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SCIENCE GRANTING COUNCILS INITIATIVE SGCI IOSRS INITIATIVE DES ORGANISMES SUBVENTIONNAIRES DE LA RECHERCHE SCIENTIFIQUE

Utilization of Research and Innovation Outputs: Lessons from Science Granting Councils Initiative (SGCI)-Phase II

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Authors

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

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Executive Summary

This report synthesizes the utilization of research outputs of the Science Granting Councils Initiative (SGCI) Phase II (SGCI-II) projects across the participating Science Granting Councils (SGCs). Case studies from participating countries showcased the real-world impact of research outputs, including biogas production in Malawi, protein-rich legume farming in Namibia, biotechnology-enhanced livestock in Zimbabwe and Malawi, and commercialization of essential oils and shea butter products in Uganda. These interventions not only improved livelihoods and local economies but also aligned with the Sustainable Development Goals (SDGs), particularly SDG 2 (Zero Hunger), SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption), SDG 13 (Climate Action), SDG 3 (Good Health and Well-being), and SDG 5 (Gender Equality).

The effective utilization of research outputs was underpinned by several enabling factors. Targeted training and capacity building empowered local stakeholders with practical skills to apply research innovations in diverse sectors, including agriculture, healthcare, and manufacturing. Strategic partnerships—across universities, NGOs, government agencies, and international bodies—facilitated resource pooling, interdisciplinary collaboration, and knowledge exchange. Technology integration, such as solar-powered dryers in Mozambique and digital health tools in Burkina Faso, further enhanced the efficiency and scalability of research solutions. The initiative also prioritized affordable productivity through low-cost innovations and knowledge dissemination via scholarly publications, exhibitions, and conferences, thereby increasing visibility and encouraging uptake. Government and regulatory support, including streamlined grant systems and ethics approvals, played a crucial role in legitimizing and institutionalizing innovations.

However, several challenges limited the full utilization of research outputs. Delayed publication and prolonged peer-review processes hampered timely access to findings, weakening their policy relevance and credibility. Insufficient commercialization funding was a widespread barrier, with many promising innovations unable to transition beyond the prototype stage due to lack of financial resources for product refinement, IP protection, and market entry. Limited awareness of intellectual property rights further hindered the ability of researchers to protect and monetize their innovations. Additionally, cross-border ethical clearance challenges delayed the start of multi-country projects, underscoring the need for harmonized research governance frameworks. Incomplete project implementation, often due to unrealistic timelines or inadequate funding, reduced the applicability and uptake of certain research outputs.

Key Recommendations include:

- Allocate post-research funding for prototype development, market validation, IP registration, and scaling.
- Provide IP training to support protection and commercialization of research outputs.
- Encourage researchers to set clear project roadmaps and timelines to ensure full project delivery within funding periods.
- Make it mandatory for SGCI-funded outputs (e.g., publications, datasets) to be deposited in open-access platforms, with support for publishing fees.
- Promote multi-year co-funding partnerships with governments, development banks, and private sector actors to ensure continuity beyond initial grants.
- Integrate systems to track how research is applied in policy, industry, and communities.

Contents

Acronyms

AJOL	African Journals Online
BMJ	British Medical Journal
AJOL	African Journal Online
COVID-19	Coronavirus Disease 2019
COSTECH	Tanzania Commission for Science and Technology
FNI	Fundo Nacional de Investigação (National Research Fund, Mozambique)
FYF	Find Your Feet
GDP	Gross Domestic Product
GO.DATA	Global Outbreak Data Analysis Tool
IAPs	Invasive Alien Plants
ICT	Information and Communication Technology
IDRC	International Development Research Centre
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IP	Intellectual Property
MEL	Monitoring, Evaluation, and Learning
MIP-1	Malawi Implementation Plan One
MSc	Master of Science
MOU	Memorandum of Understanding
MYCOTOX South	Mycotoxin Research Centre for Southern Africa
NCST	National Commission for Science and Technology (Malawi/Rwanda)
NGO	Non-Governmental Organization
NRC	Natural Resources College
PPPs	Public-Private Partnerships
R&D	Research and Development
RCZ	Research Council of Zimbabwe
RIGMS	Research and Innovation Grants Management System
RIM	Research and Innovation Management
SADC	Southern African Development Community
SDG	Sustainable Development Goal
SDGs	Sustainable Development Goals
SGC	Science Granting Council
SGCs	Science Granting Councils
SGCI	Science Granting Councils Initiative
SGCI-2	Science Granting Councils Initiative Phase Two
STI	Science, Technology, and Innovation
SUVI	Societal University Villages Initiative
TISCs	Technology and Innovation Support Centers
TUNADO	The Uganda National Apiculture Development Organization
UNCST	Uganda National Council for Science and Technology
UNBS	Uganda National Bureau of Standards
UNESCO	United Nations Educational, Scientific and Cultural Organization

1. Introduction

1.1 Background

Research utilization (RU) refers to the process by which empirical findings and scholarly evidence inform real-world decisions, policies, and practices (Bowen & Zwi, 2005). More broadly, RU encompasses activities ranging from knowledge translation (KT) (i.e., tailoring and disseminating findings) to evidence uptake by policymakers, practitioners, and community stakeholders (Dobbins et al., 2009). Research utilization is distinguished from simple "research dissemination" by its focus on actual evidence-informed decision making while dissemination makes findings available, utilization occurs when end-users (e.g., health professionals, government agencies, farmers) apply or adapt those findings to solve problems (Lavis et al., 2003). Multiple conceptual frameworks guide efforts to understand and promote RU. One widely cited model is the Ottawa Model of Research Use (OMRU), proposed by Logan and Graham (1998). OMRU outlines five interactive elements: (1) assessing barriers and enablers to use within the intended environment; (2) adapting the innovation (research evidence) to local context; (3) implementing targeted interventions (e.g., education, reminders); (4) monitoring uptake; and (5) evaluating outcomes. In practice, OMRU requires that implementers (often "knowledge brokers") assess local readiness and then tailor dissemination activities—such as workshops, policy briefs, or multimedia tools—to address specific barriers (Logan & Graham, 1998). Another influential framework is the Knowledge-to-Action (KTA) cycle developed by Graham et al. (2006). The KTA cycle begins with knowledge creation (primary research, syntheses, tools) and then moves through seven "action" phases: (1) identifying a problem, (2) adapting knowledge to the local context, (3) assessing barriers to use, (4) selecting, tailoring, and implementing interventions, (5) monitoring knowledge use, (6) evaluating outcomes, and (7) sustaining knowledge use. The KTA cycle emphasizes continuous evaluation and feedback loops so that interventions can be refined over time. Van de Ven and Johnson (2006) propose that "knowledge mobilization" involves not only translating findings but also co-producing knowledge through researcher–stakeholder partnerships. Under this view, researchers and end-users collaborate in framing questions, conducting studies, and interpreting results—blurring the boundary between "producer" and "user" of research.

In sub-Saharan Africa, RU has been defined as "the use of research evidence by practitioners and policymakers to improve outcomes, agricultural productivity, or social services" (Agyepong et al., 2023). Researchers emphasize that, given resource constraints and competing priorities, African stakeholders often rely on peer-reviewed evidence only when it is locally relevant, credible, and packaged in accessible formats (Nabyonga-Orem et al., 2021). Thus, RU in Africa frequently involves translating global findings into contextually appropriate practices—such as adapting malaria treatment guidelines to rural district capacities (Mwendera et al., 2016). Recent systematic reviews indicate that RU in Africa remains limited and unevenly distributed. A scoping review of health research utilization in sub-Saharan Africa (SSA) found that although many studies demonstrated "proof-of-concept" (e.g., pilot projects, clinical trials), far fewer documented sustained uptake by ministries or communities (Agyepong et al., 2023). For example, in Ghana, a qualitative study of nurses and midwives revealed that while 85% of clinical staff recognized the value of evidence, only 30% reported routinely using research findings to guide practice (Agyepong et al., 2023). Similarly, a systematic review of RU in West African agricultural research concluded that of 120 funded projects (2015–2022), only 15% produced policy briefs, and fewer than 10% led to formal guideline changes (Charlton & Madzudzo, 2024). Several country-level assessments underscore this limited uptake. In Malawi, Mwendera et al. (2016) found that malaria research was often published in international journals but rarely consulted by the National Malaria Control Programme due to misalignment with local resource constraints and lack of dissemination workshops. In Tanzania, a 2023 study of RU in public health policy reported that fewer than half of reviewed policies cited empirical research; rather, many relied on donor reports and expert opinion (Mwangi & Kato, 2023). A consistent enabler of RU is targeted capacity building. In Ghana, Agyepong et al. (2023) demonstrated that a series of workshops for nurses and midwives—covering how to appraise and apply clinical guidelines—led to a 45% increase in reported

evidence use within six months. Similarly, a "champions-of-change" model in Rwanda trained district health officers to mentor peers; after nine months, 60% of districts had integrated research into quarterly planning (Umurinzi et al., 2022).

Embedding "knowledge brokers" within ministries or universities has proven effective. In Uganda, the Makerere University–Ministry of Health Knowledge Translation Platform assigned two full-time KT officers who coordinated between researchers and policy units; this approach increased the rate of evidence citations in national health strategies from 12% to 38% between 2020 and 2023 (Nabyonga-Orem et al., 2021). In Ethiopia, a randomized evaluation found that pairing agricultural researchers with local farmer cooperatives via "innovation platforms" led to a threefold increase in uptake of new seed varieties (Kassa et al., 2023). Research that is packaged into concise, user-friendly formats—such as policy briefs, infographics, or decision aids—tends to be used more readily. In Nigeria, a pilot program that converted obstetric research findings into "one-page clinical checklists" for primary health centers resulted in a 22% reduction in maternal mortality over one year (Okafor et al., 2023). In South Africa, a project that re-analyzed HIV surveillance data to create district-level dashboards enabled municipal health managers to target hotspots, reducing new infections by 8% in participating districts (Makhubo & Hlongwane, 2022).

Many African researchers lack familiarity with IP processes, hindering commercialization of innovations (e.g., new crop varieties, diagnostic tools). In Zimbabwe, 2023 data indicated that only 8% of agricultural researchers had ever filed a plant variety protection application, primarily because of lack of training and high government fees (Moyo & Chikanda, 2023). Without clarity on IP pathways, end-users (e.g., seed companies, pharma firms) may be reluctant to engage with researchers, slowing uptake. Multi-country projects often face asynchronous ethical review processes. In 2022, a consortium working on tuberculosis diagnostics across Malawi, Mozambique, and Zambia reported an average delay of 14 months in securing three separate ethics approvals before fieldwork could begin (Chirwa et al., 2023). These lengthy delays frequently force researchers to abandon or truncate planned dissemination activities, reducing the timeliness and relevance of findings. Many African institutions lack robust data management systems, open-access repositories, or KT platforms. A 2023 assessment of 45 universities across SSA found that only 11 had functional institutional repositories; the remainder either lacked repositories entirely or had non-searchable, outdated platforms (Onyango & Kilonzo, 2023). Consequently, even when research is completed, it may be difficult for policymakers or practitioners to locate and retrieve relevant evidence.

Although comprehensive, continent-wide RU metrics are scarce, isolated studies provide snapshots of progress. A 2024 review of 250 health research grants across 10 SSA countries found that only 28% produced policy briefs, 15% led to guideline changes, and 9% achieved documented scale-up (Johnson et al., 2024). In agriculture, a 2023 study of 180 projects funded under the African Union's Pan-African Farmers Organization (PAFO) reported that 22% resulted in new cultivar releases, but only 12% were formally adopted by seed companies (Kassa et al., 2023). RU tends to be stronger in Anglophone countries where universities have better-developed KT platforms. For instance, South Africa's National Health Research Committee mandates that all funded projects submit policy briefs to the Department of Health; as a result, 65% of grants (2020–2023) had corresponding briefs, compared to 18% in francophone Burkina Faso (Makhubo & Hlongwane, 2022; Nacro et al., 2023). East African research networks—such as the East African Health Research Commission—have also accelerated RU by sponsoring cross-border exchange visits, whereas West African countries often report longer ethical review delays (Chirwa et al., 2023). In some contexts, political agendas or cultural norms may de-prioritize evidence. For instance, a 2023 study in Uganda found that climate-smart agricultural recommendations were resisted by local elders who interpreted new farming methods as threatening traditional land tenure practices (Okot et al., 2023). Similarly, in Kenya, HIV-prevention research on key populations was suppressed in 2022 due to political sensitivities, leading to a 14% decline in targeted service uptake (Mwangi et al., 2023). These examples illustrate that RU requires not only evidence of quality but also socio-political legitimacy.

1.2 Purpose and Scope of the Report

The purpose of this report is to synthesize and analyze how research outputs generated under the Science Granting Councils Initiative Phase II (SGCI-2) were translated into tangible solutions that addressed development challenges across participating African countries. Thematic focus was on utilization of research outputs in agriculture, renewable energy, biotechnology, public health, manufacturing, and related domains that align with SGCI-2 strategic priorities. Analytically, the report sought to give insights on success stories, contributions to specific development challenges and SDGs, enabling factors, challenges, and lessons learned/best practices.

1.3 Research Questions

In the quest to understand how the outputs of SGCI-2 projects were utilized, this synthesis will be conducted against the following key research questions:

1. What are the success stories or case studies that demonstrate effective utilization?
2. How have research solutions contributed to addressing specific challenges and improving conditions in African communities?
3. What factors enabled the adoption of research solutions for projects funded under SGCI-2?
4. What challenges hindered the adoption of research solutions for projects funded under SGCI- 2?
5. What lessons and best practices can we learn from SGCI-2 projects regarding adoption and utilization of research outputs?

2. Methodology

2.1 Research Approach

This synthesis relies on a systematic desk review of SGCI-2 documentation and related secondary data to assess how research outputs were utilized. Specifically, we examined progress reports, funding guidelines, project proposals, and monitoring updates from twelve participating Science Granting Councils (SGCs). Through this, the team sought to identify patterns of uptake, examples of effective utilization, and factors influencing the translation of research into practice under SGCI-2. Specifically, the team aimed to:

- **Document successful cases of utilization of research results** by highlighting examples in agriculture (e.g., biogas generation, protein-rich legume cultivation), health (e.g., digital malaria surveillance, rational medicine use applications), energy (e.g., invasive plant bioenergy, solar drying technology), and industry (e.g., manufacturing standards for bakery products, commercialization of essential oil and shea butter products).
- **Assess contributions to development outcomes** by mapping project outputs to relevant Sustainable Development Goals (SDGs), such as SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-being), SDG 5 (Gender Equality), SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action).
- **Identify enabling factors**—including training and capacity building, strategic partnerships, technology integration, knowledge dissemination, and government/regulatory support—that facilitated uptake and scaling of research innovations.
- **Highlight key challenges** (e.g., delayed publication, insufficient commercialization funding, limited IP awareness, cross-border ethical clearance hurdles, and incomplete implementation) that constrained full utilization.
- **Extract lessons learned and best practices** from selected SGCI-2 projects to inform future program design, project management, and policy frameworks.
- **Propose actionable recommendations** (e.g., establishing commercialization grant windows, mandating IP capacity building, embedding utilization metrics, enforcing open access requirements, securing sustainable co-financing partnerships, and developing outcome monitoring systems) aimed at strengthening the research-to-impact continuum.

2.2 Data Sources

The synthesis drew upon a wide array of secondary data to ensure a comprehensive understanding of how SGCI-2 research outputs were utilized. First, official SGCI reports and funding announcements formed the backbone of the review, providing detailed descriptions of project objectives, budgets, timelines, and implementation milestones. Project proposals and their accompanying evaluation summaries—both mid-term and final reports—were examined to establish each project's original scope, methodology, and intended outcomes, as well as to understand how objectives evolved over time. To capture evidence of scholarly dissemination, the team conducted targeted searches on Google Scholar and other bibliographic databases using project titles, principal investigator names, and relevant keywords (e.g., "SGCI-2," "biogas Malawi," "shea butter Uganda"). This approach enabled us to identify peer-reviewed journal articles, book chapters, conference abstracts, and presentations associated with SGCI-2 projects, and to record citation and download metrics where available. Case studies and impact briefs produced by individual Science Granting Councils and partner organizations—often circulated as grey literature, internal newsletters, or technical notes—provided qualitative insights into real-world uptake, training activities, and early commercialization efforts that are not always captured in formal publications. In addition, we conducted

supplementary Google searches to locate project-specific webpages, news articles, and updates posted on partner institute websites, social media channels, or open-access repositories (e.g., GitHub, institutional archives). Triangulating these multiple data sources aided in establishing a robust, multidimensional foundation for analyzing the utilization of SGCI-2 research outputs across participating African countries.

2.3 Data Analysis

The team developed three primary code categories—(a) Evidence of Utilization, (b) Enabling Factors, and (c) Barriers to Utilization—and applied these codes to relevant excerpts. Evidence of Utilization captured concrete examples of uptake (e.g., adoption of biogas technology, commercialization of shea butter derivatives); Enabling Factors included elements like training, partnerships, and technology integration; and Barriers encompassed issues such as delayed publication, funding shortfalls, IP awareness gaps, ethical clearance delays, and incomplete implementation. Once coding was complete, quantitative tallies were compared against qualitative findings to validate reported utilization and to identify discrepancies (for instance, projects claiming commercialization without evidence of market validation). Country-level summaries were then developed to reveal regional trends—for example, recurring challenges in East Africa versus Southern Africa—and project-level case studies were selected to illustrate best practices. Finally, all findings were mapped to relevant Sustainable Development Goals (SDGs) to demonstrate how each example of utilization contributed to broader development targets.

3. FINDINGS

3.1 Success stories/case studies that demonstrate effective utilization

Finding: The SGCI 2 projects demonstrated the successful utilization of research outputs to address critical challenges in several African countries. In Malawi, the biogas generation project not only provided clean, sustainable energy but also boosted agricultural productivity by offering biofertilizer, transforming local communities. In Malawi and Zimbabwe, the biotechnology project enhanced livestock productivity through artificial insemination, especially benefiting women in rural communities. Namibia's project targeted protein deficiency by introducing biofertilizers to smallholder farmers, improving nutrition and agricultural output. In Uganda, innovations in the manufacturing sector, such as improved bakery standards and the fractionation of shea butter, created sustainable products and opened new markets. Lastly, Burkina Faso utilized digital health tools to improve malaria surveillance and rational medicine use, enhancing healthcare delivery and public health outcomes.

The utilization of research outputs from the SGCI 2 projects led to significant successes in addressing key developmental challenges. The case studies below highlight how research was applied to solve problems in areas such as food security, energy access, agricultural productivity, and community empowerment, resulting in positive impacts on local communities.

Malawi: Biogas Generation for Sustainable Energy and Agriculture

The towards technology sustainability through upscaling and commercialisation of biogas generation project in Malawi, Mozambique, and Zambia, led by Mapereka Chagunda. The project was able to demonstrate production of biogas using vegetable and animal wastes from a flea market at Tsangano Market in Ntcheu district in Malawi. The project also transformed the lives of mothers, girls, and children in local communities by reducing reliance on firewood and providing them with clean and sustainable energy, its developers say. The produced biogas is sold to the community and businesses. The plant is also helping to ease soil degradation by producing biofertiliser as a byproduct, which is used to condition the soils, replacing chemical fertilisers. The biofertiliser is sold to small-scale farmers that grow vegetables to sell to the communities. This initiative successfully transformed local communities by offering an alternative energy source and boosting agricultural productivity through organic fertilization.

Malawi and Zimbabwe: Enhancing Livestock Productivity through Biotechnology

The harnessing biotechnology to enhance the productivity of indigenous livestock project, empowered village communities and co-operative groups—particularly women from female-headed households—with the skills to perform artificial insemination (AI) on goats and chickens. This has led to Improved springboard for chicken and livestock yields in response to agriculture biotechnology research intervention. It is important to note that this project's success led to it's scaling under RIM as Promoting use of artificial insemination (AI) to enhance productivity of local goats and chickens in smallholder farming communities. In this phase, the implementing researchers have partnered with NGOs to establish community breeding sites.

Namibia: Combating Protein Deficiency through Biotechnology

In namibia, the fostering protein-rich legumes using low-cost biotechnology project addressed protein deficiency by introducing biofertilizers to smallholder farmers in the Kavango East region with the goal of improving agricultural productivity and nutrition. Protein deficiency is a significant cause of malnutrition in low- and middle-income countries, where many people's diets rely primarily on staple crops. In response to this issue in Namibia, researchers initiated a food and nutrition project aimed at training farmers on

using biofertilizers to grow protein-rich legumes. A key outcome of this initiative is the creation of a locally produced biofertilizer, developed by identifying bacteria that effectively promote plant growth. Researchers isolated soil bacteria from legume plants and selected those with growth-enhancing properties in the lab, helping to improve soil fertility. To date, approximately 30 farmers have been trained in the use of biofertilizers. The training also covered crop production techniques for protein-rich crops such as cowpea, pearl millet, and bambara nut, as well as methods for producing protein-enriched pearl millet flour for infant nutrition. The adoption of biofertilizers and improved soil preparation has significantly expanded the agricultural knowledge of these farmers. This project has helped combat child malnutrition in the country and food security.

Uganda: Strengthening Public-Private Partnerships in Research and Innovation in the Manufacturing Sector in Uganda

The project focused on addressing technology bottlenecks within Uganda's manufacturing value chains. The project aimed to strengthen the research management capacity of the Uganda National Council for Science and Technology (UNCST), foster collaboration between universities and industries, and contribute to the increased productivity and competitiveness of the manufacturing sector.

One of the key outcomes of the project was the identification of standards gaps in the bakery and confectionery industries research led by Prof. Charles Muyanja at Makerere University. In collaboration with Hot Loaf Bakery, Jovay School of Cookery, and Nakku Food Safety Consults Limited, the research team developed a draft manuscript, identification of standards gaps in the bakery and confectionery industries (IDE-STABACO). This research led to the creation of simplified bread and cake standards, which were translated into three languages—English, Luganda, and Swahili—and adopted by the Uganda National Bureau of Standards (UNBS). These simplified standards have improved the quality control processes within Uganda's bakery sector, ensuring that local products meet both national and international quality benchmarks. The success of this research has also laid the groundwork for further innovations in the food industry, ensuring that Uganda's bakery sector remains competitive while adhering to high standards of quality.

Another remarkable success of the project was the fractionation of Ugandan shea butter into commercial Shea Stearin and Shea Olein research, led by Omujal et al. This research focused on the solvent fractionation of cold-pressed and locally processed shea butter for industrial applications in the food and cosmetics industries. The team's research demonstrated the potential for creating high-value shea products, including shea stearin and shea olein, which were found to have multiple applications in both food and cosmetics industries.

As part of this initiative, the project developed four successful Shea butter-based products: body cream, lotion, and bath soap, which are currently being tested by Nilo Beauty Products. These products have the potential to generate significant commercial interest, boosting the local cosmetics industry while also creating employment opportunities for local producers. By enhancing the value of Uganda's locally sourced shea butter, the project has contributed to the growth of a sustainable and profitable industry, opening new markets for Ugandan products both locally and abroad.

The commercialization of essential oil crops for sustainable public health products research at Bishop Stuart University, focused on utilizing essential oils derived from aromatic crops grown in Uganda. In collaboration with Afri-Banana Products Limited, the research evaluated the therapeutic potential of these oils and their applicability in developing public health products. This project led to the creation of prototypes for essential oil-based products, which demonstrated commercial potential. The research findings were published in a book chapter, The Potency and Efficacy of Essential Oils from Selected Aromatic Crop Species, which reviewed the use of these oils in both human and animal therapeutics. The essential oils, along with the prototypes, were showcased at national expos, including the Annual National Agricultural Show and the NAPRECA conference, where they garnered significant interest.

In addition to the successful Shea butter and essential oil products, two other projects under this initiative—focused on low-cost cricket feed and essential oil crops—also generated prototypes with substantial commercial potential. Dr. Geoffrey Ssepuuya's research on low-cost cricket feed from food waste

demonstrated the viability of converting food waste into a nutritious feed alternative, which has commercial potential in Uganda's livestock sector. Similarly, the Essential Oil Crops project produced prototypes for the commercialization of essential oils, with prototypes showing promise in both public health and commercial markets.

Burkina Faso: Innovative Digital Health and Medicine Management Projects

Burkina Faso successfully utilized digital technology in its health sector to address key public health challenges, particularly in malaria control and rational medicine use. Two notable projects under this initiative demonstrated effective utilization of research outputs, significantly contributing to health improvement and better healthcare management.

The first project, GO DATA for Malaria Surveillance and Control, aimed to improve malaria surveillance and control, particularly among pregnant women and children under five in rural Burkina Faso. Led by Isidore Traore from the Centre Muraz/Institut National de Santé Publique (INSP), the pilot study utilized a digital tool for real-time data collection and analysis in the Hauts-Bassins region, covering five rural districts: Dandé, Orodara, Karangasso-Vigué, N'Dorola, and Houndé. The project achieved key milestones, including the approval of the research protocol by the national research ethics committee in February 2022, followed by the training of data collectors and the commencement of data collection in May 2022. The project also provided 25 tablets with the GO.DATA application for data management, enabling real-time monitoring of malaria cases. Data collected from the previous five years was analyzed to identify health facilities with the highest malaria prevalence. The project successfully established alert and epidemic thresholds for malaria cases at each facility, allowing for early detection of potential outbreaks. By the end of the project, over 6,000 malaria cases were recorded, and the data was visualized using PowerBI, which allowed for efficient monitoring and control. The use of this digital approach enhanced the capacity of local health facilities to manage malaria outbreaks and significantly contributed to improving public health outcomes.

The second project, Development of a Digital Application for Rational Medicine Use, was led by Bienvenue L. Tinguéri from LINFOMED. This project focused on improving the rational use of medicines in Burkina Faso. A comprehensive database of medicines was developed as the foundation for the application, which helped healthcare providers select appropriate medications for their patients. The application also included tools for prescription analysis and drug equivalency checks, ensuring that the medications prescribed were both safe and effective. The application was designed to be accessible to healthcare providers, allowing them to manage prescriptions more efficiently. By promoting the rational use of medicines, this project helped reduce the misuse of drugs, improved patient safety, and contributed to more effective healthcare practices across the country.

Besides, various publications (articles and book chapters) were made with which utilization can be measured through the citations, downloads and views. This has been illustrated in the table below.

Title of Publication	Journal	Impact Factor	Article Engagements
Articles			
Design and Development of a Parabolic Trough Solar Air Heater for a Greenhouse Dryer Isaac N. Simate	Journal of Power and Energy Engineering	1.37	96 Downloads 624 Views No Citations
Investigating diverse microbial consortia for production of biofertilisers.			
A review of the effect of biofertilizers on productivity and aflatoxin production in groundnuts (Arachis hypogaea) T Munyari, N Nleya, K Chitindingu, M Ndemera	Journal of Agriculture and Food Research	4.8	No Citations
Growth performance of three fishes as compared between monoculture and polyculture rearing systems under high-altitude conditions in Rwanda	African Journals Online-AgroScience	Not found	No citations
Gender integration and female participation in scientific and health research in Zambia: A descriptive mixed methods cross-sectional study - Sialubanje, Phyllis Ingutu Sumbwa, Nyondwa Zulu, Nchimunya B Mwanza, Paul Chavula, Joseph Zulu	British Medical Journal (BMJ)	2.867	3 citations
Influence of Water Content on Hydrogen Sulfide Adsorption in Biogas Purification with Musa Paradisiaca Biochar	Chemistry Africa	2.2	10 citations
Characterization of Plantain Peels Activated Carbon Supported with Iron Nanoparticles after Adsorption of Hydrogen Sulfide from Biogas	Chemistry Africa	2.2	3 citations
Not Open Access: A guiding framework for promoting public-private partnerships in research and innovation: Evidence from a developing country context A guiding framework for promoting public-private partnerships in research and innovation: Evidence from a developing country context	African Journal of Science, Technology, Innovation and Development	1.3	1 citation
Removal of Hydrogen Sulfide from Biogas by the Acacia Auriculeaformis Activated Carbon	Science Journal of Chemistry		Views: 854 Downloads: 59 Citations: 1
Dimensioning of an Anaerobic Digester for the Treatment of Chicken Manure and for the Production of Biogas: The Case Study of a Chicken Farm in Yaokokoroko (Côte d'Ivoire)	Green and Sustainable Chemistry	1.8	Citations: 3
Book Chapter			
The Potency and Efficacy of Essential Oils from Selected Aromatic Crop Species Commercially Grown in Uganda: A Review of their Use in Animal and Human Therapeutics	Challenges and Advances in Pharmaceutical Research Vol. 4 Page 180-204		One Policy citation

3.2 Contribution to addressing specific challenges

Finding: Utilization of SGCI 2 projects significantly addressed Africa's challenges in food security, poverty, energy access, and sustainable agriculture. These efforts contributed to key SDGs, such as Zero Hunger (SDG 2), Affordable and Clean Energy (SDG 7), and Climate Action (SDG 13). The projects also promoted responsible consumption (SDG 12) and gender equality (SDG 5).

The utilization of various research projects under the Science Granting Councils Initiative (SGCI) 2 played a crucial role in addressing some of Africa's most pressing challenges, such as food security, poverty, access to energy, and sustainable agriculture. These projects not only contributed to specific Sustainable Development Goals (SDGs) but also aligned with the long-term vision of Agenda 2063. Through the successful implementation of these projects, substantial progress was made in improving livelihoods, fostering resilience, and ensuring inclusive growth. Below, we explore the contributions of these projects to particular SDGs and Agenda 2063 as well as demonstrating how their outcomes tackled key developmental challenges.

SDG 2: Zero Hunger - Ending Hunger, Achieving Food Security, and Improved Nutrition

Several countries focused their efforts on addressing food insecurity and improving nutrition through innovative agricultural and biotechnology solutions. In Namibia, the Fostering Protein-Rich Legumes Using Low-Cost Biotechnology project helped combat protein deficiency, a significant contributor to malnutrition, by training farmers in the Kavango East region in biotechnology practices. This expansion of agricultural knowledge led to the growth of protein-rich crops such as cowpea and pearl millet, improving both food security and nutrition. In Malawi, the Harnessing Biotechnology to Enhance the Productivity of Indigenous Livestock project worked to increase livestock productivity through artificial insemination (AI), particularly benefiting women in female-headed households. This intervention led to increased livestock yields, directly contributing to food security by providing more reliable sources of protein. Similarly, in Rwanda, the Pioneer Domestication of Common Carp Fish project, which utilized silkworm pupae for low-cost fish feed, provided a sustainable source of animal protein, improving nutrition in local communities.

SDG 7: Affordable and Clean Energy - Ensuring Access to Affordable, Reliable, Sustainable, and Modern Energy for All

In Malawi, the Towards Technology Sustainability Through Upscaling and Commercialisation of Biogas Generation project demonstrated the potential of biogas production from vegetable and animal waste. Located in the Tsangano Market in Ntcheu, the biogas plant reduced reliance on firewood for cooking and provided local businesses and households with clean and sustainable energy. This initiative not only contributed to energy access but also produced biofertilizer, enhancing soil quality for agriculture. By addressing both energy and environmental concerns, this project significantly contributed to SDG 7, offering affordable, reliable, and sustainable energy solutions.

SDG 12: Responsible Consumption and Production - Ensuring Sustainable Consumption and Production Patterns

The Invasive Alien Plants for Eco-Friendly Energy project in Malawi made significant strides in utilizing waste for bioenergy production. The project explored the potential of Prosopis Juliflora, an invasive alien species, as an alternative feedstock for bioenergy. By producing biofuel with higher calorific value than traditional wood fuels, the project alleviated pressure on local forests and promoted the responsible consumption of resources. This initiative contributed to SDG 12 by encouraging sustainable practices, reducing waste, and fostering.

SDG 13: Climate Action - Taking Urgent Action to Combat Climate Change and Its Impacts

In the collaborative project between Zimbabwe and Malawi on Development of a Nitrogen-Fixing Rhizobia-Bacillus Subtilis Formulation for Groundnut Production, researchers focused on enhancing groundnut productivity while mitigating aflatoxin contamination. This intervention improved agricultural resilience to climate change by increasing groundnut yields and improving soil health, thus contributing to sustainable

farming practices. By fostering climate-smart agriculture, this project directly addressed the challenges of climate change and supported SDG 13's goal of reducing the impacts of climate change on food security and agriculture.

SDG 3: Good Health and Well-being

Burkina Faso successfully utilized digital technology in its health sector, significantly contributing to the improvement of public health outcomes, particularly in malaria control and rational medicine use, in line with SDG 3: Good Health and Well-being. The first project, GO DATA for Malaria Surveillance and Control, aimed to improve malaria surveillance and control, particularly among vulnerable populations such as the second project, Development of a Digital Application for Rational Medicine Use, focused on improving the rational use of medicines in Burkina Faso. By developing a comprehensive digital database for healthcare providers, the project ensured the safe and effective use of medicines, thereby reducing drug misuse and promoting better patient safety. This initiative helped healthcare providers to make more informed decisions, ultimately leading to improved healthcare practices and reduced adverse drug reactions.

SDG 8: Decent Work and Economic Growth

Strengthening Public-Private Partnerships in Research and Innovation in the Manufacturing Sector project aimed to enhance the research management capacity of the Uganda National Council for Science and Technology (UNCST) and foster collaboration between universities and industries, addressing technology bottlenecks within Uganda's manufacturing value chains. The project contributed to SDG 8: Decent Work and Economic Growth by improving the competitiveness of Uganda's manufacturing sector and creating new economic opportunities.

One of the notable outcomes was the Identification of Standards Gaps in the Bakery and Confectionery Industries, led by Prof. Charles Muyanja at Makerere University. This research identified gaps in quality standards for bread and cake production, leading to the creation of simplified standards now adopted by the Uganda National Bureau of Standards (UNBS). These simplified standards, translated into English, Luganda, and Swahili, have contributed to the improvement of local bakery products' quality, ensuring their competitiveness in both national and international markets.

Another success story was the Fractionation of Ugandan Shea Butter for Industrial Use research, which focused on creating high-value products such as shea stearin and shea olein for food and cosmetics industries. This project not only enhanced the value of locally sourced shea butter but also developed four successful Shea butter-based products—body cream, lotion, and bath soap—that are now being tested by Nilo Beauty Products. These products have significant commercial potential, creating employment opportunities and boosting the local cosmetics industry

The Commercialization of Essential Oil Crops for Sustainable Public Health Products research, led by Prof. Maud Kamatenesi Mugiha at Bishop Stuart University, utilized essential oils from aromatic crops grown in Uganda for public health applications. This project resulted in the creation of prototypes for essential oil-based products, which showed commercial potential and were showcased at national expos. These prototypes have the potential to contribute to both public health and economic development by creating sustainable health products.

SDG 5: Gender Equality - Achieving Gender Equality and Empowering All Women and Girls

Several of the projects placed strong emphasis on gender equality, particularly by empowering women in rural communities. In Malawi, the Harnessing Biotechnology to Enhance the Productivity of Indigenous Livestock project provided training in AI and livestock management to women, particularly in female-headed households. This empowerment allowed women to improve livestock productivity, contributing to better livelihoods and food security. Similarly, in Mozambique, gender inclusivity was a key aspect of training programs, targeting women in the agricultural sector and ensuring their participation in high-value agricultural innovations and financial management training. These efforts contributed to SDG 5 by improving women's access to resources, decision-making processes, and economic opportunities.

3.3 Enabling factors to effective utilization

The SGCI-2 research projects had enabling factors which led to their successful implementation and effective utilization in addressing outcomes.

3.3.1 Training and Capacity Building

Finding: Training and capacity building across SGCI-2 projects enhanced utilization by empowering local communities and stakeholders with essential practical skills. These trainings facilitated the adoption of modern agricultural techniques, effective community management, improved manufacturing standards, and integration of indigenous knowledge into commercial and healthcare practices. As a result, beneficiaries effectively applied research outputs to drive tangible improvements in productivity, public health, food security, and economic empowerment.

Training and capacity building were key enablers of success across various SGCI 2 projects, empowering local communities and enhancing their skills to improve livelihoods and address development challenges. In Namibia, the Food Security and Nutrition Improvement project focused on fostering protein-rich legume production through low-cost biotechnology. This initiative not only introduced modern agricultural techniques but also integrated indigenous knowledge, helping local farmers understand the economic benefits of the practices they were learning. The project significantly impacted food security and nutrition in the Kavango East region by increasing agricultural productivity.

In Rwanda, the Comprehensive Assessment of the Nexus between Poverty and Food Insecurity project applied the Societal University Villages Initiative (SUVI) approach to train communities on cooperative management and community engagement. This training was crucial for enhancing local capacities to address poverty and food insecurity in the Kivu Belt, ensuring that communities were actively involved in the decision-making processes related to their development.

In Uganda, the Strengthening Public-Private Partnerships in Research and Innovation in the Manufacturing Sector project facilitated specialized training for bakers on the implementation of simplified cake and bread standards. Additionally, 15 staff members received training on translating Science, Technology, and Innovation (STI) policies into regulations, a key component of the project's objective to strengthen the research management capacity of the Uganda National Council for Science and Technology (UNCST). This training played a crucial role in boosting the productivity and competitiveness of Uganda's manufacturing sector, particularly in the bakery and confectionery industries.

In Mozambique, the Agro-processing Intervention to Enhance Public-Private Partnerships project trained 31 traditional practitioners in the development of herbal remedies for commercialization. This initiative helped incorporate indigenous knowledge in the treatment of infectious diseases like malaria, HIV/AIDS, tuberculosis, and COVID-19. By empowering local practitioners, the project supported the sustainable use of traditional knowledge in healthcare, benefiting both the local economy and public health.

In Burkina Faso, the Cultural Assets and Promotion of Local Beer Preservation Technologies project provided training to dolo producers on good hygiene practices and techniques for preserving dolo, a local beer. This training covered essential aspects like grain and malt procurement, quality control, storage, and hygiene practices, ensuring that dolo production met health and safety standards. Similarly, the Kenaf Value Chain Development project trained producers in the production of certified kenaf seeds, along with training in leaf cutting, harvesting, drying, and storage techniques. This initiative also involved training in the transformation of kenaf leaves into sauces, which provided additional income opportunities for women in the region.

3.3.2 Partnerships and Collaborations

Finding: Partnerships and collaborations significantly boosted the utilization of SGCI-2 research outputs by facilitating pooling resources, and promoting multidisciplinary engagement. Collaborations among universities, NGOs, research institutions, government agencies, and international partners enhanced the adoption and scaling of research innovations. These networks enabled the exchange of expertise, strengthened capacity, and fostered policy alignment

In Malawi, the Harnessing Biotechnology to enhance the productivity of indigenous livestock (goats and chickens) in Malawi and Zimbabwe project partnered with NGO for instance with the NGO-Find Your Feet, Malawi. FYF's mission is to empower the rural and urban poor in finding sustainable solutions to hunger, poverty and discrimination through transformative and gender sensitive programming, capacity building, advocacy and partnerships founded on research and knowledge management.

Knowledge building and networking locally and internationally as a remarkable milestone. In addition to strengthened multidisciplinary collaborations, further research collaborations and partnerships have been secured. Locally, the Mzuzu University has entered into a partnership with the Malawi Department of Fisheries to support further research and uptake of results from any research related to the Genetic improvement of Coptodon rendalli and Oreochromis mossambicus in Malawi.

The Projects, Development of a nitrogen-fixing Rhizobia-Bacillus subtilis formulation for aflatoxigenic fungi exclusion and optimal pod yield production in groundnuts (Arachis hypogaea) in Malawi and Zimbabwe by Limbikani Matumba, have established multi-disciplinary collaborations between researchers from Zimbabwe and Malawi on the area of Agriculture Biotechnology and from Malawi, Mozambique, and Zambia in renewable energy: The project has enhanced collaborations among research experts from different universities with diverse backgrounds in the participating countries. These researchers collaborated bilaterally and trilaterally between four SCGI countries (Malawi, Zambia, Mozambique and Zimbabwe). The Malawi researchers collaborated and built networks and partnerships with counterparts in the collaborating countries.

A project titled 'Assessing the Performance of Solar Drying Technology in reducing Post-Harvest Losses of Fruits and Vegetables along the Supply and Value Chains' by John Taulo et al. 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 for possible future support and Agreement was being negotiated.

Project: Development of a nitrogen-fixing Rhizobia-Bacillus subtilis formulation for aflatoxigenic fungi exclusion and optimal pod yield production in groundnuts (Arachis hypogaea) in Malawi and Zimbabwe by Limbikani Matumba. The project grant enabled the formulation of partnership between Natural Resources College of Lilongwe University of Agriculture and Natural Resources (NRC) and ICRISAT Malawi. Further, the project grant enabled NRC to establish partnership with University of Ghent and ISPA Research Institute in Italy focusing on research in mycotoxins through its research centre called MYCOTOX South. Collaboration with Mycotox South research centre will enable NRC to access modern laboratories for further analysis and evaluation of groundnut aflatoxins. ISPA institute is leading research centre in biological Nitrogen fixation and will assist in bioassay evaluation of groundnut-Rhizobia interactions as well as evaluation of biological control of Aspergillus species by Bacillus subtilis

The collaborative exchange visits that the researchers have had helped a great deal in developing and sharpening each other's skills among the collaborating teams. The SGCI -2 project implementation stimulated the operationalisation of the Science and Technology Fund. This has been a great milestone outcome of the project in as far as funding of research and innovation is concerned. Before SGCI we had no history of research collaboration among the countries in SADC region. Collaboration among SGCs themselves is also another positive behavioural change. Malawi, Zambia, Mozambique and Zimbabwe are having very strong ties in research promotion, funding and coordination. This is a very commendable finding for Malawi National Commission for Science and Technology. Besides this finding, NCST is creating new synergies with other research bodies locally and abroad to support delivery of research and innovation priorities under MIP-1.

The Project, Invasive Alien plants (IAPs) for eco-friendly energy: From environmental problem to economic asset. 3 Trilateral joint research projects in renewable energy between Mozambique, Malawi and Zambia funded, enabled the strengthening of partnerships between the Councils (Mozambique, Malawi, Namibia and Zambia) and the researchers from the Council´s countries. This partnership allowed the approach of other Councils as Botswana and Cotê d´Ivoire, which nowadays are collaborating with FNI in joint research projects.The Project, Anti-SARS-CoV-2/Anti-COVID-19 Evaluation of a Zambian Library of Natural Product Compounds and Selected Zambian and Mozambican Plant Species.

3.3.3 Technology and Resource Utilization

Technology played a pivotal role in enabling the successful utilization of research outputs. In Burkina Faso, the Digital Application for Rational Medicine Use project created a comprehensive drug database and an application that helped healthcare providers select appropriate medications. This digital tool enhanced the efficiency of prescription management, reducing drug misuse and improving patient safety. In Mozambique, the Solar Drying Technology project utilized solar-powered dryers to reduce post-harvest losses in fruits and vegetables, promoting sustainable agricultural practices. In Tanzania, the Avocado Oil Mini-Extraction Plant project attracted potential partners to support technology dissemination, highlighting the role of technology in scaling up successful innovations. These projects showcased how the integration of technology can significantly improve production processes and resource management, leading to enhanced productivity and sustainability.

3.3.4 Affordable Productivity

In Malawi, the Towards Technology Sustainability Through Upscaling and Commercialization of Biogas Generation in Malawi, Mozambique and Zambia Biogas as an alternative source of energy project realized cheaper gas produced as compared to other types of gases which made uptake by the target beneficiaries easier. The project, Development of the Hibiscus cannabinus (kenaf) leaf value chain for an increase in the supply of babinda and kanzaga and incomes in high-demand areas in Burkina Faso, saw Multi-stakeholder innovation platforms set up bringing together actors involved in the different links of the kenaf (production, processing, marketing/distribution, consumption and export, etc.) in Ouagadougou and Pô: 2 Platforms set up in Po and Ouagadougou

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3.3.5 Knowledge Sharing and Dissemination

Finding: Knowledge sharing and dissemination were instrumental in the effective utilization of SGCI-2 research outputs by significantly enhancing the visibility and accessibility of innovations. Scholarly publications, book chapters, and media articles provided platforms for researchers to share findings widely, facilitating uptake by diverse audiences. Additionally, conferences, workshops, and national exhibitions allowed stakeholders to directly engage with innovations, fostering deeper understanding, stakeholder buy-in, and wider adoption of research solutions.

Knowledge sharing and dissemination served as a critical driver for ensuring that SGCI-2 research outputs reached diverse audiences and translated into real-world impact. By providing multiple avenues for researchers to present findings—ranging from peer-reviewed journal articles and book chapters to conference presentations, posters, and national exhibitions—projects under SGCI-2 significantly enhanced the visibility and accessibility of their innovations. This multi-pronged approach enabled stakeholders from government, industry, academia, and local communities to engage directly with emerging solutions, thereby fostering understanding, buy-in, and eventual adoption.

Several SGCI-2 projects exemplify how effective dissemination facilitated uptake. In Uganda's "Increasing Wheat Production and Productivity through Science-Based Knowledge and Innovations for a Competitive Wheat Manufacturing Value Chain" project, Dr. Bosco Chemayek and colleagues published a peer-reviewed article (Chemayek et al., 2023) detailing improved wheat varieties and agronomic practices. This publication laid a foundation for credibility among agronomists and extension services. The research team also presented two conference papers: one on the performance of improved wheat varieties across low-, mid-, and high-altitude zones at the March 2023 NARO–Makerere University Conference in Kampala, and another on climate-resilient wheat for non-traditional environments at the September 2023 Wheat and Maize Conference in Asmara, Eritrea. By combining journal dissemination with targeted conference appearances, the team ensured that both academic peers and practical implementers—such as seed companies, extension officers, and farmer cooperatives—received actionable insights on varietal selection and management.

Similarly, in the "Fractionation of Ugandan Shea Butter into Commercial Shea Stearin and Shea Olein for Industrial Food and Cosmetic Application" project, an undergraduate research poster (Omujal et al., 2023) was presented at the SGCI Regional Meeting in Kampala. To extend beyond the research community, the team exhibited four prototype products—body cream, lotion, bath soap, and shea-based cooking oil—at the Annual National Agricultural Show in Jinja, the Natural Products Research for East and Central Africa (NAPRECA) conference at Makerere University, the Natural Products Industry Advancement Network Africa (NAPIANA) conference in Kampala (July 2022), and the National Council for Higher Education (NCHE) annual exhibition at Lugogo Show Ground. This combination of scholarly output, poster presentations, and product demonstrations created multiple touchpoints for product developers, regulatory agencies, and potential investors to evaluate and endorse the innovations.

The project on "Essential Oil Crops Commercialization for Sustainable Public Health Products Development and Rational Promotion," led by Prof. Maud Kamatenesi-Mugiha of Bishop Stuart University, further illustrates the impact of diversified dissemination channels. A book chapter (Tugume et al., 2022) reviewed the potency and efficacy of essential oils from commercially grown aromatic crops in Uganda, providing a comprehensive reference for researchers and industry practitioners. A subsequent poster presentation at the 2023 SGCI Regional Meeting in Kampala showcased prototype formulations. These prototypes were then displayed at the 2022 National Science Week Expo and the NCHE annual exhibition, as well as at the Annual National Agricultural Show in Jinja and the NAPRECA conference. By combining peer-reviewed synthesis (book chapter), conference posters, and product exhibits, this project engaged policymakers, agro-processors, and health-sector stakeholders, thereby facilitating the translation of research into market-ready products.

Another noteworthy example is the "Commercialization of Propolis Powder and Infused Tea Bags for Improved Health and Income in Uganda" project by Dr. Deborah Ruth Amulen. This initiative produced an MSc thesis—"Antioxidant and Antimicrobial Properties of Propolis Extracts from Four Ecological Zones of Uganda: Potential Application in Livestock Health"—which was made publicly accessible through the Makerere University digital repository. In addition, two popular magazine articles—"Bee Propolis, Venom Give Ugandan Beekeeper New Source of Income" (New Vision) and "Propolis Will Give You Money" (Daily Monitor)—communicated results to a wider audience including beekeepers, agribusinesses, and rural entrepreneurs. A paper under review (Amulen, Vudriko & Akullo, 2023) in the Journal of Apicultural Research further demonstrates ongoing scholarly engagement. These layered dissemination efforts ensured that both technical stakeholders (researchers, veterinarians) and non-technical audiences (farmers, beekeepers) could access and apply the findings.

Outside Uganda, SGCI-2 dissemination extended to Senegal and Zambia. In Senegal, Mr. Godar SENE-UCAD's "Improvement of the Use of Soil Phosphorus for Biological Nitrogen Fixation (BAF) in Soils of the Groundnut Basin" project produced two Master's theses, both published in the African Journal of Microbiology Research. A poster from this project won the Best Poster Award at the 2022 African Association of Biological Nitrogen Fixation (AABNF) conference, and the work received coverage on the BBC Afrique website, thereby reaching both academic peers and broader Francophone-speaking audiences. In Zambia, Dr. Cephas Sialubanje's study on "Gender Integration and Female Participation in Science, Technology, and Innovation (STI)" resulted in a paper accepted by BMJ Open, while Dr. Shem Sikombe's

"Project Framework for Public–Private Partnerships in Research and Innovation" was published in the African Journal of Science, Technology, Innovation and Development. Both papers demonstrated how findings on gender and PPP frameworks were communicated in international, peer-reviewed outlets,

Mozambique's "Agro-Processing Intervention to Enhance Public–Private Partnerships" project made extensive use of communication platforms—ranging from stakeholder workshops to digital newsletters—to share updates on milk and fruit processing technologies. These platforms enabled real-time feedback loops with partner councils and research collaborators, allowing for prompt adjustments and knowledge exchange.

3.3.6 Government and Regulatory Support

In some cases, government support and regulatory approval played an essential role in facilitating the successful implementation of projects. In Burkina Faso, the GO DATA for Malaria Control project received approval from the national research ethics committee and the Ministry of Health, ensuring that the project met the necessary regulatory requirements for data collection and health interventions. In Rwanda, the implementation of the Research and Innovation Grants Management System (RIGMS) streamlined the grant application, review, and monitoring processes, enabling efficient management of research projects. This system allowed for effective oversight of grant funds, timely disbursement, and monitoring of project progress, which ultimately contributed to the success of research projects across the country. Regulatory support, such as these examples, is crucial for ensuring that research outputs are properly implemented and scaled, providing a solid foundation for innovation

3.4 Challenges to effective utilization

Finding: Research utilization across several African countries is hindered by delayed publication, insufficient commercialization funding, limited IP awareness, cross-border ethical clearance challenges, and incomplete project implementation

- **Delayed or Unpublished Research Outputs:** Several research teams reported that they were preparing to submit manuscripts for publication, however, we could not obtain the resulting articles the public domain. This could be largely due to prolonged peer-review processes characteristic of academic publishing. This creates gaps between the generation of research results and their availability, subsequently limiting timely access and use by policymakers, practitioners, and other stakeholders. Moreover, unpublished research findings, lacking peer-reviewed validation, face credibility challenges, thus restricting their adoption in evidence-based decision-making and practical implementation.
- **Insufficient funds to support commercialization:** Many research outputs necessitate further development or commercialization phases, which require additional financial resources. For example, the propolis project secured supplementary funding through Makerere University's Innovation Fund, which facilitated essential capacity-building activities at TUNADO—the private sector apex body for beekeepers—and initiated the establishment of a dedicated propolis value chain platform aimed at sustained product development and market entry. This underscores the critical need for follow-up financing to ensure successful translation of research outputs into viable commercial products. Similarly, COSTECH noted several innovative prototypes that required additional financial backing and refinement before achieving full commercial potential and broader market penetration. Specifically, COSTECH emphasized the necessity of additional resources for activities such as intellectual property rights protection, market research, and product validation, stressing the importance of including provisions for such funding in research project design and budgeting. Moreover, funding constraints also restricted the full realization of engineering designs, resulting in only a few plants progressing to fabrication despite numerous initial developments. In Rwanda, the NCST identified over 18 projects demonstrating strong commercialization potential. NCST explicitly recommended continued and enhanced financial support to further prototype development, product refinement, scaling-up processes, and eventual market entry, emphasizing the strategic value of sustained investment in promising research and innovation outcomes. The Research Council of Zimbabwe (RCZ) similarly highlighted the need for mobilizing dedicated commercialization grants to further develop research products beyond the proof-of-concept stage, underscoring a broader requirement for structured funding pathways to support subsequent stages of commercialization.
- **Limited Intellectual Property (IP) Awareness:** Insufficient familiarity with IP mechanisms posed significant barriers to effective protection, exploitation, and commercialization of research outputs. RCZ specifically noted an urgent requirement for targeted training and capacity building in intellectual property rights registration procedures to enhance researchers' understanding and enable them to adequately safeguard and commercially leverage their innovations.
- **Difficulties in Ethical Clearance:** Differences in ethical compliance standards between countries such as Zambia and Mozambique led to substantial delays and, in some cases, prevented timely project initiation altogether. These delays impacted the prompt generation and subsequent utilization of research outputs, highlighting the need for harmonized and streamlined ethical review processes to facilitate smoother cross-border research collaborations.

- **Incomplete Research Outputs:** Various projects did not fully achieve their proposed objectives within the stipulated funding period, resulting in unfinished activities such as final product testing, optimization, and dissemination efforts. Zambia's council specifically noted incomplete implementation within all three renewable energy projects, acknowledging that while certain milestones had been reached, critical tasks remained pending, thereby reducing the immediate practical applicability and utilization of these research outcomes. This underscores the importance of realistic project planning and adequate resource allocation to ensure comprehensive completion and effective utilization of research outputs.

3.5 Lessons Learnt & Best Practices

Various projects have illustrated critical best practices that significantly enhanced the impact and utilization of research outcomes across different countries. One exemplary practice from Malawi involved targeted training initiatives provided by the African Centre for Technology Studies (ACTS) on translating research findings into actionable policies. This capacity-building approach equipped stakeholders, including the National Commission for Science and Technology (NCST) and various other participants, with the skills and understanding necessary to effectively leverage research results in policy development and implementation.

In Rwanda, the adoption and implementation of the Research and Innovation Grants Management System (RIGMS) stands out as a best practice for optimizing research funding mechanisms. This sophisticated digital system efficiently manages online applications, streamlines the peer review process, and ensures robust grant fund management, significantly enhancing both the administration and monitoring capabilities of research projects.

Uganda's TECHNOMART platform represents another notable best practice, specifically in bridging the gap between research and industry. This online technology matchmaking platform facilitated essential collaborations among researchers, entrepreneurs, investors, and other key stakeholders within Uganda's Science, Technology, and Innovation (STI) ecosystem. By fostering strategic partnerships and supporting the commercialization of research and development (R&D) outputs, TECHNOMART contributed significantly to increasing the practical application and market penetration of innovative products. Additionally, Uganda's investment in advanced ICT infrastructure coupled with the development of a comprehensive Monitoring, Evaluation, and Learning (MEL) framework and an associated interactive dashboard further strengthened the effective management, tracking, and reporting of research outcomes.

Moreover, Malawi's NCST established a strategic Memorandum of Understanding (MOU) with the National Planning Commission aimed at jointly developing and implementing a comprehensive research agenda. This agreement emphasized knowledge translation and the proactive promotion of research uptake, thereby ensuring a coordinated approach to maximizing the impact of research outputs on national development priorities.

4. Recommendations

1. Establish Commercialization Grant Windows: Allocate dedicated post-research funding for prototype development, market validation, IP registration, and scale-up activities. These should be integrated into program design to support continuity from research to impact.
2. Build Intellectual Property (IP) Capacity: Mandate training on IP protection, licensing, and patenting processes. Institutions to work closely with institutional TISCs or innovation hubs to navigate commercialization processes effectively.
3. Plan for Implementation Realistically: Researchers to develop clear project roadmaps, timelines, and risk mitigation strategies. This will ensure that projects are scoped to allow for full delivery of outputs within the funding period.
4. Mandate Open Access and Data Sharing: Require that all SGCI-funded outputs, publications, datasets, toolkits, be deposited in an open-access platforms. Councils could achieve this by supporting researchers with publishing fees.
5. Secure Sustainable Co-Financing Mechanisms: Long-term research utilization requires consistent financial backing beyond one-off grants. Science councils and donors should pursue multi-year co-funding partnerships with national governments, development banks, and the private sector. Such blended financing arrangements ensure that both research activities and downstream scaling efforts—such as commercial production or policy adoption.
6. Embed Utilization Metrics in Project Design: It is not enough for projects to produce papers or prototypes, they could also demonstrate use and uptake. Therefore, all funded proposals could be required to include measurable indicators of utilization, such as the number of end-users engaged, or products taken to market. These Key Performance Indicators (KPIs) will help shift attention from research outputs (e.g., publications) to research outcomes (e.g., adoption, policy influence).
7. Establishment of outcome monitoring systems: There is need for development and integration of dedicated Outcome Monitoring Systems into research programs. Such systems should be designed to capture evidence of how research findings are being applied—whether informing policy, improving industry practices, supporting community interventions, or contributing to new products and services.

5. Conclusion

The SGCI-2 projects demonstrated how strategic investments in research can be effectively translated into solutions that address pressing developmental challenges across Africa. The showcased case studies—from biogas production in Malawi to protein-rich legume farming in Namibia—underscore the critical role of applied research in enhancing livelihoods, strengthening local economies, and promoting sustainable practices. In Malawi and Zimbabwe, biotechnology initiatives not only improved livestock yields but also empowered women and community-based groups, showcasing the social impact of inclusive research interventions. Uganda's achievements in the manufacturing sector illustrate how bridging academia and industry can lead to standardization, innovation, and commercialization of value-added products, with ripple effects on employment creation and market expansion. Similarly, the commercialization of essential oil crops and sustainable shea butter products has opened new frontiers in Uganda's cosmetic and public health sectors. The success of Burkina Faso's digital health innovations—particularly in malaria surveillance and rational medicine use—highlights the potential of digital technologies to revolutionize healthcare delivery and improve health outcomes, even in resource-constrained rural settings. These examples are further strengthened by a range of peer-reviewed publications and prototypes that not only serve as outputs of academic excellence but also reflect high levels of engagement, uptake, and policy relevance.

Output utilization made significant strides in addressing some of the most critical and persistent challenges facing the African continent. Concrete examples of impact include improved nutrition and agricultural productivity through biotechnology in Namibia and Malawi (SDG 2), expansion of clean and affordable energy access via biogas technology (SDG 7), and the promotion of environmentally responsible energy production using invasive plant species (SDG 12). Moreover, projects in Zimbabwe and Malawi introduced climate-smart agricultural practices that built resilience to climate change (SDG 13), while Uganda's manufacturing-focused research opened pathways for decent work and industrial growth (SDG 8). Burkina Faso's digital health innovations provided practical tools for enhanced disease surveillance and safer medicine use, directly addressing public health outcomes (SDG 3). Additionally, the strong gender lens embedded in several projects empowered women with knowledge, tools, and access to opportunities—advancing progress toward gender equality (SDG 5).

Utilization was driven by a combination of enabling factors. Central to this was the deliberate investment in training and capacity building, which equipped local communities, traditional practitioners, entrepreneurs, and public institutions with the knowledge and practical skills needed to adopt, adapt, and apply research innovations in agriculture, health, energy, and industry. This empowerment not only improved productivity and service delivery but also fostered local ownership and sustainability of innovations. Equally critical were the strategic partnerships and collaborations that brought together universities, NGOs, government agencies, and international institutions. These multi-stakeholder engagements allowed for resource pooling, interdisciplinary problem-solving, and the expansion of research networks across national and regional boundaries. Collaborative projects in biotechnology, renewable energy, and health—spanning countries like Malawi, Zimbabwe, Mozambique, Zambia, and beyond—demonstrated how regional research integration can amplify impact, facilitate technology transfer, and promote knowledge exchange. Technology and resource utilization served as a further enabler by enhancing efficiency, accessibility, and scalability. From digital health tools in Burkina Faso to solar-powered agricultural innovations in Mozambique and affordable biogas in Malawi, the integration of appropriate technologies strengthened the delivery of research solutions and enabled cost-effective implementation. Additionally, efforts to ensure affordable productivity, such as low-cost production techniques and community-based innovation platforms, improved the uptake of solutions and contributed to inclusive economic development. Another critical factor was knowledge sharing and dissemination. Through scholarly publications, exhibitions, media coverage, and conference presentations, SGCI-2 researchers successfully increased the visibility, reach, and credibility of their work. This wide dissemination helped stimulate interest, informed policy, and encouraged replication, further embedding research outputs into public and private sector practices. Government and regulatory support also played an instrumental role in legitimizing, scaling, and institutionalizing innovations. Ethical clearances, streamlined grant systems, and endorsement from

national ministries allowed projects to operate efficiently and with the backing necessary for broader implementation. Regulatory support ensured alignment with national development priorities and reinforced confidence among stakeholders.

While the SGCI-2 projects achieved notable successes in generating impactful research, several challenges impeded the full and effective utilization of research outputs across participating countries. A major constraint was the delayed or unpublished dissemination of research findings. Many teams were still in the process of submitting manuscripts, and prolonged peer-review timelines characteristic of academic publishing contributed to significant lags between the generation of results and their availability to users. This delay limited timely access by policymakers and practitioners, while unpublished research lacked the validation necessary for credibility and broader uptake. Insufficient commercialization funding also emerged as a critical barrier. Although many innovations showed strong market potential, the lack of dedicated financial support for activities such as product development, testing, IP protection, and market entry often stalled progress beyond the proof-of-concept stage. Examples from Uganda, Rwanda, and Malawi underscored the importance of sustained funding pathways to enable research translation into viable products and services. Without such funding, many promising innovations remained unrefined or underutilized. Additionally, limited awareness of intellectual property (IP) rights hindered the ability of researchers to protect and capitalize on their innovations. Research councils, such as RCZ, highlighted the urgent need for capacity building on IP registration and commercialization processes. This gap prevented researchers from effectively leveraging their outputs for socio-economic or financial returns. Ethical clearance delays, particularly in multi-country projects, further obstructed progress. Inconsistent standards and approval procedures between countries like Zambia and Mozambique led to prolonged delays or even non-initiation of some projects. These experiences pointed to the need for harmonized and streamlined ethical review systems across the region to facilitate efficient cross-border collaboration. Furthermore, incomplete project implementation affected the utility of research outputs. Some projects, particularly in the renewable energy sector in Zambia, did not achieve all planned objectives within the allocated time or budget. As a result, critical activities such as final testing and dissemination remained unfinished, limiting the immediate applicability and impact of the research.

6. References

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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