Towards inclusive PE for science granting councils in Sub-Saharan Africa: challenges and opportunities

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Abstract

Inclusive public engagement (PE), an approach that recognizes the plurality of gender identities, is crucial for science reach, uptake, and impact. This study explored the PE activities of 15 science granting councils in Sub-Saharan Africa to identify existing practices, their strengths, and barriers to inclusive PE practices. Key informant interviews were used to elicit data, with additional data collected through a digital audit of the 15 councils. The study established that SGC activities demonstrate relatively good alignment with their PE mandate. Initiatives have been developed and implemented, although there are areas that need strengthening. Some of the key areas that need strengthening are the lack of commitment to multilingual knowledge transfer using local languages; the explicit inclusion of women in policies and programs, the diversification of engagement platforms and tools to address the urban-rural divide and the digital divide.

Keywords Science communication in the developing world

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Inclusive public engagement with science and innovation in Science Granting Councils (SGCs) in Sub-Saharan Africa

There are growing global efforts to embrace PE and participation in science, and increasing acknowledgment of the extent to which inclusive PE with science and innovation can facilitate the reach and uptake of research among different publics and stakeholders [Scheufele, Krause, Freiling & Brossard, 2021]. This is particularly so in Sub-Saharan SGCs which play an important role as intermediaries between science in society in national systems of innovation [Mouton, Gaillard & van Lill, 2015]. Their roles include setting research agendas, disbursing funds for research and development (R&D), and assessing the communication, uptake, and impact of publicly funded research [Mouton et al., 2015]. They also function to promote public participation and dialogue within the national innovation systems and are thus responsible for promoting inclusive PE with research and innovation.

The Science Granting Councils Initiative (SGCI) was launched in March 2015 initially as a partnership of the UK's Foreign, Commonwealth and Development

Office (FCDO), Canada's International Development Research Centre (IDRC) and South Africa's National Research Foundation (NRF). The initiative has 17 participating SGCs in Burkina Faso, Côte d'Ivoire, Ghana, Senegal, Kenya, Uganda, Tanzania, Rwanda, Ethiopia, Botswana, Malawi, Mozambique, Namibia, Zambia, Sierra Leone, Nigeria, and Zimbabwe. The initiative was aimed at strengthening the abilities of these Councils to: manage research, design and monitor research programs based on the use of robust Science. Alongside these functions, they have become crucial intermediaries between science and society with responsibility for the valorisation of science [Maharaj, 2021]. The key thematic areas that the SGCI focuses on are research management, evidence in policymaking, cooperation projects, strategic communications, knowledge uptake, gender and inclusivity, and private sector engagement

Since the inception of the SGCI, they have been making several efforts on inclusive PE to forge a scientifically engaged and participatory population with a better appreciation and understanding of science and technological developments.

This paper approaches public engagement with a lens that views its role as redressing the perception of a deficit model and enhancing increased uptake of science in solving societal challenges as noted by Maharaj [2021]. Inclusion then becomes a key tenet of effective public engagement since it affords a multiplicity of actors to participate in science and contribute their perceptions, different forms of knowing, and intellectual assets [Maharaj, 2021; Kano et al., 2019]. Inclusive public engagement is purported to involve this multiplicity of actors with different identities from the planning phase [Kano et al., 2019], harnessing multiple layers of engagement tools and strategies to achieve inclusivity [Canfield et al., 2020].

While there have been efforts to embrace PE and participation in science by SGCs, pertinent aspects such as gender transformation and inclusivity remain barriers to the effectiveness of the efforts. There has been growing awareness that addressing inclusivity in PE is crucial to ensuring that the knowledge that SGCs invest in reaches different sectors of the population and has greater potential for uptake.

A consortium led by the Human Sciences Research Council and the University of Johannesburg conducted a project commissioned by the Scinnovent Centre to explore mechanisms to strengthen inclusive PE approaches in Sub-Saharan Africa in 2020–2021. In this article we discuss some of the PE efforts identified in councils, considering existing opportunities that can be leveraged for inclusive PE.

The main objectives of the paper were to:

- Discuss strengths and barriers to inclusive PE practices by SGCs in Sub-Saharan Africa.
- Explore the resource deficits that hamper the development and implementation of inclusive PE strategies.

PE as a viable pathway to research uptake

PE here refers to a set of "intentional, meaningful interactions that provide opportunities for mutual learning between scientists and members of the public [Metcalfe, 2020; Fairhead, Leach & Small, 2005]. In this mutual learning experience, science itself benefits from the broader participation of public groups that may have knowledge that could be useful to researchers [Peters & Besley, 2019] even though they are not researchers. PE offers a participatory approach [Wibeck, 2013] that provides opportunities for mutual learning between scientists and the public affected by science [Metcalfe, 2020]. Such learnings include increased awareness of the cultural relevance of science and recognition of the importance of multiple stakeholder perspectives and domains of knowledge to scientific endeavours. The PE approach affords SGCs a more holistic, interactive approach that can potentially get people excited about science, increase public trust in science, and embrace public attitudes and perceptions about science [Felt & Fochler, 2008]. Some of the key publics that emerge in the SGCI resources are key partners in advancing knowledge, knowledge producers, knowledge users, and innovators across all levels. Given the widely acknowledged value of PE, SGCs in Sub-Saharan Africa have focused on enabling PE with research and innovation using emerging internet-based communication digital technologies. These initiatives leverage the significant strides that have been made to grow internet penetration in Sub-Saharan Africa. Although the focus on digital advancements is often centred in urban areas, there is the acknowledgment that digital and social media are cost-effective and can reach geographically disparate audiences almost simultaneously and for a lower cost burden [Lubinga, Sitto & Molebatsi, 2021]. Approaches to PE hinge on the co-construction of knowledge through meaningful engagements between the public and science as noted in Stofer, Hanson and Hecht [2022]. Goals for PE with science thus include increased awareness of the cultural relevance of science and recognition of the importance of multiple perspectives and domains of knowledge to scientific endeavours.

Gender inclusivity as an enabler of inclusive PE

Gender inclusivity remains a global challenge in science, technology, and innovation (STI). Combs, Wendel and Gonzales [2018] define gender inclusivity as an approach that acknowledges gender as a source of disadvantage and challenges binary notions of gender identity as masculinities-femininities. Our paper aligns with this approach to gender by considering gender identity as inclusive of identities that fall outside of culturally defined masculine or feminine norms [Combs et al., 2018]. Inclusive PE activities need to consider the needs and practices of research producers and users who identify themselves as male, female, both, or neither as noted by Carpenter, Eppink and Gonzales [2020].

The *IDRC Equality Statement* notes that "attention to diversity and inclusion is a fundamental dimension of research quality" [p. 3, International Development Research Centre (IDRC), 2019]. One of the key drivers of gender disparities is a gender divide in access to information and communications technology (ICT) that marginalizes other genders and employs masculine lenses in research. Gender transformative and inclusive research, in contrast, employs a gender transformative lens to provide a holistic analysis of phenomena [IDRC, 2019].

(SGCs) are key to advancing gender transformation in research, policies, and programs in national systems of innovation [Maharaj, 2021]. There have been significant efforts by SGCs to consider gender inclusivity in their programs. One of these is the SGCI Gender Mainstreaming Framework and Action Plan (2018), outlining flexible guidelines for African SGCs and Collaborating Technical Agencies to mainstream gender and inclusivity throughout SGCI initiatives. The Framework is responsive to sociocultural differences in gender transformation discourse and adopted 'gender and inclusivity' as an accessible umbrella term that integrates diversity beyond gender.

SGCs can stimulate research designs and content that is responsive to gender and inclusivity, through funding projects informed by a gender transformative lens. Integration of an intersectional gender transformation perspective in funding agencies' policies, however, remains uneven [Benschop & Husu, 2021]. In particular, the weaknesses are illuminated in the areas of addressing barriers to gender and inclusivity (this refers to the inclusion of other groups marginalized by under-representation, socio-economics, or any other form of exclusion into STI activities) in human capital development, and (ii) integrating sex, gender, and inclusivity into research designs and content. Although these efforts are visible, gender inclusivity in research and innovation, as well as in PE in SGCs has remained elusive.

Digital PE: an opportunity for inclusivity or a threat?

The prevalent adoption of digital communication technologies for PE has presented several opportunities for widening the reach of PE while it also somewhat reinforces existing inequalities in access to information for certain populations. There have also been changing sociocultural patterns that intersect with an evolving communication environment characterized by information-seeking and sharing practices that are mostly online [Brossard, 2013]. This has led to renewed attention on redefining scientists' roles and practices to include communicating science through platforms accessible to the digital publics that have an interest in knowledge use [Nisbet & Markowitz, 2016; Nisbet & Scheufele, 2009]. Major scientific institutions and funding agencies have also increasingly focused on diversified communication and dissemination methods, and often require public engagement to be components of project protocols for funded research [Liang et al., 2014].

Several studies identify the dialogic nature of digital platforms as an important feature in engaging different publics and allowing for the exchange of views about science and deliberations about the trustworthiness and applicability of science [Wilcox, 2012; Cahill & Ward, 2007; Jenkins, 2004]. This literature values digital science communication for its ability to facilitate the visibility of different voices in a dialogue where all voices are heard and valued. This closes the gaps between information-rich and information-poor publics [Jones-Jang, Mortensen & Liu, 2019]. It also has the potential to influence the public to be attentive, interested, and participatory in science-related matters [Jones-Jang et al., 2019]. Digital science communication allows the production of visualized tools that enable target audiences to have a better understanding of science. Visualised tools also allow audiences of different levels of literacy to access and consume information. [Allgaier, 2012; Sugimoto et al., 2013; Bucchi & Saracino, 2016].

There is a large body of research demonstrating the usefulness of social media as a communication tool [Koivumäki, Koivumäki & Karvonen, 2020; Collins, Shiffman & Rock, 2016; Martyn-Hemphill et al., 2015; Osterrieder, 2013]. This research describes social media as a cost- and time-efficient, user-friendly mode of communication for a diverse range of publics with access to the internet. Key motivational factors that drive users of science-based social media content include entertainment as well as seeking information, guidance, and community [Jarreau & Porter, 2017].

However, with pervasively low internet penetration rates, averaging 39.3%, and Africa lagging behind the global average by 24% [Internet World Stats, 2021], the use of digital technologies and internet-based PE could exacerbate the marginalization and exclusion of other population groups from participation in science. For example, this has the potential to intensify the exclusion of rural-based researchers from participating in specific scientific research conversations because of their limited access to online communities of research practice. This Practice Insight provides nuanced insights into the contextual and systemic challenges that hamper inclusive PE in 15 SGCs in Sub-Saharan Africa.

Methods

Data for this paper was collected qualitatively from 15 SGCs. Ethical clearance for the research was issued by the University of Johannesburg, South Africa. The study used purposive sampling to select a set number of representatives of the 15 consenting SGCs to interview. The invitation to participate involved a multi-level process that involved:

- Email invitations issued to each of the 15 SGCs;
- A call for participation was announced at the SGCI Masterclass held virtually in November 2021;
- Social media invitations sent to the administrators of social media platforms of the councils;
- A second round of emails using a database of contact details obtained during the masterclass.

Although 15 councils had consented to participate in the study, only six SGC representatives responded to the invitation for interviews. However, all 15 SSGs, including the six that were interviewed, participated in the digital audit." The six SGC representatives that were interviewed were regionally distributed as follows: Southern Africa (n=4), Eastern Africa (n=1) and Western Africa (n=1). The semi-structured interviews followed a guide developed by the research team through a preceding consultative process with various SGCI stakeholders. The interviews were conducted virtually and recorded using computer-based video software, namely Zoom (zoom.us, 2020) and Microsoft Teams. Interviews were audio recorded and later transcribed verbatim and the transcripts were uploaded on the ATLAS. ti qualitative data analysis software in preparation for analysis. The data was then analysed through a thematic analysis process that used both inductive and deductive coding [Braun & Clarke, 2019].

In addition, all 15 SGCs consented to participate in a digital audit that was aimed at their online presence and their online PE activities. The objectives of the audit were to identify all digital assets of each SGC and determine problem areas and opportunities The Audit followed the Inflo Digital Audit Methodology [Edmondson, 2021] a data-driven approach, to obtain nuanced insights into the digital assets of each SGC, its web, and social media presence, as well as the PE related content on their website. The audit process involved the collection and synthesis of analytics on the following for each of the councils:

- *Content & SEO audit of the websites and social media pages:* this was a top-level review of major content areas and critical content units. The audit also analysed content performance against a range of content metrics, from brand voice, topic, and structure to bounce rate, page views, and other traffic/engagement data.
- *User experience and user interaction and recommendation:* the overall user experience of the sites, including user interface design and interactive experiences was also analysed to get insight into how user-friendly they are.
- *Systems & technology audit:* a review of the councils' current platforms in use, including their content management systems (CMS) and caching technologies, and a summary of opportunities and considerations.

Results and discussion

This study established that the PE mandate is acknowledged by the studied SGCs and there are several initiatives in place with specific strengths that can be built on. Interviews with SGCs show that attempts at inclusive PE have used a range of approaches that include: public seminars to engage knowledge producers, private partners, and policymakers; mass media to engage the general public and science fairs mostly for engaging learners in schools with STEM. While interviewees noted that these methods have strengths in reaching targeted audiences, they indicated notable weaknesses that need to be strengthened to effectively execute the inclusive PE mandate.

Use of digital communication technologies for PE: strengths and opportunities to be leveraged.

The digital audit established all SGCs use digital technologies in their PE endeavours, although there are variations in the extent to which these are harnessed for increased inclusive PE. The audit also found that most of the websites have a Search Optimization (SEO) Challenge that compromises their visibility. Figure 1 below is a finding on the website of the Tanzania Commission for Science and Technology (COSTECH) whose website exhibits a positive user experience.

The digital audit also found that the social media platforms Facebook and Twitter, as well as websites are the digital assets that most councils use. Some have extensive following on social media. Some examples can be seen below:

- The Ministry of Tertiary Education, Research and Technology (Botswana) has 81000 followers on Facebook, while COSTECH has Facebook3.9k Facebook followers and 10k followers on Twitter.

Figure 1. SEO finding of COSTECH (Tanzania).

- The two councils have frequent and responsive social media presence and posting.
- Good Responsive Digital Websites with regularly updated Content.

There are, however, councils where there is transmissive use of digital platforms that are either not functioning or not engaging, restricting access to information. For example, at the time of the study, the website of the Fonds National de la Recherche et de I'innovation Pour le Developpement in Burkina Faso was not active. The TetFund in Nigeria had four platforms: Facebook, LinkedIn, Instagram, and Twitter, which simply offer information about what they are doing, but hardly stimulate discussion.

The councils' online presence can be argued to be an attempt to achieve the goal of educating the public and widening the representation of voices through the modalities of communication and involvement. This has to be seen in the context of a current shift to online and digital communication practices, which has led to improved access to research and engagement and research engagement more consumer-driven. This enables networks of people to be involved in content consumption and dissemination, while they also engage and share skills and knowledge regardless of distance. Given current improvements in internet penetration in the region, this offers a good opportunity to be leveraged for inclusive PE. The reliance on digital communication technologies for PE however also presents challenges for rural research users or interest groups because it neglects those who have no access to digital and online technologies yet they are beneficiaries of research and they could contribute to knowledge generation and dissemination. All of the participants alluded to the prevalent digital divide in their countries as one of the barriers to effective digital public engagement with science. The following excerpts from participant interviews exemplify some of the problems that are posed by heavy reliance on digital communication technologies in public engagement: "Some of our rural communities could not afford these devices. So in many aspects, this then increased the divide between the haves and those who don't have and that excluded those that do not have from the main activities in our engagements" (**Malawi**). "…not all communities have access to digital communication. So some of them that are important to some of these engagements will not be able to hook on because of lack of data …" (**Botswana**).

It then becomes apparent that the continued use of digital methods to reach diverse audiences raises issues of affordability and thus marginalizes mostly rural audiences, whose socioeconomic situation restricts their affordability. This is also alluded to by Rasekoala [2022], who notes that Africa is still very much largely rural and there is a huge and growing divide in terms of access to science communication programs between the urban elite and the majority of rural populations. This then compromises efforts for inclusivity by the SGCs. Given the widely acknowledged issues of internet penetration in Sub-Saharan Africa, Sobane, Riba and Lunga [2021] propose that PE approaches need to consider harnessing the often well-established community systems and practices of communication in these contexts. This reliance on the convergence of digital systems with more indigenous communication systems for PE may give SGCs opportunities to develop meaningful and more effective multi-sectoral PEs. For example, a representative of the SGC in Botswana indicated that their PE activities involve engagement through digital platforms such as the website and social media; engagement on mass media such as television, as well as in-person activities such as science fairs and community gatherings. A converged strategic communication approach such as this may enable SGCs to evade the over-reliance on digital technologies, ensuring a more meaningful appreciation of the value of scientific research and effectiveness to ensure stakeholders' appreciation of science's value in everyday use is enhanced.

Gender representation in policies and frameworks as enablers of inclusive PE

There seems to be increasing acknowledgment that advancements in research use and impact depend on addressing issues of gender equality and inclusivity and developing and implementing gender transformative policies and practices [Huyer, 2015], including in PE initiatives. Although it has been widely acknowledged that gender identities go beyond the dichotomy of masculinity-femininity, most policies still focus on this binary notion of gender. The UNESCO Institute of Statistics (2019) report indicates that while Sub-Saharan Africa has made significant gains in the number of female graduates, only 30% of researchers in sub-Saharan Africa are women and gender parity on the continent is particularly low in STI leadership, decision-making and senior research positions. This implies that SGCs need to improve and increase their efforts in gender equality and inclusivity, especially in the PE to strengthen the participation of often-marginalised populations.

The councils have a diverse range of policies, systems, and frameworks that are indicative of the willingness to address gender equality and inclusivity in the processes of knowledge production and use. For example, Ghana's Council for Scientific Research introduced a gender policy, to be operationalized through a gender unit and gender desks at all of its institutes, while Zambia's NSTC has a funding instrument that explicitly encourages females to apply.

Data from the interviews also contains content about the presence of gender policies and frameworks in the councils, although the extent to which they are implemented or enforced is not clear. For example, a representative of the NCRST in Malawi explains how they embed gender in their processes in this way:

> "It is our very focus… to ensure that a gender equal process is very much taken on board. when we develop a call for project proposals we make sure that aspect of gender is incorporated…" (**Malawi**)

These deliberate investment efforts to achieve gender inclusivity in research innovation have implications for the development and implementation of gender-inclusive public engagement strategies. If implemented the right way, these policies and programmes go a long way towards operationalizing the co-creation advocated for by Kim, Byon and Baek [2019] as a useful mechanism of drawing from different knowledge bases to enhance uptake and create ownership of the processes of knowledge production and application. They also go a long way in legitimizing the outcomes of PE, since this would have amplified the voices of different genders.

Contextualising PE to attract public interest in science and recognition of its relevance

The implicit and strategic goal of PE is to facilitate public interest, understanding, and trust in science as noted by [Scheufele et al., 2021], and to assure public audiences that scientists are willing to engage with and "listen" to non-scientists. The study established that most of the engagements carried out by SGCs adopt a deficit model that does not recognize the voice of the public, acknowledge its contribution or contextualize it to societal priorities. As such, the public struggles to see the relevance of science to everyday lives. One of the participants elaborates that there exists:

> "…conflict…in priority setting… where you put out finances to research, science, and technology and people want a road or a clinic… when we mobilize people to come and be engaged to issues related to science there is reluctance, but on issues that relate to how their lives can improve they can take advantage of science…" (**South Africa**)

This interview extract highlights the importance of transforming PE to address critical and contextualized public needs. In particular, there is a need for PE to move to the use of innovative ways that resonate with the lived experiences of *all* in society across intersectional boundaries of ethnicity/tribe, race, gender, social class, and age as noted by Rasekoala [2022] and Scheufele et al. [2021]. The value of contextualization particularly concerning the framing of science PE is expressed in the following excerpt from one of the interviewees:

> "Let me give you an example, when we had a…meeting in one of the areas where people are participating, we heard the researchers talking about farming and farming is the mainstream activity of the people in that community. I can tell you that the reception was overwhelming so basically what I'm trying to say is that to enhance our PE, we must talk to the issues that are talking to the needs of society" (**South Africa**)

This implies that careful contextualization is critical to an effective and meaningful PE strategy for SGCs in Sub-Saharan Africa.

Investment in the use of local languages for PE

The data shows that there is a recognition of the need to use local languages for more meaningful PE on science knowledge, but efforts by SGCs vary from a *complete lack of commitment* to *only some commitment* using local languages for effectiveness. Among SGCs where there is reportedly a lack of commitment, interviewees attributed this to a lack of resources and a lack of recognition of the significance of the communicative task of PE. The weight of the linguistic task as some of the respondents put it is heavy because:

> "I cannot say that we are inclusive from that perspective because we tend to be much more Anglophone or rather we tend to be more, you know, English" (**Mozambique**)

These perspectives are representative of the general opinion held by some SGCs that translating science into local languages is a huge effort. In some instances, participants from the SGCs reflected some commitment to knowledge translation although it is limited to a regional language and to mass media. Participants shared that:

> "On a weekly basis we have a radio slot that broadcast in mostly the language of the people in Setswana in issues of science and of course, there are those broadcasts that will be in English as the subject might be more difficult to articulate in [dominant local language]" (**South Africa**)

This seeming neglect of the use of Indigenous languages, as noted by Sobane et al. [2021] constitutes a form of exclusion in multilingual contexts where it has been proven that multilingual knowledge transfer facilitates improved public understanding and encourages the use of science in policy and practice. Kago and Cissé [2022] offer language harmonization as one of the strategies that can be used to facilitate linguistic inclusivity PE. On the other hand, Makalela [2016] offers translanguaging as a communication strategy that can be used to ensure effective engagement with multilingual audiences. It is especially the case where the goal of the engagement is to educate which Scheufele et al. [2021] argue is the primary goal of most engagement activities.

Because of the extent to which language barriers compromise access to, and participation in meaningful PE especially for marginalized communities, there is a need for SGCs to commit to increased language diversity in their stakeholder engagements, especially regarding local/Indigenous African languages spoken in the SSA region. It is however noteworthy that literature has acknowledged that resource constraints, and the resourcefulness of these languages to convey technical concepts are some of the challenges that would compromise language diversity in PE [Kago & Cissé, 2022]. Kago and Cissé [2022] suggest that despite these challenges, the use of indigenous languages in PE is valuable and can be achieved through the commitment of resources by governments and other relevant institutions.

Conclusion and recommendations

SGCs in SSA are engaged in several PE initiatives, like public seminars with various decision-making stakeholders, mass media communication to reach the general public, and STEM fairs to reach school learners, although multiple factors hamper SGCs from developing and implementing effective PE strategies. SGCs need to revisit their policies and programmes to ensure that they clearly articulate and address gender equality and inclusivity. There is also a need for careful consideration of how current initiatives can strengthen the use of digital technologies for wide reach but supplement them with other in-person and mass media efforts to ameliorate the effects of the digital divide and the rural-urban divide. SGCs also need to allocate adequate human resources toward the development and execution of multilingual PE. The development of communication tools in local languages may aid in facilitating better access to scientific knowledge for a majority of the population, thus minimizing stakeholder exclusion based on language.

The participants of this study provided rich insights into the existing challenges for SGCs in Sub-Saharan Africa, broadly those of a systemic, practice-based nature. In light of converged communication strategies, which harness digital and traditional communication technologies and indigenous communicative practices, we recommend that SGCs could revisit their PE policies, practices, and programmes to ensure that they are inclusive and implementable with their current resources. Sub-Saharan Africa has a wealth of communication practices, tools, and platforms, as well as rich culturally oriented communication actors such as traditional leaders that could be harnessed by SGCs to enhance PE with science in the region. In particular, inclusive PE initiatives can focus on more linguistically inclusive communication practices, especially with the use of local languages.

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