hubs, and traditional knowledge repositories. The TECHNOMART initiative in Uganda and solar-drying innovations across southern Africa show that well-targeted infrastructure investments can catalyze wider collaboration and technology uptake.
5. **Mainstream Gender and Inclusivity in All Research Programs**
   IDRC should require all funded research projects to demonstrate gender sensitivity and inclusive design. This may involve dedicated budget lines for inclusion, gender metrics in evaluation, and targeted support for women-led innovation projects. Programs like the Women Innovators Programme in Namibia should be used as benchmarks.
6. **Encourage Data Interoperability and Open Access Publishing**
   To promote visibility, learning, and policy impact, IDRC should mandate the publication of project results in open-access repositories and support the development of data interoperability standards. This ensures research outputs are accessible across borders and institutions and encourages secondary research, uptake, and replication.
7. **Foster North-South and South-South Research Synergies**
   As a global funder, IDRC is uniquely positioned to link African research institutions with counterparts in the Global North and other parts of the Global South. It should use its convening power to support consortia that blend local relevance with global scientific excellence—such as the UCAD and Université Laval partnership in Senegal.
8. **Translate Research into Policy and Practice through Knowledge Products**
   IDRC should fund not just implementation but also synthesis and translation efforts. This includes the development of toolkits, policy briefs, webinars, and synthesis reports like the one under review. These products help bridge the gap between research outputs and practical decision-making, enhancing the influence of SGCI-supported work.

7. REFERENCES

- African Union Commission. (2014). Science, Technology and Innovation Strategy for Africa 2024 (STISA-2024). Addis Ababa: African Union.
- Boshoff, N. (2009). Neo-colonialism and research collaboration in Central Africa. *Scientometrics*, 81(2), 413–434. https://doi.org/10.1007/s11192-008-2211-8
- Clark, W. C., van Kerkhoff, L., Lebel, L., & Gallopin, G. C. (2016). Crafting usable knowledge for sustainable development. *Proceedings of the National Academy of Sciences*, 113(17), 4570–4578. https://doi.org/10.1073/pnas.1601266113
- Frodeman, R., Klein, J. T., & Mitcham, C. (Eds.). (2010). *The Oxford Handbook of Interdisciplinarity*. Oxford University Press.
- IDRC. (2021). Science Granting Councils Initiative in Sub-Saharan Africa: Phase 2 Mid-Term Review Report. Ottawa: International Development Research Centre.
- Leach, M., Raworth, K., & Rockström, J. (2020). Transforming innovation for sustainability. *Environment: Science and Policy for Sustainable Development*, 62(2), 6–15. https://doi.org/10.1080/00139157.2020.1708242
- Mouton, J., Gaillard, J., & van Lill, M. (2015). *Science Granting Councils in Sub-Saharan Africa*. Stellenbosch: CREST.
- Muuthe-Kaaria, E., Kingiri, A., & Rwamigisa, P. (2022). Strengthening science-policy interfaces in Africa through collaborative research. *Research Policy*, 51(4), 104472. https://doi.org/10.1016/j.respol.2022.104472
- OECD. (2020). *Addressing societal challenges using transdisciplinary research*. OECD Science, Technology and Innovation Policy Papers No. 87. https://doi.org/10.1787/0ca0ca45-en
- Owusu-Nimo, F., & Boshoff, N. (2017). Research collaboration in Ghana: Patterns, motives and roles. *Scientometrics*, 110(3), 1097–1121. https://doi.org/10.1007/s11192-016-2221-x
- Tijssen, R., Yegros-Yegros, A., & Winnink, J. (2016). University–industry R&D collaboration in Africa: A bibliometric analysis. *Scientometrics*, 107(2), 455–468. https://doi.org/10.1007/s11192-016-1856-6
- Tiyambe Zeleza, P. (2016). The Transformation of Global Higher Education, 1945–2015. Palgrave Macmillan.

African Centre for Technology Studies
2nd Floor, Konza Complex
Nairobi-Mombasa Road
P.O. Box 45917 - 00100
Nairobi, Kenya.

Email: info@acts-net.org
Tel: +254-710 607 210