New trends in knowledge generation lift research cooperation in Africa

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1 Context

A variety of factors have triggered and intensified international research cooperation. Some of these include the severity of current global policy challenges such as climate change, communicable diseases, international financial instability and the fight against terrorism. These are concerns that no single country can effectively resolve on their own. Knowledge sharing is crucial to understand practical experiences and to inform development and policy implementation. An attraction for South–South cooperation arises out of their similar development experiences and challenges, which enables them to understand their collective circumstances better, learn lessons, and adapt with more relevant responses. Domestic research and knowledge sharing can complement international technical assistance and financing as it nurtures local capacity.

There has been a steady rise in international research cooperation across the South and between the South and the North. This cooperation has adopted different modalities ranging from scientific research to knowledge sharing. Knowledge sharing platforms in Africa are crucial to understanding the complexity of global challenges, but the extent to which policy makers utilize use scientific evidence to inform policy is not clear. Knowledge sharing is now increasingly being viewed as a form of development cooperation. Those that are demand-driven and foster mutual accountability can be effective. Examples of South–South knowledge sharing platforms include the African Peer Review Mechanism (APRM), which initiates governance self-assessment by African Union member states, and the Forum on African China Cooperation (FOCAC), which seeks to strengthen relations between African countries and China.

The paper sought to understand the relationship between global challenges and improvements in research cooperation between countries and regions in the South. A review of knowledge generation and dissemination processes, recently formulated re-

search policies, and interviews with representatives from research organizations, point to new trends in African research. The paper concludes that while global challenges have increased the level of knowledge sharing, the use of scientific evidence is formulating government action remains low. However, agencies such as the African Union and FOCAC have been instrumental in triggering transnational research cooperation, which signals a new dawn for scientific research in Africa.

2 Empirical Approach and Main Findings

This study included desk reviews of national research policy documents, reports from regional fora and workshops, strategic plans of national science and research councils in Kenya, Ghana, Nigeria, Rwanda, South Africa, Tanzania, and Uganda, and interviews with officials from some of these councils. The main research question was whether global challenges and the need to improve research cooperation and knowledge development in Africa has resulted in government support for research and utilization of research evidence. The study explored trends in government investment in research, and the relationship between sources of research financing and research focus. Data sources included : research and knowledge development platforms where there has been cooperation between countries ; the content of selected knowledge-management platforms ; and the research policies of governments that have been involved in research activities in Africa. Other sources included interviews and focused discussions with institutions involved in research, including regional bodies, universities, and national and cross-national research institutions, such as the National Council for Science Technology and Innovation (NACOSTI) in Kenya, the Uganda National Council for Science and Technology (UNCST), the Consultative Group for International Agricultural Research (CGIAR), and the Alliance for Accelerating Excellence in Science in Africa (AESA).

Characteristics of research environments — There is a direct link between the breadth and depth of research and its financing. In recent years, African governments have made some effort to increase research funding. Historic under-expenditure, however, has resulted in the lack of organizational capacity (e.g., poor technical capacity to collect data, analyse performance ; and poor national STI policy frameworks), especially in the least-developed countries.

Each of the countries is this study (Kenya, Ghana, Nigeria, Rwanda, South Africa, Tanzania, and Uganda) has formulated a national STI policy. However, with the exception of South Africa, data collection is infrequent. Although scanty, the data confirm the dismal investment in research by African governments, and a skewed research landscape in which the numbers of male researchers far exceeds female researchers. For Ghana, Kenya, and South Africa, a comparison between 2007 and 2010 indicated a slight increase in the total gross domestic expenditure (GERD) on R&D. In Ghana there was a slight reduction in the percentage of female researchers, but there was a marked increase in Kenya and South Africa. Encouragingly, all the countries, with the exception of Rwanda, reported a significant percentage increase in the number of scientific publications and in publications per capita between 2005 and 2010. African researchers doubled their research output in science, technology, en-

gineering, and mathematics. However, the pace and quality of research needs to be improved.

Trends in continental and regional research cooperation — International research cooperation has adopted several approaches : knowledge sharing on common challenges ; undertaking joint research ; establishing and managing peer-review platforms ; establishing think tanks ; promoting inter-university links and exchanges ; and creating government-led regional blocks.

The African Union's Science, Technology and Innovation Strategy (STISA-2024) prioritizes : research and innovation in agriculture and food security ; prevention of communicable diseases such as HIV/AIDS, TB, and malaria ; ICTs and global communication and knowledge transfer ; environmental protection and biodiversity ; harmony, peace, and security ; and trade and wealth creation. STISA-2024 calls for greater resourcing of national, regional, and continental institutions.

At the continental level, major initiatives have been supported by African and international donors. The CGIAR is a long-standing example of national and international collaboration to support research capacity in agriculture. Through its affiliate programs, such as the Climate Change Agriculture and Food Security program, has been consistently generating research findings on climate change-related challenges, such as droughts, famines, environmental degradation, and food insecurity. Even so, policies that are implemented are often those made through political considerations. Workshops, seminars, and conferences have become a major characteristic of knowledge generation and sharing in Africa. Given the fact that most of the research is externally funded, it is most often the donor's interests and not national priorities that dictate the research agenda in these institutions. Government agencies often participate in the knowledge workshops where new knowledge and research outcomes are shared, although this does not translate to use of these outcomes.

In September 2015, African and international partners launched AESA, an initiative that aims to drive Africa's research agenda and build scientific capacity across the continent. AESA was created by the African Academy of Sciences (AAS) and NEPAD with international donor support. The AESA was endorsed by African governments, to support the implementation of STISA and the African Health Strategy (AHS 2015–2030). AESA is focused on health research with plans to expand into other areas. AESA will prioritize research areas, manage funding competitions, and evaluate the impact of research outcomes. AESA is envisioned to be Africa focused and led by Africans to pursue strategic research and partnerships with like-minded organizations. AESA is also intended to invest in building the capacity of local researchers through the implementation of the two grant programs DELTAS Africa and Grand Challenges Africa.

Regional intergovernmental bodies in Africa have all established knowledge and data sharing platforms. The Inter-Governmental Authority on Development (IGAD), the East African Community (EAC), Southern Africa Development Community (SADC), Economic Community of West African States (ECOWAS), and Great Lakes nations

have used such mechanisms to design strategies to counter challenges such as poaching and illegal trade in wildlife products, terrorism, and related criminal activities.

Other continental and regional initiatives supporting research and knowledge sharing include : the International Conference on Illegal Trade in Wild Fauna and Flora, which was organized under the leadership of the Republic of Congo in partnership with the African Union Commission (AUC). The Council for the Development of Social Science Research in Africa (CODESRIA) funds and promotes research for the social transformation and development of the African continent. The Organization for Social Science Research in Eastern and Southern Africa (OSSREA) supports research through training and capacity building and developing links between researchers and policymakers in the region. Finally, the Partnership for African Social and Governance Research (PASGR) aims to increase the research capacity of institutions and individuals in the areas of social policy and governance.

Country experiences — The UNESCO Science Report for 2010 on sub-Saharan Africa indicates a positive move by many African countries to improve internal capacity for science and technology. R&D budgets invest heavily in student stipends and researchers' salaries and the residual is directed to research activity. Additional challenges facing advancement of R&D in Africa include inadequacy of the ICT infrastructure leading to limitations in Internet access, low literacy levels, low research capacities, and brain drain, which accounts for a third of all African researchers.

Six country cases are briefly summarized in Table 1. It illustrates the main challenges, characterizes the linkages between research and policy, and priority research foci for Ghana, Kenya, Nigeria, Rwanda, Tanzania, and Uganda.

3 Main messages for policy and practice

This study has considered the different modalities of generating and sharing knowledge among African countries. Research supported jointly or separately by different agencies, existing knowledge platforms, and funding mechanisms all themed around the global challenges, have been explored. The complexity of global challenges has indeed led to greater knowledge generation and sharing between countries. Although knowledge sharing between and within countries is significant, it is not necessarily sourced from scientific research activities. The fora through which such knowledge is shared are themselves sources of data as discussions and pronouncements in conferences, seminars, and workshops are often used as the basis of policy and decision-making.

There is a positive shift across the continent that begins with the gradual increase in research funding. The increase in numbers of researchers in general and particularly female researchers is notable. New initiatives such as the recently launched AESA, STISA-2024, and the 2007 endorsement by Heads of State to increase research funding to 1% of GDP are indicators of this shift. The increase in the number of shared platforms for knowledge exchange between countries and new Africa-led efforts to improve research capacity, are all strong examples of gradual but significant steps to improve research. STISA stands out as a positive trigger for African countries to give more attention and invest in STI. Subsequently, national research councils have

received national boosts through more funding, and in Kenya, the establishment of national research funds is a positive development.

Without solid leadership by African governments, the continent will continue to lag behind the rest of the world even in the context of increased South–South and North–South research cooperation. That there is increased research and knowledge sharing within and across countries in light of global challenges is not in doubt. There are areas of concern that governments could address.

National governments need to invest in and prioritize research on national priorities. To the extent they can, governments should encourage and create platforms for international funding agencies to support domestically-driven research priorities. While STEM fields are relatively well supported, social science research has been largely relegated to individual interests and universities, whose funding is often limited. As a result, there is limited capacity for research to inform social policy and domains where social research can by complementary. New STI investments need to support African universities become research intensive and collaborative institutions. They need investments in infrastructure, research funding and incentives to collaborate with non-academic partners and users of research. Related to this, governments need to enhance their capacity to use research evidence. There is clear disconnect between policy and research in Africa, with policies being designed based on political considerations and pronouncements rather than being anchored in solid research.

While noting these concerns and areas for action, the findings noted a shift toward increasing financing, political interest in reforming and creating new national research and innovation agencies, and investing in the capacity for research. These shifts signal a new dawn that opens a path for African governments generate evidence on pressing challenges, support research cooperation and harness insights.

Country case studies			
Country	**Transnational challenges**	**Research funding and links with policy**	**Thematic focus of government research institutions**
Ghana	Climate change, food insecurity, drug trafficking, and disease outbreaks	Government investment in R&D is low	Mainly agriculture and food security, and recently, mining
Kenya	Terrorism, poaching, drug trafficking, climate change, food insecurity, and disease outbreaks	Policy not always linked to research-based evidence In August 2015, a Parliamentary caucus to ensure evidence-based policy and decision-making in Parliament was formed.	Mainly agriculture, ICTs, health, and water No notable links between government financing and research on global challenges
Nigeria	Terrorism, poaching, drug trafficking, climate change, food insecurity, and disease outbreaks	Limited interaction between researchers and policymakers Research outcomes hardly used in policymaking leading to low motivation among researchers	Mainly agriculture and food security No notable links between government financing and global challenges
Rwanda	Poaching, climate change, food insecurity, and disease outbreaks	Country is a good example of South–South cooperation in sharing knowledge, particularly on reduction on HIV/AIDS infant mortality, and malaria and TB	Research is mainly done through government line Ministries and not through a centralized agency Rwanda is positioned as a STI hub and is keen to encourage STI activities No direct links between government financing and global challenges
Tanzania	Terrorism, poaching, drug trafficking, climate change, food insecurity, and disease outbreaks	Limited links between policy and research outcomes	Mainly crop development and food security Inadequate attention to socioeconomic areas Lacks a multidisciplinary approach No direct links between government financing and global challenges
Uganda	Terrorism, poaching, drug trafficking, climate change, food insecurity, and disease outbreaks	Despite tripling of research output between 1997 and 2007, there is no definite link between research outcomes and policy formulation	Mainly health and natural sciences and to a lesser extent, social sciences No direct links between government financing and global challenges