

# In Search for Scientific Collaboration: South Africa's Science Diplomacy Towards Africa



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**Abstract** To bolster science diplomacy in Africa, South Africa has through the Department of Science and Innovation (DSI) entered into science bilateral agreements with many countries in the continent. Additional agreements and engagements exist through Science Councils and institutions of higher learning. To strengthen its science diplomacy imperatives in Africa, DSI has established a Science and Technology Diplomacy program that explores possible ways of strengthening links with countries and institutions in Africa. To understand how South Africa can pursue its scientific engagement with the continent of Africa, a prospecting exercise for opportunities of engagement was done through science dialogues. The findings suggest that to meaningfully contribute to the development of Science, Technology, and Innovation (STI) agenda of the African Union (AU), South Africa requires a well-defined objective and a plan that is based on a clear understanding of the general strengths and weaknesses of science, technology, and development in Africa as well as the specific challenges within individual partner countries. Supporting continental science and technology strategy (e.g., AU's STISA) and science and technology initiatives that contribute to developing and supporting research capacity and infrastructure should guide South Africa's science diplomacy towards Africa.

**Keywords** Science diplomacy · South Africa · Africa · Science collaboration · Research · Partnerships

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# 1 Introduction

For South Africa, the African continent has been the mainstream of its diplomatic priority since 1994 (Landsberg and van Wyk 2012). Under former President Thabo Mbeki, South Africa's foreign policy towards Africa reached its height (van Nieuwkerk 2012). During this period, South Africa's diplomatic emphasis towards Africa was focused on political stability, peace and security, trade and development. In the past 20 years, there has been a growing realization of the importance of Science Diplomacy for Africa. Science diplomacy as a notion represents a paradigm shift in diplomatic circles of the twenty-first century (Turekian 2018). It has long been used as a tool for bilateral and multilateral relationships (S4D4C 2019). In this regard, South Africa, through the DSI has entered into Science Bilateral Agreements with various countries in the continent. Additional agreements and engagements exist through South Africa's Science Councils such as NRF, CSIR, HSRC TIA, and many more others that are funded by DSI and institutions of higher learning.

Across the world, governments have realized the significance of science in advancing diplomatic relationships, although these were often not classified as Science Diplomacy. With the increased importance of science in diplomatic circles, the application and definition of science diplomacy has broadened considerably (S4D4C 2019). This coincides with the growing realization that science and technology underpin many of the challenges and opportunities countries face, whether as a driver or a potential solution provider to global problems (S4D4C 2019). Global interconnectedness has heightened the incentive for science and technology diplomacy as a vehicle for diplomatic engagement that has gained prominence on diplomatic agenda (Ngwenya 2015).

International cooperation on science seems to be based on two foundations of collaboration, advancing knowledge, and ensuring scientific capability thereby advancing broader national interests (Gluckman et al. 2017). Science Diplomacy thus serves as an effort to leverage science engagement, collaboration, and knowledge exchange in support for broader objectives beyond scientific discovery (Turekian 2018). This takes place in the form of international exchange of personnel, ideas, sharing equipment, and research infrastructure. Breakthroughs in Science have long relied on the international exchange of people and collaboration (The Royal Society 2010). This suggests that Science Diplomacy is not limited to office and laboratory but entails the movement and interaction among people. It serves as a way of engaging with people from different countries, cultures, and backgrounds. It provides a common language, lenses, and approach for addressing major societal problems and is based on common methods of self-evaluation such as peer review and benchmarking (Ngwenya 2015).

The globalization process has driven societies to assimilate and transfer technologies at a much higher speed than ever before (Ngwenya 2015). In this process, advanced countries have managed to exploit their own technological capabilities while developing countries are left on the margins of scientific breakthroughs. Science Diplomacy gained prominence in 2009 at a meeting held in Wilton House,

United Kingdom (Gluckman et al. 2017). Whose outcome was the development of a lexicon that has come to be widely used, with Science Diplomacy being recognized as taking three broad forms, which are:

Science in Diplomacy: science providing advice to inform and support foreign policy objectives.

Diplomacy for Science: diplomacy facilitating international scientific cooperation.

Science for Diplomacy: scientific cooperation improving international relations.

Recognition of Science Diplomacy has been the way to pursue national agendas, a component that fits a category of soft power diplomacy (The Royal Society 2010). In pursuit of the advancement of Science Diplomacy, the American Association for the Advancement of Science founded the Centre for Science Diplomacy in 2008. Its founding objective was to advance the overarching goal of using science and scientific cooperation to promote international understanding and prosperity by providing a forum for scientists, policy analysts, and policymakers where they can share information and explore collaborative opportunities (Inglesi-Lotz and Pouris 2018).

In the world of science-centric development, knowledge is built through sharing and reviewing conditions under which research takes place. In this process, perspectives of Science, Technology, and Innovation are shared among peers to seek consensus on existing problems such as climate change, poverty, COVID-19, human rights, social dynamics of human development, and many more others. Science diplomacy is a niche diplomacy, which demands the involvement of non-state experts in bilateral and multilateral negotiations on scientific matters (Ngwenya 2015).

Over years, perspectives on science and technology have been primarily dominated by views and ideas of natural scientists. Hence, there is a growing realization that the effective impact of Science and Technology requires equal collaboration and partnerships between social and natural scientists. This has manifested itself in many ways where, for instance, approaches to challenges like pandemics, climate change, peace and security, and nuclear disarmament have brought together both natural and social scientists, with active participation of civil society.

To establish itself as a country that can promote and develop scientific knowledge with its peers South Africa's DSI has established a science and technology diplomacy program (DST 2021) that aims at exploring modes of fostering links with various countries and institutions in Africa. The department seeks to use the program to forge and strengthen relationships with the world, especially the African continent. The set objectives of the program are to:

- (a) **Integrate** social and natural scientists' collaboration to ensure the development of solutions that are balanced, i.e., that are transdisciplinary and integrate social perspectives,
- (b) **Enhance** joint research collaboration with social science institutions in Africa to promote mutual socio-economic development through integrated scientific knowledge development,

- (c) **Create** awareness of the importance of societies' inclusion in the knowledge-based economies,
- (d) **Equip** communities with tools to be drivers of their own development, thus empowering them so that they can influence and contribute to the advancement of knowledge economy,
- (e) **Strengthen** the science to society regime for the communities to be brought closer to science and measure the impact of scientific contribution from the perspective of communities.

To generate insight on how South Africa can strengthen its scientific engagement and collaboration with countries in Africa using DSI's science diplomacy, a prospecting exercise for opportunities of collaboration was done through science dialogues.

## 2 Methods

A case study approach was used to gain insight into the status of Science Technology and Innovation in six selected countries. These were Mozambique, which represented a Lusophone region, Kenya, Ethiopia, and Uganda that represented the Anglophone region, and Mali and Cote d'Ivoire that represented a Francophone region of the continent. The aims of visiting these countries were to:

- (i) determine the state of affairs in scientific and technological environment in these countries so as to forge effective collaboration with South Africa,
- (ii) identify existing challenges and possible areas of improvement and
- (iii) develop appropriate policy responses by South Africa to identified opportunities that will position South Africa as a country that seek to influence development in Africa through STI.

A focus group discussion where representatives from academic community, scientists, civil society, and government representatives participated were used as a platform for sharing ideas and expressing opinions on the status of STI in the visited country. In addition to the issues discussed areas of possible collaboration between South Africa and the visited country were identified. Challenges faced by participants in their respective countries, methods to be used to improve the quality of research, and the uptake of research findings by policymakers were proposed.

## 3 Results

Participation in the dialogues was equally represented by both male and female researchers. These came from various fields (political science, agriculture, economics, engineering, etc.) and backgrounds (policymakers, education management, government, and research), with social scientists and academics constituting the larger portion. This was the case in all countries visited.

To engage meaningfully with the continent and have a continent-wide impact through science technology and innovation, it was noted that South Africa requires a well-defined strategy with well-articulated objectives and a plan that is based on a clear understanding of the strength and weaknesses of science, technology, and development in Africa.

The general perception was that there is little or no uptake of research results by policymakers in many countries visited. This is primarily due to the existing schism between researchers and policymakers. Institutions for higher learning are not equipped to conduct quality research as a result they prioritize teaching over research. Lack of investment on research infrastructure, funding, and support for research discourage lecturers from dedicating their time to research.

What emerged strongly is the significance of institutional collaborations across the continent, with a dire need to conduct research that supports planning and informs government policies. This, however, requires the development of research capacity and investment into infrastructure that will allow researchers to conduct and produce indigenous research results that are comparable to that of other institutions in the world.

In addition to these general findings, country-specific ones, which provide opportunities for bilateral and regional collaborations were expressed in each country that participated in the dialogues.

### ***3.1 Mozambique***

Due to economic hardship, the country was facing there was no allocated budget and resources for research. The institutions rely much on foreign funding, which is difficult to access. The policymakers do not use findings thus researchers felt less appreciated by the government. The greater concern was the inability to access data from government institutions. To address some of the concerns raised, recommendations were made, and these are listed in Table 1.

### ***3.2 Cote D'Ivoire***

Three thematic thrusts were identified, that can be the basis for bilateral research collaboration between Cote d'Ivoire and South Africa. These are:

- Agriculture,
- Natural resource management, and
- Information Communication Technology (ICT).

Discussion noted that, for Africa to benefit from these areas, value chains, both backward and forward, needs to be developed. The health and social security sectors were recognized to be major sectors the participants noted the two countries should

**Table 1** Recommendations made to address some of the concerns raised in Mozambique

Proposal	Proposed action
Mobility for researchers, which is hamstrung by certain VISA requirements, especially on the side of South Africa	Creation of an Academic VISA for researchers
A need to access data to improve research and support for policies	African Data Base for research done in Africa
There is a need to share information on regional funding opportunities, for future collaboration	
Research needed for the benefit of society, research that will cater to people's problems	Researchers to search for funding that will attend to challenges in their communities
Methodology of research (decolonize knowledge development process)	Knowledge exchange and support
Collaborate in areas of food security, water, natural resources management, and disaster management	Identify opportunities where collaboration can be attempted

pay attention to. The critical consideration was on the social impact of disease burden on the economies of countries in Africa and on the kind of research, researchers from two countries can prioritize to ensure that social protection policies are reinforced to protect the populations of Africa, especially the young generation.

Environmental degradation and waste management were cited as areas that require consideration as these form an important area which researchers can explore. Discussions centered on the methodological pathways through which waste is collected and disposed of in many African cities. As there is a shortage of clean and drinkable water in many cities in the continent, a need to research how water is harvested, stored, treated, and distributed in cities in Africa was identified.

The conversation also touched upon the importance of gender in STI. The challenge of resource mobilization was discussed and various options were explored on how resources can be mobilized to strengthen research and collaboration between the two countries. As a way forward following recommendations were proposed:

- i. Creation of a continent-wide and country-specific research database for effective collaboration. Database should be divided into discipline-specific areas so as to ease collaboration and networking.
- ii. Creation of an enabling environment whereby research institutes and researchers working in South Africa and Cote d'Ivoire could start working together in order to maximize the research expertise in both countries.
- iii. At the political level, the Department of Science and Technology in South Africa and the Ministry of Higher Education and Scientific Research in Cote d'Ivoire should start talking to each other and to create platforms through which areas of research priorities could be identified and resources mobilized for the financing of such projects.

- iv. It was also concluded that an MOU should be signed between CIRES and the HSRC in order to maximize research collaboration in the research areas already identified.

### 3.3 Ethiopia

Ethiopia is a country at crossroad. Any opportunity of collaboration is acceptable. The lack of institutional strength and manpower for research and development was cited as a drawback for the country. The government is investing in youth development and infrastructure for research and development. To establish collaboration between South Africa and Ethiopia opportunities for collaboration were recommended (Table 2).

### 3.4 Kenya

Compared to other countries visited, Kenya had a well-structured system of innovation. The government fully recognizes the role of STI in wealth creation and building human capital needed for country's transition to a knowledge-based economy. The country's Vision 2030 proposes to intensify the application of STI to raise productivity and efficiency levels across the three pillars of national development.

With this recognition, the country is implementing STI policy framework through the identification, acquisition, transfer, diffusion, and application of relevant STI knowledge in all sectors of the economy.

Opportunities for collaboration were identified to be:

- i. Capacity building through training and mentorship of junior researchers by senior colleagues on interdisciplinary research—Experienced interdisciplinary research should act as advocates for juniors.

**Table 2** Opportunities for collaborations between South Africa and Ethiopia

Recommendation	Action required
It was recommended that the University of Gondar and AISA-HSRC should initiate the joint research and collaborative work to take forward the established relationship between South Africa and Ethiopia	Joint research projects carried out by researchers from both institutions leading to joint publications Staff exchange visits for research and knowledge sharing Mutual assistance in the establishment of new programs and projects Exchange of information and publications Jointly organizing conferences, policy dialogues, and workshops

- ii. Publications—co-authorship of journal papers, books, seminar, and conference papers—some are struggling financially, and few papers are submitted as researchers prefer western journals—the *debate on open versus restricted access*.
- iii. Rewarding outstanding interdisciplinary research activities to provide the requisite incentives.
- iv. Initiating dialogue between social scientists, natural scientists, and resources-based national and regional agencies—increase the level of awareness about the significance of IR.
- v. Maintaining quality standards for interdisciplinary researchers—representation in ethical committees, review panels, etc.
- vi. Meetings to share and exchange ideas and knowledge through joint field visits, retreats, seminars, conferences, guest speakers, shared facilities, etc.
- vii. Funding collaborative interdisciplinary research
- viii. Making research output a key performance indicator for upward mobility in universities and research institutes.

### 3.5 Mali

Mali is facing among the major challenges, issues of state fragility, insecurity, pervasive poverty, and weak institutions of the state. Most of these challenges are endogenous. South Africa can contribute to ensuring that some of these challenges are overcome. Some of the challenges Mali faces are specific to Mali, there are challenges which most countries on the continent could relate with. Collective efforts should be deployed in order to ensure that most challenges in the continent are overcome. As a result, participants in the dialogue proposed that the following measures be considered:

- (i) Creation of a network of researchers and academics that would continue to debate and propose solutions to the pressing challenges facing the two countries. The networking platform should focus on training of doctoral students, organization of conferences and seminars, funding proposal writing workshops, and researcher exchange programs.
- (ii) Creation of a publication and dissemination platform for Malian researchers in order to expose their work to South African researchers and academics.
- (iii) Revitalize the Timbuktu digitization project which the government of South Africa has spent a considerable amount of money already.
- (iv) Creation of a conflict mediation forum whereby Malian academics and researchers could benefit from the expertise of South Africa in resolving the security and secessionist tendencies in the country.

While there are efforts to unite the continent politically, very little is done to conjugate African efforts within the domain of STI. While recognizing the work of CODESRIA in providing a platform for African researchers to share their expertise



and disseminate their research findings, the dialogue contended that more of such institutions need to be created in uniting African scientific voices. These institutions should ensure that their work is cut across disciplines, languages, ethnicities, and religions.

### **3.6 Uganda**

There has been a persistent perception that universities need to help Uganda Move forward. From Uganda's point of view, South Africa is well poised to pull up other African states. The world is experiencing issues like global warming, changing seasons, and other environmental challenges such as storms and locust swarms. Drug trafficking, diseases, and many other problems require research.

African countries need to rise above military, politics, and wars and turn to knowledge because knowledge is an essential pillar of development. As per the observation by Ugandan researchers, less attention is given to higher education and research. There was a general feeling that Academic institutions need to push for government to prioritize research, teaching, and learning in institutions of higher learning. Researchers and academics need to have conscious as they undertake research to be able to win the attention of the government so as to demystify wrong perceptions about research. For this, researchers need to simplify information as they develop it.

Just as in many countries in the continent, in Uganda, policies in government are not based on research. There is an underutilization of research in the country, with lot of information being stacked away in libraries, so recommendations from evidence-based research are not used for policy development. In the budget of the country, education, which is very strategic in the development of the country is placed under research and funded priorities. Generally, funding limits research activities in the country and this discourages lecturers from dedicating their time to research. As a way forward, the following recommendations were suggested:

- Regional Science and Technology Diplomacy events that will deliberate on topical issues of the region.
- Development of awareness of international topics such as sustainability through the promotion of awareness of the importance of green economy and green growth.
- Gender equity: Africa has a patriarchal system; men need to be encouraged to adopt gender equity.
- Scientific collaboration: this must involve exchange of information, research, and joint proposal writing.

## 4 Discussion

The countries visited provide some valuable insight into the state of science, technology, and research in the continent. As could be deduced from focus group discussions, funding for research, science, and technology is inadequate; as a result, research activity in many countries in Africa is minimal. This was found to differ between the regions, with Lusophone and Francophone regions being greatly affected by the shortage of funding for research. Anglophone region, especially in East Africa, have some resources, although not enough, which allow them to do some research. As a result, discussions in East Africa were extensive and informative both in outlining what needs to be done and how the continent can tackle the scarcity of resources.

Despite challenges expressed, there was an interest among researchers to collaborate. For this water management, peace and security, environmental management, product development, and valorization of research findings as well as sharing models of the uptake of research findings by policy-makers were identified to be areas of preference for collaboration. There is a grave concern that research outputs hardly find their way to policy formulations in the continent. This was well articulated in Uganda, Kenya, and Mozambique.

The most prominent challenge mentioned in all discussions is the underfunding of research and the lack of infrastructure to conduct credible research. This highlights a need for resource mobilization and the development of measures for successful development of science and technology in the continent. Without enough resources, Africa will remain a passive participant in knowledge production. While it is still too early to provide models of best practice in the field of science diplomacy, it is apparent that necessary conditions for Africa's Science engagement are needed. Some of these may include sharing scientific expertise at bilateral levels and making funding available for such collaboration.

South Africa through its Science Councils has afforded the opportunity to establish initiatives intended to bring Scientists closer to each other (Table 3). In addition, most institutions of higher learning in South Africa attract a sizeable number of students and lecturers from the continent. This indicates that Science diplomacy is not only motivated by the creation of new knowledge alone but also involves the movement of people and strengthening relationships at all levels.

Given this, it is important to acknowledge a few other characteristics of science diplomacy. While much of the scientific endeavors are driven by unplanned interactions, science diplomacy has a more strategic approach (Turekian 2018). For South Africa, the Science and Technology Diplomacy program provides a valuable space for engagement with the continent and promoting stronger collaboration among social and natural scientists.

**Table 3** South Africa's initiative to engage with African Countries

Initiative	Category	Strategic objective
National Research Foundation Conference Fund Knowledge exchange Pos-doctoral research program Researcher grading scheme	Continental	Promote the development of knowledge within the region (SADC) and the continent
South Africa Science Forum	International	Strengthen collaborations across the World and the continent thus promoting South Africa as a knowledge-based country
African Young Graduates and Scholars Conference	International	Present young scholars and researchers with an opportunity to share their work with the reading community thus getting a chance to develop their confidence
Africa Unity for Renaissance Conference	International	Provide platform for researchers in the continent and those in diaspora to share their research findings, thus contribute to the development of knowledge in the continent
Africa Research Fellowship programs	Continental	Attract top researchers from the continent to work with institutions in South Africa, thus strengthening research capacity of the country
Scarce Skills Program	International	Attract and retain skills to benefit the economy of South Africa including research and teaching at institutions of higher learning

## 5 Conclusions

In its quest to bolster science diplomacy in Africa, South Africa needs to be cognizant of the fact that the future prosperity of Africa, in an increasingly competitive, globalized, and knowledge-based economy, heavily depends on the continent's potential to generate knowledge through interdisciplinary research, technological innovation, and collaboration. This requires:

- (a) a strong focus on capacity building and skills development.
- (b) high-quality educational and research institutions that are equipped with adequate facilities.
- (c) support for a coherent strategic approach to multidisciplinary research infrastructure in Africa.
- (d) establishment of continental research infrastructure that allows several researchers to collaborate and undertake common research in multiple locations and countries.

- (e) forge multi-country initiatives to a better use, development, and sharing of resources and research infrastructures.
- (f) establish a continental roadmap for multidisciplinary research infrastructure development including developing new ones and upgrading existing ones as need arises. This has a potential of stimulating the implementation of an interdisciplinary research agenda.
- (g) fostering networking and improvement in the efficient use of national, regional, and continental research infrastructures.

To assist and improve the uptake of research findings, it will be necessary to:

- (a) enhance the application of knowledge gained in research by reaching a consensus at the African Union level that countries need to base their policies on evidence-based research findings.
- (b) promote the migration of countries to knowledge-based economies, through the development of continental centers of excellence.
- (c) enhance research funding by encouraging universities to generate their own funding through the commercialization of their work.

In view of this, universities need to demonstrate well-informed acquaintance with policies, programs, and projects, by putting forward the best available evidence from research, influence policymakers on what evidence to use, when, and how and ensure that tacit knowledge, practice/experiences, and voices of ordinary citizens are equally valid forms of evidence needed to influence policies tailor-made to support development.

To mitigate constraints and challenges in research, the following recommendations are worth consideration:

- Develop investment in research across the continent through the National Research Foundation model.
- Exempt research equipment from taxation. Taxation of research equipment tends to affect the level of research activities in Africa.
- Create a cadre of professionals that will focus on research. Most researchers in Africa are faced with the problem of competing priorities, i.e., teaching and research.
- Develop mechanisms for funding research in the continent. Most research in Africa relies on funding from outside/foreign funding. Where this fails, researchers fail to receive the required funding for their work.
- Most of the universities in Africa lack state of the Art facilities and infrastructure to facilitate innovative research. For this, an opportunity exists for universities to partner and consolidate resources to establish well-equipped research centers.
- Visa processing procedures limit the mobility of researchers thus hindering the scope of collaborative research.
- Brain drain: More people trained remain in the countries where they get scholarships. This reduces the pool of resources to tap from in local research.

Knowledge-generating institutions such as Think tanks need to start enhancing collaboration among themselves as opposed to each operating in silos. Organizations like The Council for the Development of Social Science Research in Africa (CODESRIA) must facilitate these collaborations. Researchers need to be challenged at individual level to collaborate with others nationally, regionally, and globally. Going transnational is key in the development of evidence-based research. This research needs to embrace cross-disciplinarity, trans-disciplinarity, and transnationality approaches. There is a great need to endeavor to promote close collaborations between social and natural scientists. The International Social Science Council, recently transformed into the International Science Council where the humanities and social science have now been merged is an indication of a developing trend in different disciplines in research are being brought together.

There is a lot that Africa can tap from collaborative research and just allowing different sectors to work together towards the development of knowledge. Institutions need to be ready to capitalize on the available opportunities to steer forward collaborative research that is multidisciplinary. Exchange Programs by researchers across the continent need to be enhanced. Enhancing existing infrastructure and taking advantage of it, upscaling it through initiatives that are more robust in approach is critical. Allowing universities to come together and develop collaborative centers of excellence as opposed to each university working in isolation is required for Africa to immerse itself in knowledge economy.

**Acknowledgements** The Science, Technology, and Innovation Diplomacy Dialogues were financially supported by South Africa's Department of Science and Innovation. Institutions, researchers, as well as members of the civil society who participated in the dialogues, helped to make this study a success. All of them are equally acknowledged for their contribution and support.

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