Investigating the Communicating of Science

Cheryl Sjöström

Lund University, Sweden

AgriFoSe2030

Agriculture for Food Security 2030
- Translating science into policy and practice

Contents

Glossary of Acronyms

AAU	Association of African Universities
AgriFoSe2030	Agriculture for Food Security 2030
AHESTI	Agricultural Higher Education, Science, Technology and Innovation
ARUA	African Research Universities Alliance
AU	African Union
CAADP	Comprehensive Africa Agriculture Development Programme
CAVS	The college of Agriculture and Veterinary Sciences, University of Nairobi
CESA 16-25	Continental Education Strategy for Africa 2016-2025
CGIAR	formerly the Consultative Group for International Agricultural Research
CODESRIA	council for the Development of Social Science Research in Africa
CSIS	Consejo Superior de Investigaciones Científicas
FAO	Food and Agriculture Organization of the United Nations
FARA	Forum for Agricultural research in Africa
GFAR	Global Forum on Agricultural Research and Innovation
HEI	higher education institution
IAPRI	Indaba Agricultural Policy Research Institute
IDS	Institute of Development Studies
IFAD	International Fund for Agricultural Development
IMF	International Monetary Fund
NARS	National Agricultural Research Systems
NGO	non-governmental organization
NORAD	Norwegian Agency for Development Cooperation
NUFFIC	Dutch organisation for internationalisation in education
ODI	Overseas Development Institute
ReSAKKS	Regional Strategic Analysis and Knowledge Support System
RUFORUM	Regional Universities Forum for Capacity Building in Agriculture
SDG	Sustainable Development Goals
SDGC/A	Sustainable Development Goals Center for Africa
SDSN	United Nations Sustainable Development Solutions Network
Sida	Swedish International Development Cooperation Agency
SSA	sub-Saharan Africa
STEM	science, technology, engineering, and math
Stisa-2024	Science, Technology and Innovation Strategy for Africa 2024
UN	United Nations
US$	United States Dollar

Summary

This study investigates the challenges and potential pathways for improved science communication, particularly in regards to research on the topic of smallholder food security and for science being generated by universities in sub-Saharan Africa. Questions asked in this study include those that aim to identify the academic substrate from which a university based in Africa must navigate. It also identifies limitations and opportunities for those institutions and for researchers who actively seek to have an impact on smallholder food security. Finally, it seeks to identify where improvements can be made in order to enhance science-based decision-making in this field.

Based on this study, we can see that there are a number of focal actors and agendas to which universities in sub-Saharan Africa must work in concert with, and that there are a number of umbrella organizations in Africa with the intention of creating synergies and networks for knowledge exchange. RUFORUM is identified as an umbrella organization that is particularly well-situated to be of good support for universities and researchers engaged in questions of food security. Using webometrics I identified top-performing universities in sub-Saharan Africa, which I then overlapped with the member universities of RUFORUM to identify candidates for closer investigation. Communication channels from universities vary greatly, as one would expect, and strategies range from the creation of a separate campus with the mandate of linking science with local society, to embracing the role of social media in targeting a wider audience, to engaging with existent international research systems such as that of the CGIAR where appropriate.

There is a range of challenges to science communication. Some are generalizable to academia at large, such as skewed merit-based systems favoring academic journal publications, limited funding, and the tricky business of reaching out from academia or one's own discipline while still maintaining credibility. Specific to academia in Africa is the historical pendulum swing of the role and priority given to higher education as well as limiting infrastructure and inadequate national commitment to research. We can see that different strategies for overcoming challenges can work and there is no one 'right' way. The agendas of international bodies such as the World Bank and other funding agencies do affect the trajectories and priorities of universities, thus creating both a challenge but also a point of entry for the promotion and resource support for articulate scientific communication for multiple audiences, as part of the academic curriculum and measurements of success as an academician. With such a transformation, the communication of science can become not only the means to a goal (that is, to help attain sustainable smallholder food security) but as a goal in itself, giving university researchers the capacities and opportunities to find meaning and satisfaction in their work by contributing to the wider society.

Keywords

1 Introduction

This report addresses an identified challenge whereby knowledge production is currently not being fully mobilized from one place of its creation, that is, within universities, to where it is intended to end up, that is, having an impact on society. More specifically, this report considers knowledge production within universities in sub-Saharan Africa (SSA) that have the intention of contributing to African smallholder food security. The pathway from university know-how to the end user of smallholder farmers more often than not includes intermediaries of policy-makers, public and private sectors and civil society, rather than linking directly from individual researchers to individual farmers (although the latter definitely exists). This delivery chain process means that science needs to be translated and interpreted at multiple nodes, to actors sitting with different competencies, mandates, capacities and interests. The production of science itself is also not originating from a single, conformative silo of knowledge but in itself can produce complex or even conflicting results, which makes the integration of 'science with a capital S' into the world outside of university a tricky process, which does not effortlessly line up with demands from practitioners and policy-makers asking for concrete and actionable results. These challenges, however, should not be viewed as insuperable barriers for the flow of knowledge from universities, yet, as can be found in the literature and will be stressed in this report, at the same time they need to be taken seriously and given proper attention in terms of resources and incentives explicitly earmarked for the act of communicating in order for challenges to be overcome.

The task at hand for this report is therefore, broadly speaking, to see how this flow of knowledge is currently working, using selected universities in SSA as a focal point as well as more general literature on the subject of science communication. It will include identifying multiple factors that affect the flow of knowledge in terms of structures and behaviors inside and outside academia, and suggesting how communication between universities and society at large can be improved. The ultimate aim of this type of questioning is to come closer to addressing the societal challenge of smallholder food insecurity that requires, in big and small ways, contributions from the scientific community.

It has been argued that knowledge production at universities, together with so many other actors, has so far been unable to tackle the problem of smallholder food insecurity despite decades and dollars being spent on trying to understand and solve it. Smallholder food insecurity persists, particularly palpable in areas in sub-Saharan Africa (FAO, IFAD, UNICEF, WFP, & WHO, 2018).

The limited allocation of resources within academia directed to the communication of science is embedded partly in a merit-based system in academia that does not measurably reward researchers for the kinds of communication best suited for policy-makers and practitioners. The number of peer-reviewed scientific publications in high-impact journals remains a strong indicator for judging the competencies of researchers, and thus weighs heavier on a list of merits than, say, the number of policy briefs written or open-forum dialogues with farmer's groups or local politicians (cf. Alvesson et al, 2017). Yet even if alternative pathways of communicating *were* rewarded within academic institutions, engaging beyond the boundaries of one's discipline implies challenges that cannot be

sidestepped but that need explicit and careful consideration so as to maintain the right balance of openness yet not too open to risk credibility (Cash et al., 2013). We address these kinds of challenges in more depth in section 8.

The situation for African universities and university researchers is both recognizable in a bigger context of challenges to scientific communication, but also includes features that are unique for the continent. Here researchers and institutions need to be diligently in line with goals and funding, and navigate in an environment that can be shaky at best, completely unsupportive at worst. This we take up more both in section 5 and section 8.

However, there are fine examples of how SSA universities have worked actively with these challenges and are able to reach beyond their own walls. In some instances, it has requires the creation of a physical unit within the university with the mandate for communicating. In others, it has been through creative networking, tailoring the communication depending on the message being given and on the desired impact. Section 7 is dedicated partially to this analysis.

The bulk of this ensuing report is thus an investigation of the *communication* of science, rather than an investigation of the science itself. It is grounded in the goal of striving for a food secure world, as defined in goal 2 of the framework of the Sustainable Development Goals (United Nations, 2017). It also embraces the assumptions that science indeed has something important to contribute to meet this goal, and that there is a gap between the production of scientific knowledge and policy, and practitioner responses to that knowledge. The report is produced within the confines of the Sida-financed AgriFoSe2030 programme, which will be briefly introduced below. Following that introduction will be sections setting the boundaries around what is included in and excluded from this study and defining the methods used for conducting the work. We then move into identifying focal actors, institutions and documents playing varied roles in guiding research being done on the situation of African smallholders from universities in SSA. Which universities we then look closer at is introduced in section 7. The report ends by accounting for some communication strategies of those institutions identified as successful communicators, what challenges can be found in the process of communicating science for societal impact, and what lessons can be learned in moving towards a situation where research is more and more able to make an impact in the lives and livelihoods of farmers and communities in sub-Saharan Africa.

2 AgriFoSe2030

Agriculture for Food Security, or AgriFoSe2030, is a Swedish International Development Cooperation Agency (Sida)-funded programme with the explicit goal of contributing to the sustainable intensification of agriculture for increased food production on existing agricultural land. The programme advocates for a science-based approach to achieve the UN Sustainable Development Goal (SDG) number 2 to "end hunger, achieve food security and improved nutrition and promote sustainable agriculture" (United Nations, 2017). Although this is a global goal speaking to developed and developing countries alike, focus within AgriFoSe2030 is on that of low-income countries in Africa and Asia.

The programme targets young researchers within academic institutions, creating networks and training cohorts of academics in critical analysis and in the synthesis of scientific reports. These academics are also equipped in the art of translating science to information that is understandable and accessible to those outside of his or her own subject matter, most particularly, to policy-makers and practitioners. This communication training is achieved through activities that either improve the *capacity* of the researcher to synthesize and translate science into information that is directly applicable, or by the researcher being given the opportunity of performing this communication him or herself. See the graphic of this process in Figure 1 below.
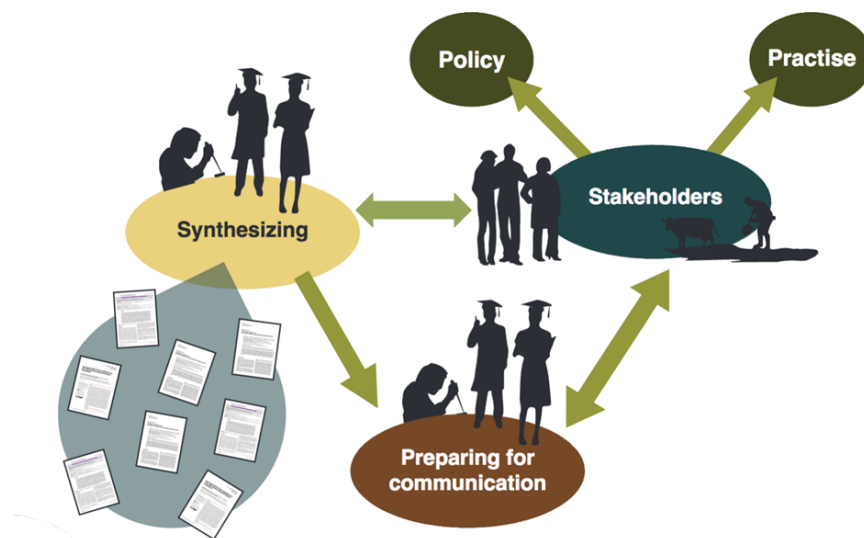
Figure 1: A schematic illustration of how researchers from target countries and Sweden within AgriFoSe2030 collaborate and build capacity to synthesize, communicate and co-create scientific data and research findings in dialogue with various stakeholders, in support of evidence-based decision-making and improved practice. Source: (AgriFoSe2030, May, 2017)

Starting in early 2017, AgriFoSe2030 added a new category to the programme's objectives. That new objective is to look more closely at structures at universities in Africa and Asia that translate science within the agricultural sector into policy and practice, an effort strongly endorsed by the programme's funder Sida. Incorporating this institutional focus demonstrates learning processes identified by participants of the programme after it had been running for slightly over one year. Where the main thrust of AgriFoSe2030 remains in the capacity building of young researchers and in the synthesis of scientific reports and briefs, it now also considers *the institutional milieu* at universities as the interface

of translation of these reports and briefs to targeted end users as yet another important axis in the strive towards reaching food security.

Why include this objective? It relates back to the initially identified challenge of science reaching and having an impact on society, something which I touch upon in section 3. It is believed within AgriFoSe2030, fully in line with the development discourse adopted by the African Union and other main actors in Africa as we shall see in more detail below, that the development of smallholder farming will be best achieved through state-of-the art science being utilized in evidence-based decision-making and improved practices within the agricultural sector (AgriFoSe2030, May, 2017). Without a facilitating forum for outreach though, reaching the full potential for science to have an impact will continue to be hampered.

Therefore, university spaces that actively and intentionally bridge science with society will be investigated here, rather than the science itself. The role of universities in development efforts is constantly being negotiated and defined, and we will look at that discussion a bit more closely in the following section. I will now therefore elaborate on what issues are included in this study and how they are defined, as well as what is excluded from analysis and disclaimers for those choices.

3 Motivations, definitions and scope

As previously stated, one finds an underlying assumption in development discourse that science can and should play an important role in securing a food-secure future on the African continent, but that knowledge gets "lost" somewhere between the product of the researcher and the application and absorption of his or her knowledge by society.

One caveat with the claim of science getting "lost" along the way is that it is in fact very difficult to identify where, when or how science actually impacts society. Spaapen et al (2007) have distinguished three broad groups of stakeholders into policy makers, professional users and end users. It's easy to see how one singular outcome of research would be valued differently by these groups in society depending on their differing interests and expectations (Spaapen et al., 2007; Spaapen & Van Drooge, 2011). So while understanding research impact is important and attempts of assessment are widely administered (Bell, Shaw, & Boaz, 2011; Bornmann, 2013), claiming *where, how* and *when* science impacts society is challenging to detect, let alone to quantify and evaluate.

I refer to science in very broad terms for this study. In many academic spheres 'science' is colloquially or functionally synonymous with natural or 'hard' science disciplines, with its counterpart of 'social science' picking up all of the rest, including the humanities. In this study and in the AgriFoSe2030 programme in general, the term science is intended to be understood very broadly to include natural sciences, applied sciences, social sciences and the humanities.

The assumption of the importance of knowledge in agricultural development also assumes that knowledge being produced by universities is in fact *relevant* and *suitable* for the task at hand. Therefore the capacity of individual researchers at higher education institutions to ask critical, relevant questions, to learn and to create new knowledge is crucial, yet it is not pointedly considered as part of this study. A best case scenario is that research on agriculture being produced is demand-driven and originating in conversation with farmers, farmer's groups or others with topical knowledge, creating a circular and multidirectional path of knowledge rather than linear. What I will be referring to in this report is only the finished product of 'produced scientific knowledge', which in its identification and preparation has hopefully had a two-way communication and now, is a product with the potential for societal benefit. Not all research in this field is designed to be applied to society, and we can consider this in some more detail in section 8.

The above paragraph speaks about the production-side of scientific knowledge in universities. On the other, receiving side of the communication is actually not even the end users of the farmer, but one or several more nodes of transferring through either policy-making or practitioners within the field of smallholder food security. This report will not include an investigation of the processes and channels by which practitioners reach farmers nor the true, measurable impact of policies for agricultural development on the existence of smallholder food security. Both of these areas are incredibly large and important, and are areas of research all on their own accord. However, for the purpose of this study they remain out of scope.

What remains is thus to direct our magnifying glass on the space in between - at institutions located at the exit gate of 'the ivory tower' of universities and ask the following questions:

1. *What does the academic substrate look like for a university based in Africa? In other words, what rules (written or unwritten), mandates and channels exist for researchers in these institutions?*
2. *Looking specifically at research on smallholder food insecurity in Africa, what limits and what facilitates the university from getting their scientific knowledge into spaces of policy and practice?*
3. *What can be learned and/or scaled-up from communication strategies used by institutions ranked highly as successful in communication?*

As this study focuses on the domain of higher education institutions, the investigation does not include purely international bodies or national research systems. Some of the main actors in this excluded category are the Global Forum on Agricultural Research and Innovation (GFAR), the United Nations Sustainable Development Solutions Network (SDSN), the Overseas Development Institute (ODI), the Institute of Development Studies (IDS), Indaba Agricultural Policy Research Institute (IAPRI), The Forum for Agricultural research in Africa (FARA), or any of the CGIAR centers. That being said, no university exists in isolation, so such institutions will inherently be present and are included in accordance to their linkages in section 6.

Finally, a few more terms need to be defined. For example, what is meant by "policy-makers and practitioners" as the forums and people to which science should be communicated? Policy making refers broadly to the forums whereby formal laws and regulations are formed to steer society in one direction or another. I refer to policy-makers as those engaged with these decision-making bodies whereby their actions have long-term influence on society. Included here is a wide range from the larger international bodies such as the United Nations, African Union and the like, to state legislatures, parliamentarians, and even to local decision-making bodies such as municipalities and locally administered councils. A plethora of international partnerships and programs would also find themselves at home in this category of decision-making at various places in civil society, and at various levels of formality and mandates.

The label of 'practitioners', particularly when it comes to agriculture, includes a rather wide group of individuals and organizations as well. Under this category is included farmers themselves, as well as non-governmental organizations such as charities, institutions of faith and aid organizations, multinational corporations, businesses, unions, and extension and other state services. Scientists can potentially cross the boundary from knowledge-producer to policy-maker or practitioner via any number of channels, including but not limited to those mentioned above.

4 Methods

This study is a review of existing research, policy, reports and other regulatory documents that relate to the communication of science to society or that help to define the substrate within which universities in Africa function. It also includes information from blogs and news articles from represented organizations, in line with the rise in this form of communicating. Examples of communication channels at representative universities were found by visiting official university websites and sending emails to entry points to verify the current status of these channels. I was also able to ask questions to the web communicator at one focal institution directly for deeper insight.

Identifying and evaluating candidate universities in sub-Saharan Africa was done using webometrics, relying on the ranking based on Web visibility by the Cybermetrics Lab in Spain. There are a number of ranking systems of universities currently available and these have been compared (Aguillo, Bar-Ilan, Levene, & Ortega, 2010). The dataset from the Cybermetrics Lab was deemed the most suitable for this study due to the large global coverage and the inclusion of web presence in calculating the universities ranking. Using the AgriFoSe2030 network of stakeholders at institution in Africa, I was able to identify individuals at relevant institutions to engage in follow-up discussions based on the webometrics ranking.
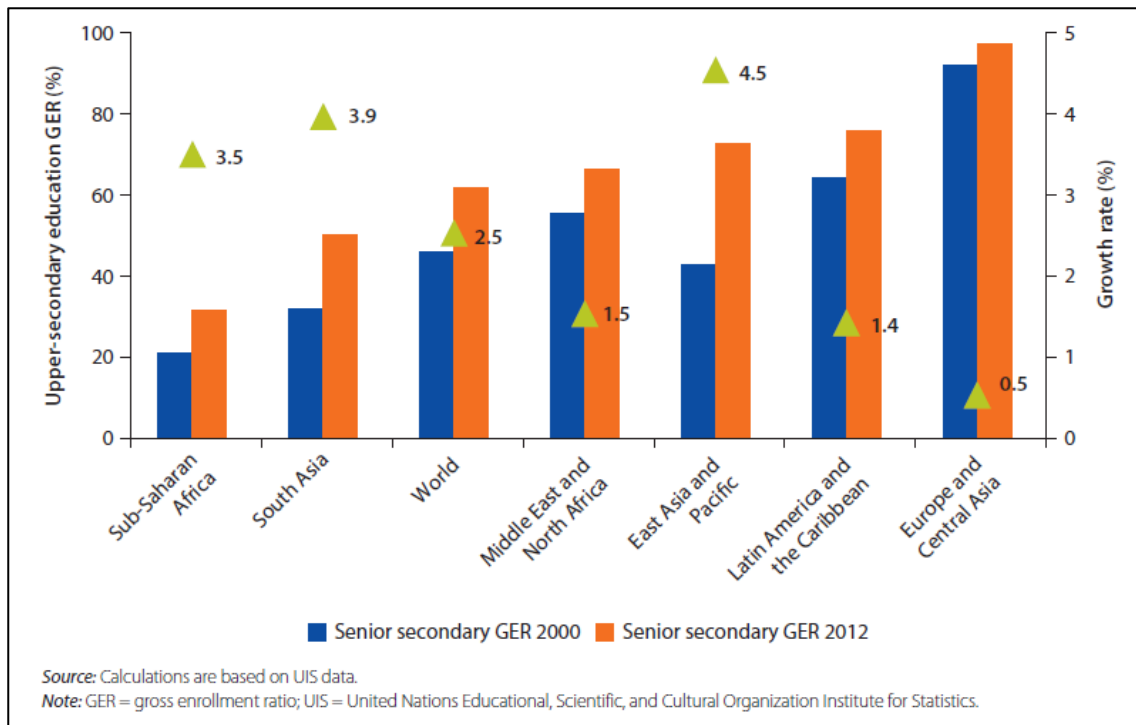
5 The role and status of universities in sub-Saharan Africa

We will now take a short look at the historical development of universities in sub-Saharan Africa. In 1960, one would have found only a handful of higher education institutions on the continent. Today, there are over one thousand higher education institutions ranging from state to private, and from liberal arts to vocational and technical, each with their own focal areas and 'knowledge products' (Banya & Elu, 2001; Cybermetrics Lab, 2019b).

The link between tertiary education (and in many cases secondary education as well) and poverty alleviation has come into and fallen out of the graces of the international donor community and the agendas of national governments over the past 50-60 years. During the first years after independence, many national governments in Africa invested large amounts of resources into higher education, being seen at that time as forums for producing the manpower and competences to lead nations in the move towards independence (Banya & Elu, 2001; Darvas, Gao, Shen, & Bawany, 2017). Authors Banya and Elu continue that "[i]n the social science literature of the 1960s, higher education was presented as being crucial to creating a modern polity through political socialization, political recruitment and political integration" (2001, 3). However, unsustainable fiscal commitments and a lack of emphasis by the World Bank and other donor institutions on tertiary education led eventually to an underinvestment in higher education on the continent, particularly evident starting from the mid-1990s (Banya & Elu, 2001; Bloom, Canning, & Chan, 2015). Mkandawire speaks of the three generations of researchers in Africa since independence, where initially those educated abroad returned home, the second generation tending to remain as expats and contributing to the 'brain drain' scenario, and a third generation starting around the 1980s that were educated locally, yet suffered from the lingering disadvantage of an implicitly higher value of US/European-education and a lack of investment in educational facilities in-house (1995). This decades-long neglect has resulted in a situation where "African universities are lagging behind the rest of the world in their knowledge production function" (Cloete, Maassen, & Bailey, 2015, xii) and one finds a missed opportunity to offer quality, relevant education to a growing youth workforce as a stimulant for positive economic development (Osiru, Kalungi, & Adipala, 2016).

The higher education sector in sub-Saharan Africa is currently undergoing spectacular expansion, with both public but mostly private institutions arriving to the scene and annual enrollment growing at the rate of 3.5% (Darvas et al., 2017). Despite this expansion, however, data from the World Bank show that supply has failed to keep up with demand, leading to a lag in access to tertiary education in global comparison, as seen in Figure 2 below exemplifying gross enrollment ratios in upper secondary education in different regions of the world. From the same study we also find that "although gender parity has improved, the legacy of patriarchy continues to undermine equitable participation on the part of African female students, and gendered patterns of program choice are evident in enrollment data" (Darvas et al., 2017, p. 25).

Figure 2 – Access to tertiary education in global comparison

Upper-secondary education GER (%) / Growth rate (%)

Categories: Sub-Saharan Africa · South Asia · World · Middle East and North Africa · East Asia and Pacific · Latin America and the Caribbean · Europe and Central Asia

Growth rate values: 3.5 · 3.9 · 2.5 · 1.5 · 4.5 · 1.4 · 0.5

■ Senior secondary GER 2000   ■ Senior secondary GER 2012

Source: Calculations are based on UIS data.
Note: GER = gross enrollment ratio; UIS = United Nations Educational, Scientific, and Cultural Organization Institute for Statistics.

Source: Adapted from Darvas et al. (2017, p. 22).

As we will see in section 6, the role of universities in current international development discourses and agendas has again become explicit and emphasized (Mba & Acquah, 2018; Owens, 2017), although not always free from friction and conflicts (McCowan, 2016).

6 Focal actors, institutions and steering documents

Since the responsibility of initiating and administering communication tends to lie primarily on the individual researcher and/or their research institution (as opposed to on policy-makers and practitioners themselves), the focal point of my investigation is on sub-Saharan African universities and the communication channels they utilize to get scientific knowledge into society in some way.

We shall start by considering the forum and network from where research takes place. Indeed, as highlighted by a recent report of The Royal Society, international collaboration and networking enhances scientific research quality and effectiveness, and is a precursor to address high-level global challenges such as food security (Royal Society, 2011). What conditions in the form of people, institutions and agendas do researchers currently have to adhere to? And what tools for communication do they have at their disposal based on these conditions? The following section identifies actors, institutions and mandates that both steer and support the role of higher education in agricultural development for food security. The subsections move from the global sphere towards regional spheres of influence, each feeding off of and feeding into the next.

6.1 United Nations, Agenda 2030

The United Nations (UN) Sustainable Development Goals (SDGs) are a collection of 17 goals, developed and adopted by member states in 2015 at the UN General Assembly in New York. They expand on their predecessors which ended in 2015, namely the Millennium Development Goals. Unique to the SDGs are their call for action by all nations and stakeholders globally regardless of income to be a truly universal agenda. It is to be "a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in larger freedom"; this by "eradicating poverty in all its forms and dimensions" (United Nations, 2015a, p. 1), i.e. bold, ambitious and inclusive.

Also unique to the SDGs is the explicit inclusion of higher education as one of the goals. Goal 4 – Quality Education – calls for lifelong learning opportunities for all including "technical, vocational and tertiary education, including university" (United Nations, 2015b). Achieving Goal 4 to create strong higher education, more than just for the sake of the goal in itself, shall support achieving the other goals by fostering sustainable development educational systems around the world. Challenges of meeting this goal include lessons learned about underinvestment in knowledge and responsible research (Owens, 2017), as well as the destructive impact of other global challenges on education, such as climate change, conflict, and increasing gaps between rich and poor (UNESCO, 2016).

The Sustainable Development Goals Center for Africa (SDGC/A) was created in July 2016 as an international organization to support the mobilization of the SDGs in Africa. The Center have produced a number of reports and publications, including the Africa SDG Index & Dashboards 2018 Report and the Africa 2030 Report, assessing the performance and giving priorities for action to all African countries (see Sustainable Development Goals Center for Africa, 2019).

6.2 International funders, coalitions

The plethora of international funding institutions, each with their agendas and focal areas, are obvious influencing universities and researchers in Africa when producing knowledge for society. Development assistance definitely support capacities of universities through loans and grants, yet it is important to also acknowledge how the agendas of international donors by default influence and steer the agendas of research institutions. One example of such major funds is the current World Bank project entitled Africa Higher Education Centers of Excellence Project, an investment to the tune of US$ 150 million over a six year period (US$ 290 million including funding from non-bank sources). The project provides funds to "promote regional specialization among participating universities in areas that address regional challenges and strengthen the capacities of these universities to deliver quality training and applied research" at 19 centers of excellence on the continent, mostly focusing on the promotion of tertiary education and agricultural excellence, but also funding specialization in health, oil and gas, water and sanitation, and waste management. (World Bank Group, 2019). This category of international supporters and support mechanisms includes but is not limited to the development agencies Sida (Sweden), NORAD (Norway) and NUFFIC (Netherlands) that are all active in Africa, as well as the Poverty Reduction Strategy Papers of the IMF and World Bank. The latter are designed as policy tools to assist low-income countries to identify their own poverty reduction strategies, yet which also have been denounced as "hegemonic instruments in the definition and application of the global agenda both in education and in poverty reduction" (Tarabini & Jacovkis, 2012, p. 508).

6.3 African Union, Agenda 2063

Formally established by the Assembly of the African Union (AU) in January 2015, Agenda 2063 'The Africa We Want' is a central framework intended to guide a kind of all-encompassing transformation on the continent over a 50-year period. Starting from the 50 year Anniversary of the Organization of African Unity (what is currently the African Union) in 2013, Agenda 2063 lays out seven aspirations to meet in the coming 50 year period of time, framed around inclusive, united commitments to create an independently strong and viable continent. Higher education is not explicitly referred to in the seven aspirations of Agenda 2063 (African Union Commission, 2015), yet in direct response to Agenda 2063 the Assembly of the AU three years later (2016) adopted the Continental Education Strategy for Africa 2016-2025, or CESA 16-25 for short, calling for holistic, harmonized, quality and relevant education across the continent (African Union, 2016).

Concerning matters of agriculture science, technology and innovation, The Forum for Agricultural Research in Africa (FARA) is the technical arm of the AU designed to assist researchers in upholding AU frameworks, most notably three frameworks: that of Agenda 2063; the Comprehensive Africa Agriculture Development Programme (CAADP); and the Science, Technology and Innovation Strategy for Africa 2024 (Stisa-2024) (African Union Commission, 2014b; FARA, 2019).

From the African Union we also have the Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods, or the Malabo Declaration for short. It is the successor to the Maputo Declaration and was adopted in 2014 by heads of state and

government, having the aim of realizing set-out goals by the year 2025. The Malabo Declaration reconfirms states commitments outlined in the Maputo Declaration in 2003 as part of the CAADP process and to allocating at least 10% of public expenditures to agriculture, as well as other commitments to end hunger, halve poverty, boost intra-African trade, and enhance livelihoods through targeted support of agricultural production systems and their infrastructure (African Union Commission, 2014a).

Existing at a boundary-crossing juncture between the African Union and other international research centers is the constellation called ReSAKKS, the Regional Strategic Analysis and Knowledge Support System. ReSAKKS, established in 2006 under the CAADP, has the mandate to support evidence- and outcome-based policies, providing analytical and knowledge products as well as facilitating dialogue between stakeholders. At ReSAKKS one finds loads of information for mapping and analyzing data, both aggregated and disaggregated into different categories. (International Food Policy Research Institute, 2018).

6.4 International research centers

International research centers are major players when it comes to agricultural research systems in Africa (Omotesho & Falola, 2014) and thus should be considered as part of the substrate within which universities in Africa need to navigate. The CGIAR, established in 1971, is a network of 15 independent research centers, conducting research and innovation on various aspects of the global food system in pursuit of their vision of 'a world free of poverty, hunger and environmental degradation' (CGIAR, 2016; CGIAR Fund Office, 2012). With over 10,000 scientific employees in 96 countries and an annual budget exceeding 930 million USD it is a world leader on research on sustainable agriculture (CGIAR System Management Office, 2017).

The CGIAR system, although formally engaging with FARA around the turn of the century (CGIAR & Forum for Agricultural Research in Africa, 2001), tends to run parallel to, rather than linking explicitly with, higher education institutes and fora on the continent (Dimelu & Anyanwu, 2008; Omotesho & Falola, 2014). This dynamic will be brought up again in section 9 of this report.

The two United Nations agencies of the Food and Agriculture Organization (FAO) and the International Fund for Agricultural Development (IFAD), with their separate mandates, are also worth mentioning as influential international actors for African universities. Both provide support for the creation of and dissemination of agricultural research and, as their presence in the development arena in Africa is one determinant of development trajectories/aspirations, what they are doing and saying and choosing to finance will in turn impact the broader tendencies that universities must be responsive towards.

6.5 National research systems

National Agricultural Research Systems, or NARS, as the name suggests are active at the national-level of organizing research on agriculture. NARS are made up of various national agricultural research institutes, universities, private-sector actors and agricultural producers groups in different constellations and with various historical and influential existence (Omotesho & Falola, 2014). Some

countries, like Uganda for example, have a strongly identified unified NARS based on the National Agricultural Research Act of 2005, designed to improve the delivery, financing and management of agricultural research services (Government of Uganda, 2005; National Agricultural Research Organisation (NARO) Uganda, 2014). Other countries have less clearly defined national systems.

6.6 Umbrella organizations for African universities

Below are a number of identified constellations comprised of African universities themselves, sometimes exclusively and sometimes with other bodies than universities. The mandate of these umbrella organizations is one that would be pertinent for universities dealing broadly with questions of agriculture and food security on the continent.

6.6.1 AAU

The Association of African Universities (AAU) has its headquarters in Accra, Ghana. It was established in 1967 by African universities themselves to serve as the collective voice of higher education. Their network promotes cooperation on issues pertaining to higher education, as well as for reaching across borders between higher education and policy-makers, all with the aim of enhancing both quality and relevance of education in Africa. It currently has just under 400 members. (Association of African Universities, 2019)

According to the association (ibid), the AAU contributes to African development in three ways, namely by:

1. Supporting the core functions of higher education institutions (HEIs);
2. Facilitating and fostering collaboration of African HEIs; and
3. Providing a platform for discussions on emerging issues

The AAU takes a broad approach in the type of support it offers as well as the forums to which it contributes. Again based on the organizations own presentation of its services, assistance is offered over these eight broad areas:

1. Promote and facilitate networking, collaboration and experience sharing in teaching, learning and research;
2. Improve leadership, institutional management and the policy environment of African higher education;
3. Empower AAU members to address developmental challenges and become an effective voice in national, continental and global bodies
4. Facilitate mutually beneficial interaction between member institutions and the external academic and other communities;
5. Provide effective representation of the African higher education community in regional and international affairs;
6. Improve the governance and organizational framework of the Association;
7. Raise efficiency and effectiveness of the Secretariat;
8. Provide the Secretariat with a secure and adequate resource base for the pursuit of the Association's goals

As can be seen from this list, the AAU does not explicitly identify agriculture in any of their aims or focal areas. However, it is to follow that the development of agriculture and the rural sector on the

continent is strongly benefited by the presence of a coherent representation of education, a supportive policy environment, and functional leadership and presence in a range of development forums. Additionally, the AAUs strong presence on the continent has resulted in the opportunity to act as the key regional facilitation partner of the Africa Centres of Excellence project, a World Bank-sponsored initiative with the aim of "promoting regional specialization in various fields of academic discipline – Science, Technology, Mathematics, Engineering, Health and *Agriculture* – that address regional development challenges […]" (Governmenet of Ghana, 2018, italics added).

6.6.2 CODESERIA

From the more general apex organization for higher education of the AAU, the Council for the Development of Social Science Research in Africa (CODESRIA), as the name would indicate, targets primarily social science research taking place in Africa. CODESRIA is headquartered in Dakar, Senegal and was established in 1973 as an independent research organization. Its aim is to "promote the publication and dissemination of research results undertaken by African scholars" as well as to increase collaboration with other actors that are engaged in knowledge production. (CODESRIA, 2014). The AAU is a partner of CODESRIA.

Inspiringly written to introduce their research support is the following introductory text:

> *"The basic assumptions that informed the launching of the CODESRIA Research Programme remain as valid to this day as they were in 1973: There is no fatality about the African condition, and research, properly undertaken and deployed, can and should play a key role in the social transformation and development of the African continent – as, indeed, any other region of the world. African scholars, through their research output, can and are expected not only to contribute to the expansion of the frontiers of scientific knowledge but also the strengthening of the capacity within the continent to respond to the multifaceted challenges of development that confront society."*

As with the AAU, CODESRIA also strives to promote and facilitate the space that knowledge-production occupies on the continent. Particular to CODESRIA is the focus on strategies such as the inclusion of holistic, multi-disciplinary approaches to knowledge production, promoting academic freedom and independent thought and encouraging sensitivity to the specific particularities of the development process in Africa. They also highlight the intersectionality of development, and the need to include different perspectives in knowledge production, particularly concerning questions related to gender and age (commonly referred to as questions of women and youth) (CODESRIA, 2014).

First impressions of this network, together with the risk of preconceived notions about agriculture being more of a 'hard' science than a 'soft' science, might not lead one to think about research on agriculture. However, typing the word 'agriculture' on their search engine resulted in 84 articles as of January 2019, reminding us of the multifaceted nature of agriculture and the multitude of arenas where discussions on agricultural development are taking place.

6.6.3 ARUA

ARUA, or the African Research Universities Alliance, is a rather newly established network since 2015, comprised to date of 16 research universities across sub-Saharan Africa. Seeking to unite a

critical mass of people and resources, ARUA has as its mission to "strengthen African universities through effective capacity-building that comes from working together as leading institutions for the task of increasing significantly their research output" (ARUA, 2019). The Secretary-General is based at the University of Ghana, with board members based at other partner universities. Keeping a wide lens on the kind of research areas they focus on, ARUA aims to impact a large catchment of societal challenges in Africa by pooling resources and effectively increasing the output of quality research stemming from the region. ARUA has created 13 centres of excellence hosted by member universities. The ARUA Centre of Excellence in Food Security is one of these, hosted by the University of Pretoria (South Africa) in partnership with the University of Nairobi (Kenya) and the University of Ghana.

6.6.4 RUFORUM

Working most explicitly at the nexus of African universities, African agricultural development, and capacity building from within universities is the network RUFORUM, short for the Regional Universities Forum for Capacity Building in Agriculture. RUFORUM is currently headquartered in Kampala, Uganda at Makerere University. From its establishment in 2004 the network has grown continuously over the years to in October 2019 include 114 member universities from 38 African countries (RUFORUM, 2019a). The focus of RUFORUM is on African universities actively and normatively engaging with questions of agricultural development on the continent, where the basic assumption is that higher education has a significant role to play in supporting a vibrant agricultural sector, which in turn is the engine for sustainable livelihoods and national economic development.

RUFORUM operates as an international non-governmental organization (NGO). Their agenda, rather than being created in isolation, is derived from existent relevant frameworks and initiatives on the continent, such as that of the SDGs of the UN and the STISA-2024 of the AU. It has the mandate to oversee graduate training, functioning as a mechanism linking universities and development. Strategies of RUFORUM include scientific training focused on crop and soil sciences, as well as fostering soft-skills of academics around issues of leadership and networking in an effort to create a better match, so-called "fit for purpose" graduates, between academicians and the roles they are to fill in society. (Okori & Ekwamu, 2017) What we see therefore is a platform with the goal of supporting knowledge generation about African agriculture, expanding the skillsets of academics, fostering dialogue with end-users, and thereby strengthening the capacity of higher education to respond to calls of the global community for knowledge-based reform.

The outline of their work is captured in the strategy document called RUFORUM Vision 2030: The African Universities' Agenda for Agricultural Higher Education, Science, Technology and Innovation (AHESTI). Vision 2030, as it is presented was created with a broad range of input from both member universities, public officers, policy-makers, civil society and private sector actors (RUFORUM, 2017b).

Working hand in hand with global leading institutions, as of autumn 2017 the FAO and RUFORUM have entered into partnership with a Memorandum of Understanding (FAO, 2017; RUFORUM, 2017a). They have also entered into a 5-year project with the World Bank and seven African country

governments entitled The Strengthening Higher Agricultural Education in Africa (SHAEA) Project (RUFORUM, 2019b).

Based on the progress and relative situation of this network, it seems a logical step to utilize RUFORUM in this study as a platform for identifying university actors and processes involved in communicating science about agricultural development in Africa.

7 Mapping it out

The previous section was in itself a type of mapping exercise, creating an understanding of the institutional substrate within which any university in sub-Saharan Africa must function. As we can clearly see, navigating the waters in terms of whose mandates to follow, which funding and financial support exists based on what ideologies, and how to prioritize research areas is tricky business that universities have to manage.

Yet beyond the challenges of producing coherent, strategic, quality research, what we are asking here is, when researchers have indeed successfully navigated those rocky waters and produced scientific information that is of benefit to agricultural development on the continent, where do they go from there? How is the communication of knowledge facilitated, whose responsibility is it, and what channels are formally or informally in place at their disposal?

The mapping exercise here in section 7 turns to the universities themselves, to identify candidate universities, based on two-tiered system as presented below.

7.1 Part I – Identifying candidate universities

There are several ways of identifying potential candidate universities for further investigation into their communication structures. For the purpose of this study, I have utilized cybermetrics[1] and relied on the ranking done by the Spanish public research body called CSIS (Consejo Superior de Investigaciones Científicas). The Cybermetrics Lab at CSIS has produced a webometrics ranking of world universities every six months since 2004 (Cybermetrics Lab, 2019a), with the goal of promoting academic web presence and, in line with the goal of AgriFoSe2030, of increasing the flow of knowledge from universities out into society. The Lab contends that communication through the internet is "already the most important scholarly communication tool" (Cybermetrics Lab, 2019a), indicating that web presence can be a helpful proxy for demonstrating how, to whom, and how much a university is reaching beyond its boundaries and into society. The ranking is done by analyzing data related to the processes of generation and scholarly communication of scientific knowledge.[2]

The webometrics ranking can be broken down into world regions, identifying the ranking of each university in both a regional context and a global context. For this study, I have used the ranking of sub-Saharan African universities, edition July 2019 (Cybermetrics Lab, 2019b).

The July 2019 list of universities in sub-Saharan Africa has a total of 1095 universities in the ranking. For this study I have considered only the top 100 universities. See Annex 1 for the complete list of the top 100 sub-Saharan African universities. Reducing analysis to the top 100 ranked is my first tier of setting boundaries.

The second tier of boundary-setting was done by extracting the universities from this list of 100 whom are also members of RUFORUM. As previously identified, by being a member these universities are

---

[1] Cybermetrics, also called webometrics, is an emerging discipline for the quantitative analysis of the Internet and Web contents.

[2] For more on the methodology and objectives of the ranking, please see the webometrics website (Cybermetrics Lab, 2018).

explicitly engaged in capacity-building within agriculture and are thus particularly interesting from the perspective of science communication for agricultural development.

Of the top 100 universities, 54 are members of RUFORUM. This list of 54 can be seen in Table 1 below. The majority of the universities (57%) are located in the five countries of South Africa (9, marked in blue), Kenya (7, marked in orange), Nigeria (7, marked in green), Uganda (4, marked in grey) and Ghana (4, marked in yellow).

Considering the member universities of RUFORM located in sub-Saharan Africa, half of them are in this top 100 ranking, which speaks well for the RUFORUM network and the kind of capacity, advocacy and voice they represent.

Table 1: Ranking Web of Universities July 2019, sub-Saharan Africa, top 100, and member university of RUFORUM 2019

Webometrics ranking in sub-Saharan Africa 2019	Member university of RUFORUM 2019
3	Stellenbosch University, South Africa
4	University of Pretoria, South Africa
7	University of South Africa, South Africa
8	University of the Western Cape, South Africa
9	University of Nairobi, Kenya
12	Makerere University, Uganda
13	University of Ghana, Ghana
16	University of the Free State, South Africa
17	Kenyatta University, Kenya
18	Kwame Nkrumah University of Science & Technology, Ghana
19	University of Nigeria, Nigeria
22	University of Zimbabwe, Zimbabwe
23	Tshwane University of Technology, South Africa
25	Moi University, Kenya
26	Jimma University, Ethiopia
30	University of Zambia, Zambia
31	Universidade Eduardo Mondlane, Mozambique
32	Mbarara University of Science and Technology, Uganda
33	University of Mauritius, Mauritius
35	University of Fort Hare, South Africa
36	University of Botswana, Botswana
37	Jomo Kenyatta University of Agriculture and Technology, Kenya
39	University of Cape Coast, Ghana
41	University of Limpopo, South Africa
42	Université d'Abomey-Calavi, Benin
46	Sokoine University of Agriculture, Tanzania
48	Mekelle University, Ethiopia
49	Bahir Dar University, Ethiopia
50	University of Port Harcourt, Nigeria
51	University of Rwanda, Rwanda
52	University of Venda, South Africa
53	Federal University of Technology Minna, Nigeria
54	University of Namibia, Namibia
55	University for Development Studies, Ghana
58	Université de Dschang, Cameroon
60	Egerton University, Kenya
62	Bayero University Kano, Nigeria
65	University of Malawi, Malawi

	67	Federal University of Technology Owerri, Nigeria
	68	Nnamdi Azikiwe University, Nigeria
	75	Haramaya University (Alemaya), Ethiopia
	81	Midlands State University, Zimbabwe
	82	University of Agriculture Abeokuta, Nigeria
	83	University of Buea, Cameroon
	86	Maseno University, Kenya
	88	Université d'Antananarivo, Madagascar
	89	Université de Lomé, Togo
	90	University of Swaziland, Swaziland
	92	Kyambogo University, Uganda
	94	Bindura University of Science Education, Zimbabwe
	96	Gulu University, Uganda
	97	Chinhoyi University of Technology, Zimbabwe
	99	Masinde Muliro University of Science & Technology, Kenya
	100	National University of Lesotho, Lesotho

7.2 Part 2 – Examples of communication channels

From these 54 candidate universities that, to repeat, are both interested in agricultural development on the continent (according to their membership in RUFORUM) and are successful communicators (according to webometrics ranking), I have turned my attention to the top performers by looking closer at their websites and the kind of science communication they are engaged in. Below is information from the top two performers in South Africa and the top performers in Kenya. Follow up discussions were taken with the University of Nairobi.

South Africa's University of Pretoria, ranked at number one, has a unique arrangement in the entity called 'Enterprises University of Pretoria', a company fully owned by the University of Pretoria offering, amongst other things, research and advisory services for governments and businesses. 'Research Solutions' is one branch of this entity. The self-description on the front page of their website indicates that the target audience is within the realm of enterprise; 'putting science into practice' as business solutions. One particular Research Solution initiatives is called "Shift to Strategic Municipal Advisory, Research and Training Solutions", targeting local, metropolitan and district municipalities in categories including strategy development, social development, agriculture , roads and transport, and water and sanitation.

Stellenbosch University, South Africa at number two in communication-ranking has a specially designed search engine combining all faculties called a Knowledge Directory. As of October 2019 there are 2,192 searchable researcher profiles there, giving those of us searching for specific competencies the chance to identify individuals whom are experts in that field. With multiple browsing functions (by Surname, Keyword, Subject or Faculty/Unit) it is user friendly and allows for email communication directly to the individual researcher from the university website. This is of course a tool for communicating *inward* to researchers, and not for researchers to communicate *outward*, but it provides the forum whereby contacts can potentially be established.

Turning to Kenya, the college of Agriculture and Veterinary Sciences (CAVS), as part of the University of Nairobi lands at number eight on the continent and number four amongst the RUFORUM

universities identified by Webometrics. From a conversation I had with their web communications officer Timothy Miringu, he confirmed that CAVS has an explicit goal to communicate to the greater society, captured in the mission statement of the university "to provide quality university education and training and to embody the aspirations of the Kenyan people and the global community through creation, preservation, integration, transmission and utilization of knowledge" (University of Nairobi, 2019). When asked which communication channels that are being used at CAVS he confirmed multiple pathways, including the more classical channels of scientific journals and conferences, as well as social media (mostly Twitter and Facebook), verbal and written presentations at publicly available forums (such as radio, bulletin boards, pamphlets, community meetings), stakeholder workshops with farmers, farmer groups and practitioners, material directed towards policy-makers, as well as field outreach activities targeting communities within which researchers live (Miringu, 2019). He continues, "There are some variables at play when it comes to communicating scientific knowledge. In some instances, individual scholars take it upon themselves to go out there using some of the channels [mentioned] above to communicate their work. In other cases depending on the size of the project, researchers collaborate with communication companies and other partners to pass scientific knowledge." Certain challenges arise with this non-definitive approach to communicating, which will be brought up in the following section.

8 Challenges of communicating science

The effort needed to make ones research results part of a general known pool of knowledge is substantial. It would be a fallacy to assume that by sharing ones knowledge publicly (or semi-publicly as in the case of academic journals) that it has been sufficiently *communicated*. The task of communicating itself requires a thought-process that forces academics many times out of their comfort zones, taking the perspective of the end user and speaking their language, which may differ significantly to that usually used in academic circles.

Science communication, as it is classically understood is a type of public communication whereby scientific information is presented to a non-expert audience, whereby access to this knowledge will allow for informed and thus improved decision-making (Allen, 2017; Treise & Weigold, 2002). A bit more nuanced view is more receptive to the idea that the audience, here in this report referring mostly to policy-makers and practitioners, are not blank recipients of scientific knowledge but have their own knowledges, experiences, ideologies and the like that scientists need to be aware of and adaptive towards. In the same vein, we would be wise to avoid viewing 'Science' as a missing piece of a puzzle simply needing to be inserted into society. The latter risks being an elitist notion that overlooks the contextuality of knowledge and decision-making processes and does not encapsulate the dynamics of scientific communication as a process under constant development (Allen, 2017).

We might also keep in mind that the aim of universities is not solely the creation of knowledge for policy-makers and practitioners, rather, that they have a number of mandates to uphold towards different stakeholders in terms of basic education and specialized research. And of course, universities are not alone in matters of creating and communicating knowledge to influence policy makers, whom instead must listen to other authorities, local constituents, industries, and other actors in society.

Although not an exhaustive list, the three sections below address some of the more recognized challenges of communicating science, starting from challenges to academia more generally, and then continuing to those pertinent in the context of sub-Saharan Africa.

towards. In the same vein, we would be wise to avoid viewing 'Science' as a missing piece of a puzzle simply needing to be inserted into society. The latter risks being an elitist notion that overlooks the contextuality of knowledge and decision-making processes and does not encapsulate the dynamics of scientific communication as a process under constant development (Allen, 2017).

We might also keep in mind that the aim of universities is not solely the creation of knowledge for policy-makers and practitioners, rather, that they have a number of mandates to uphold towards different stakeholders in terms of basic education and specialized research. And of course, universities are not alone in matters of creating and communicating knowledge to influence policy makers, whom instead must listen to other authorities, local constituents, industries, and other actors in society.

Although not an exhaustive list, the three sections below address some of the more recognized challenges of communicating science, starting from challenges to academia more generally, and then continuing to those pertinent in the context of sub-Saharan Africa.

8.1 Challenges related to academia at large

The problem of science getting 'lost' somewhere between universities and society is not one that is particular to Africa, but is rather by and large a challenge for universities and researchers all over the world. More so now than ever before, dominant discourses are lifting the role of higher education in solving global societal and environmental problems (African Union Commission, 2015; UNESCO, 2015, 2016; United Nations, 2015b, 2017). What are then some of the main challenges to achieving this outcome of incorporating science-based understandings deeply into decision-making processes in society?

One recurring theme on the subject implies that scientists are not very good communicators. Communicating requires specific skill sets, and can be equally challenging as the generation of the knowledge intended to be communicated. This is important to consider as an alternative logic to the knowledge-deficit model, the latter leaning heavily on calls for more and more knowledge production. "Many graduate education programs in science, technology, engineering, and math (STEM) fields generally lack formal training in public communication" claim Simis et al. (2016), calling for more explicit training in communication methods grounded in nuanced understandings of what constitutes 'the public' to whom scientists are trying to communicate to (ibid). As Schimel (2012, p. 11).states it, "[d]espite the importance of writing, however, for most scientists it is something we do post hoc. After we get the data, we "write up" the paper. This is an unfortunate approach. Because writing is a critical tool, you should study it and develop it as thoroughly as your other tools. Writing is as complex and subtle as molecular biology."

This lack of communication training in standard curriculums is not exclusively found in the 'hard' STEM sciences, but exists in the social sciences as well. Heavily laden with jargon and technical terms, or designed exclusively for the attention of microtribes of fellow peers, much of what is produced in social science ends up relatively inaccessible to wider society (Alvesson, Gabriel, & Paulsen, 2017), where

writing as a method has inadvertently fallen by the wayside and, as urged by Burlingame (2018), needs to be revived for the sake of researchers themselves as well as for that of the general public.

Particular to but not exclusively found in the social sciences is the massive bulk of scientific material being produced. At first glance this might seem only positive; resulting in more knowledge now being at the disposal of the world. Unfortunately the opposite turns out more often than not to be the case. Production has been on an upward trajectory, with a massive increase seen starting in the 1990s. As noted by Alvesson et al (2017), it is estimated that over one million academic articles were published in 1996. By 2009 that number had increased to a million and a half, equivalent to about one new article being added to the pool every twenty-two seconds (Alvesson et al., 2017, p. 4). This proliferation of published work can crowd out the really interesting nuggets of information and "makes it increasingly difficult to tell the wheat from the chaff" due to the shear amount of knowledge products one needs to sift through (Alvesson et al., 2017, p. 10). The authors continue, "[w]e do not claim that all research has to address broader and non-specialist groups. There certainly are areas of abstract or inward-looking theorizing, methodology, and reflexivity that can be predominantly of interest to academics. […]. Some such work is necessary […] but should not dominate at the expense of research with the ambition to have something to say to broader audiences" (p. 18).

Regarding university researchers themselves, they are perhaps unique in some regards in their occupational choice from other career paths, yet they are subject to the same principles as employees in many other branches of work: there is a logic of how to perform and succeed within the workplace which, for the sake of job continuation or advancement, must be adhered to. Publishing in the 'right' high-impact journals and strategically navigating levels of hierarchy are part of this logic driving employees of universities and are part and parcel of building a resume to support a continued career in academia. Science communication that deviates from these established forums, for example by speaking at a hearing of a local political committee or being interviewed on public radio, risks falling by the wayside when one thinks of applying for the next research grant. Again quoting Alvesson et al, when investigating the loss of meaning in academic work, they write that:

> "Survival and eventual rise up the slippery pole, including rapid (over-)promotion, financial benefits, invitations, and other instrumental rewards replace the passion for discovery and the intrinsic quest for knowledge. Discovery without outputs in prestigious outlets becomes meaningless; delight in discovery for its own sake becomes an exception." (2017, p. 28).

As a human living and communicating with other humans, we have surely all applied different ways of communicating, depending on factors such as the context of where we are and to whom we are talking. Yet beyond this kind of effort applied to adjust the way we talk and the words we use, there are some foundational differences between the fields of science and journalism that can create friction whenever these worlds meet. Below is a table (Table 2) from Nancy Baron's book "Escape from the Ivory Tower" (2010), comparing and contrasting these differences.

Table 2: Differences between Science and Journalism

Differences between Science and Journalism

Science	Journalism
Slow and ongoing	Deadline-driven
Evidence first	Conclusions first
In-depth	Quick overview
Uncertainty	Certainty
Specifics	Generalizations
Credentials	Perspectives
Rational	Emotional

Source: Adapted from Baron (2010).

I think all of us working as researchers can relate to at least a number of these chasms whenever we have engaged with journalism. What becomes apparent here is that there is a need to make these differences explicit and, if one is engaged in science intended for outreach, one needs an understanding that the usual rules of science will not always be applicable when writing for a broader audience.

Extending one's research over boundaries, should those be boundaries between academic disciplines, between 'scientific' and 'non-scientific' knowledges, or between descriptive and normative claims, is a big challenge of science communication. This is especially relevant in the case at hand, where we are making claims that science can and should help to improve food security for smallholder farmers. The concept "boundary work" (Cash et al., 2003; Clark et al., 2016) has been used to recognize scholarship existing and engaging at the boundary between knowledge and action and has identified challenges that this type of engagement needs to tackle in order to be successful. Particularly, the salience, the credibility and the legitimacy of scientific claims are attributes that, when engaging at the boundary between science and society, need to exist in a delicate balance. "In particular", says Clark et al (ibid, p. 4617), "for knowledge to be used in support of decision making, it need[s] to be perceived by decision makers as not only scientifically credible but also as salient to their needs. […] However, an overly permeable boundary risk[s] the politicization of science, with decision makers using – and even directing – research primarily to support decisions they had already made". In other words, scientists need to be aware of and adapt to the needs of those to whom they communicate in order to have a social impact. Yet bend too far, and one's credibility as an objective, authoritative voice is put at risk. What's more, the knowledge being communicated risks cooptation as instruments of political arguments, whether those arguments support or counteract the kind of change sought (Molinari & Besson, 2016).

Relating back to the valuing and measuring of scientific output, a study commissioned by the Austrian Council for Research and Technology Development (Felt & Fochler, 2018) looks at the impact of science on society, identifying difficulties in measuring societal impact, particularly from within social sciences. Their observations include recognition that social science knowledge reaches society through multiple pathways, yet some pathways "do not enjoy the same attention in today's institutional perception" (p. 39), and that "some of the greatest potential for increasing the societal impact of the social sciences lies with the institutions, in particular the universities" through for example better

funding, increasing visibility, and creating suitable ways of measuring impact (Felt & Fochler, 2018, p. 40).

8.2 Challenges related to academia in Africa

We have considered in sections 5 and 6 some of the realities of conducting research in the context of African universities based on historical and contemporary relationships with society. Omotesho and Falola (2014) have identified some major bottlenecks to a more efficient agricultural research system in Africa. I have compiled their findings in table 3 below.
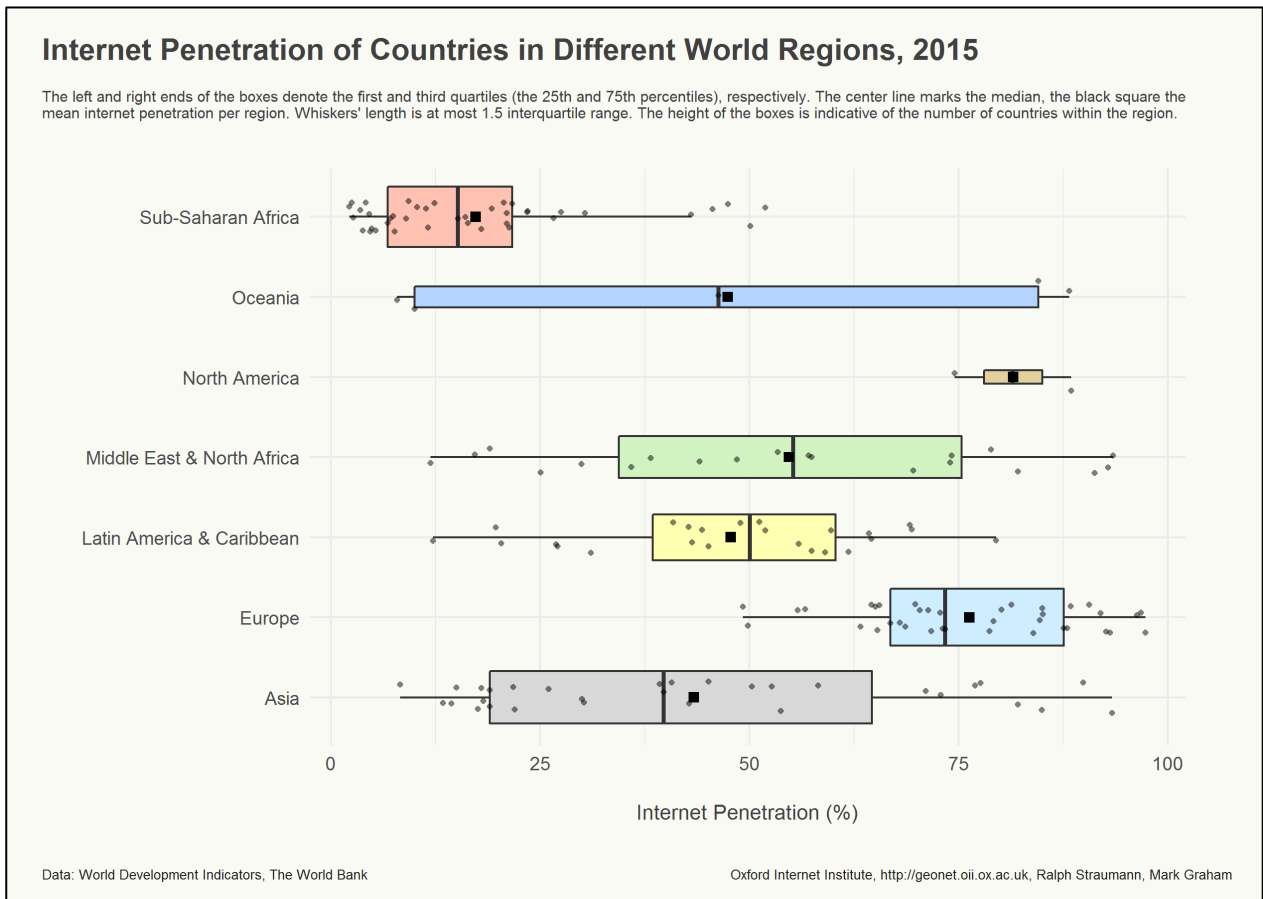
Table 3: Bottlenecks to a more efficient agricultural research system in Africa

Poor environment for research
o Inadequate national commitment to research o Policy instability o A lack of strategic planning for agricultural research in member countries o Limited societal appreciation for the importance of agricultural research in development o Poor remuneration of researchers o Wrong research intent o Fatigue among respondents o A lukewarm attitude to research findings among users o A lack of interactive academic and professional societies o A lack of access to scientific information that is already available on the region and globally o Poorly developed end-users of research outputs (i.e. industries, private sector, civil society, etc.) o Researchers failing to disseminate their research findings beyond journals and donors o Poor administrative support for research both at governmental and institutional level
Limited manpower for agricultural research
o Lack of a stable agriculture manpower policy to guide training in research methodology for professionals o Rapid staff turnover, inadequate technical support o An inability to retain trained manpower due to poor levels of remuneration and the lack of an enabling environment o Poor career perspectives o Gender discrimination o A shortage of qualified agricultural researchers o A lack of specialists in agriculture's core sub-disciplines
Inadequate infrastructure for research
o A lack of appropriate laboratory space, equipment, supplies o Deteriorating library facilities o Erratic electricity supplies o Poor access to current (published) agriculture-related research o Inadequate transportation for research purposes o Poor and uncertain potable water supplies o Physical insecurities of life and property in many institutes, including the safety of field crops, animals, research plots

More generally we also find, based on data from World Development Indicators of the World Bank, that communication through the internet is relatively low in Africa due to low internet penetration in the region, see Figure 3 below (Straumann, 2017). As communication through the internet is an important communication tool this has repercussions as to how far communication can reach through these channels (Cybermetrics Lab, 2019a).

Figure 3: Internet penetration of countries in different world regions

Internet Penetration of Countries in Different World Regions, 2015

The left and right ends of the boxes denote the first and third quartiles (the 25th and 75th percentiles), respectively. The center line marks the median, the black square the mean internet penetration per region. Whiskers' length is at most 1.5 interquartile range. The height of the boxes is indicative of the number of countries within the region.

Internet Penetration (%)

Data: World Development Indicators, The World Bank

Oxford Internet Institute, http://geonet.oii.ox.ac.uk, Ralph Straumann, Mark Graham

Source: Adapted from (from Straumann, 2017).

9 Looking forward

It is literally impossible to create a map that leads you to your goal if you don't know where you're currently standing. This report speaks to the AgriFoSe2030 programme goal of establishing 'communication units' at universities in Asia and Africa, with a focus on the current situation in Africa. Although not prescriptive of where to go next, my intention is to create a better sense of 'where we're currently standing' by contextualizing science communication both broadly and with an African university focus, identifying main challenges, and providing a few examples of science communication strategies already in place at institutions that are ranked as successful communicators, based on webometric indicators.

Few today would deny that an investment in higher education will have positive impacts on social progress and development, particularly in sub-Saharan Africa. It would be misleading to claim that investment in communication and collaboration in science is not happening there, because it is, as demonstrated by the abundance of programs, frameworks and goals currently in place through state governments and regional/international bodies. Yet honestly, while preparing this report I so easily became overwhelmed and confused by the overabundance of initiatives, partnerships, coalitions, clusters and other such nomenclature, each with their own acronyms, implementation windows, visions and mandates for investing in education. One might say that simply navigating the comings and goings of initiatives and funding, deciding where to invest ones intellectual energies, can act as a deterrence for even the most ambitious of researchers to find the 'right' path for outreach at any given time. Professor Carl Eicher already back in 1999 called for more coordinated systems approach to investments integrating research, extension and higher education (the so-called agricultural knowledge triangle), rather than a project-by-project approach (Eicher, 1999). Two decades later, this seems to still be something worth considering, echoed by other calls for reform in the donor community to improve effectiveness and responsiveness of tertiary education systems (Salmi, 2017).

We can take a number of points from the findings in this report: 1) scientific knowledge – coming from universities and pertinent to smallholder food security – is indeed often getting 'lost' somewhere between knowledge production and application into society where it's needed most. 2) This loss is not particular to African universities, but researchers at such institutions face challenges that are unique due to historical and contemporary circumstances where higher education is part of broader societal conditions. 3) The internal dynamics of a career in research are not often conducive with high-quality science communication outreach. Placing a higher value on this kind of communication within the university career system and allocating sufficient resources (time, funding, and valuation) are important steps to take to foster its improvement. 4) The challenge is not only about communicating more but communicating better. Researchers must recognize and be trained to recognize the different needs and languages of policy-makers and practitioners and tailor messages accordingly. This should not come at the cost of instrumentalizing science to the whims of policy and practice, but can exist where multiple forms of knowledge, including that of science, converge to offer real-world solutions.

Universities should encourage and offer training in creative and accessible scientific writing as part of higher education curriculum towards this end.

What can we learn from communication efforts by those identified as successful communicators? We can see that different strategies work and there is no one 'right' way. Where the University of Nairobi has many lines out, teaming up with third party assistance when needed, University of Pretoria has created an entire campus run as a business venture dedicated to providing science-based solutions to corporate or municipal audiences. Challenges arise to either strategy as well as those in between in terms of longevity and accessibility and financial sustainability. The agendas of international bodies such as the World Bank and other funding agencies do affect the trajectories and priorities of universities, thus creating both a challenge but also a point of entry for the promotion and resource support for articulate scientific communication for multiple audiences, as part of the academic curriculum and measurements of success as an academician. With such a transformation, the communication of science can become not only the means to a goal (that is, to help attain sustainable development goal number 2) but as a goal in itself, giving university researchers the capacities and opportunities to find meaning and satisfaction in their work by contributing to the betterment of themselves and to wider society.

10 Bibliography

African Union Commission. (2014a). *Malabo Declaration on Accelerated Agricultural Growth And Transformation for Shared Prosperity And Improved Livelihoods*. Retrieved from Malabo, Equatorial Guinea: https://au.int/sites/default/files/documents/31247-doc-malabo_declaration_2014_11_26.pdf

African Union Commission. (2014b). *Science, Technology and Innovation Strategy for Africa 2024*. Retrieved from Ethiopia: https://au.int/sites/default/files/newsevents/workingdocuments/33178-wd-stisa-english_-_final.pdf

African Union Commission. (2015). *Agenda 2063 The Africa We Want*. Retrieved from https://au.int/sites/default/files/pages/3657-file-agenda2063_popular_version_en.pdf

African Union, T. (2016). *Continental Education Strategy for Africa (CESA 16-25)*. Retrieved from Addis Ababa Ethiopia: https://au.int/sites/default/files/documents/29958-doc-cesa_-_english-v9.pdf

AgriFoSe2030. (May, 2017). Agriculture for Food Security (AgriFoSe2030). Translating science into policy and practice. In A. A. f. F. Security (Ed.), (pp. 4).

Aguillo, I. F., Bar-Ilan, J., Levene, M., & Ortega, J. L. (2010). Comparing university rankings. *Scientometrics, 85*(1), 243-256. doi:10.1007/s11192-010-0190-z

Allen, M. (2017). The SAGE Encyclopedia of Communication Research Methods. doi:10.4135/9781483381411

Alvesson, M., Gabriel, Y., & Paulsen, R. (2017). *Return to Meaning: A Social Science with Something to Say*. Oxford: Oxford University Press.

ARUA. (2019). About the African Research Universities Alliance (ARUA). Retrieved from http://arua.org.za/about/

Association of African Universities. (2019). About. Retrieved from https://www.aau.org/about/

Banya, K., & Elu, J. (2001). The World Bank and financing higher education in Sub-Saharan Africa. *Higher Education, 42*(1), 1-34. doi:10.1023/a:1017584501585

Baron, N. (2010). *Escape from the ivory tower: a guide to making your science matter*: Washington : Island Press, cop. 2010.

Bell, S., Shaw, B., & Boaz, A. (2011). Real-world approaches to assessing the impact of environmental research on policy. *Research evaluation, 20*(3), 227-237.

Bloom, D. E., Canning, D., & Chan, K. (2015). Higher education and poverty in Sub-Saharan Africa. *International Higher Education*(45). Retrieved from https://ejournals.bc.edu/ojs/index.php/ihe/article/viewFile/7924/7075

Bornmann, L. (2013). What is societal impact of research and how can it be assessed? a literature survey. *Journal of the American Society for Information Science and Technology, 64*(2), 217-233. doi:10.1002/asi.22803

Burlingame, K. (2018). Where are the storytellers? A quest to (re)enchant geography through writing as method. *Journal of Geography in Higher Education*, 1-15. doi:10.1080/03098265.2018.1554630

Cash, D. W., Clark, W. C., Alcock, F., Dickson, N. M., Eckley, N., Guston, D. H., . . . Mitchell, R. B. (2003). Knowledge systems for sustainable development. *100*(14), 8086-8091. doi:10.1073/pnas.1231332100 %J Proceedings of the National Academy of Sciences

CGIAR. (2016). *CGIAR Strategy and Results Framework 2016-2030. Redefining how CGIAR does business until 2030*. Retrieved from https://library.cgiar.org/bitstream/handle/10947/3865/CGIAR%20Strategy%20and%20Results%20Framework.pdf?sequence=1

CGIAR, & Forum for Agricultural Research in Africa. (2001). *FARA/CGIAR Consultation on Agricultural Research in Sub-Saharan Africa: Meeting of the Minds III - Towards a Common Ground*. Retrieved from https://hdl.handle.net/10947/522

CGIAR Fund Office. (2012). *The CGIAR at 40 and Beyond: Impacts that Matter for the Poor and the Planet*. Retrieved from https://hdl.handle.net/10947/2549

CGIAR System Management Office. (2017). *CGIAR Financial Report 2016*. Retrieved from

Clark, W. C., Tomich, T. P., van Noordwijk, M., Guston, D., Catacutan, D., Dickson, N. M., & McNie, E. (2016). Boundary work for sustainable development: Natural resource management at the Consultative Group on International Agricultural Research (CGIAR). *113*(17), 4615-4622. doi:10.1073/pnas.0900231108 %J Proceedings of the National Academy of Sciences

Cloete, N., Maassen, P. A. M., & Bailey, T. (2015). *Knowledge production and contradictory functions in African higher education*.

CODESRIA. (2014). The Council for the Development of Social Science Research in Africa (CODESRIA), About Us. Retrieved from http://www.codesria.org/spip.php?rubrique193&lang=en

Cybermetrics Lab, C. (2018). Ranking Web of Universities. Retrieved from http://www.webometrics.info/en

Cybermetrics Lab, C. (2019a). Methodology. *Ranking Web of Universities*. Retrieved from http://www.webometrics.info/en/Methodology

Cybermetrics Lab, C. (2019b). Sub-Saharan Africa. Edition 2019.1.2. Retrieved from http://www.webometrics.info/en/Ranking_africa/Sub_saharan_Africa

Darvas, P., Gao, S., Shen, Y., & Bawany, B. (2017). *Sharing higher education's promise beyond the few in Sub-Saharan Africa (English)*. Retrieved from Washington, D.C.: http://documents.worldbank.org/curated/en/862691509089826066/Sharing-higher-education-s-promise-beyond-the-few-in-Sub-Saharan-Africa

Dimelu, M., & Anyanwu, A. (2008). Linkage Behavior and Practices of Agencies in the Agricultural Innovation Transfer Sub System in Southeastern Nigeria: Issues for Agricultural Extension policy. *Journal of Agricultural Extension, 12*(2).

Eicher, C. K. (1999). *Institutions and the African Farmer*. Retrieved from http://documents.worldbank.org/curated/en/656041468768263033/pdf/multi0page.pdf

FAO. (2017). FAO and RUFORUM announce new partnership [Press release]. Retrieved from http://www.fao.org/partnerships/container/news-article/en/c/1051550/

FAO, IFAD, UNICEF, WFP, & WHO. (2018). *The State of Food Security and Nutrition in the World 2018. Building climate resistence for food security and nutrition*. Retrieved from Rome:

FARA. (2019). Who We Are. Retrieved from https://faraafrica.org/about-fara/who-we-are/

Felt, U., & Fochler, M. (2018). *THE SOCIETAL IMPACT OF SOCIAL SCIENCE KNOWLEDGE IN AUSTRIA: IMPACT PATHWAYS, MEASUREMENT, POTENTIAL. An Explorative Study*. Retrieved from Vienna: https://www.rat-fte.at/files/rat-fte-pdf-en/documents/publications/181022_Societal_Impact_Felt_Fochler%202018_ENG-compressed.pdf

Governmenet of Ghana. (2018). Ghana hosts Africa Centres of Excellence project workshop. Retrieved from http://www.ghana.gov.gh/index.php/media-center/news/2754-ghana-hosts-africa-centres-of-excellence-project-workshop

National Agricultural Research Act of Uganda, (2005).

International Food Policy Research Institute. (2018). ReSAKKS, Regional Strategic Analysis and Knowledge Support System. In IFPRI (Ed.), *Broschure*. www.resakss.org.

Mba, J. C., & Acquah, S. K. (2018). Why are investments in higher education and research in Africa so important? Higher education is the key to unlock sustainable development in Africa.

McCowan, T. (2016). Universities and the post-2015 development agenda: an analytical framework. *The International Journal of Higher Education Research, 72*(4), 505-523. Retrieved from https://doi.org/10.1007/s10734-016-0035-7

Miringu, T. (2019). [Personal communication].

Mkandawire, T. J. T. (1995). Three generations of African academics: A note. (28).

Molinari, V., & Besson, C. (2016). Using and abusing science : science and political discourse from Burke's 'French Revolution' to Obama's science fair. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=1236802

National Agricultural Research Organisation (NARO) Uganda. (2014). Home. Retrieved from http://www.naro.go.ug/data/smenu/4/NARS.html

Okori, P., & Ekwamu, A. (2017). RUFORUM: An Innovative Mechanism for engaging African Universities in Development. Retrieved from https://blog.ruforum.org/2017/11/21/ruforum-an-innovative-mechanism-for-engaging-african-universities-for-development/?utm_source=RUFORUM+Mailing+List&utm_campaign=5e7f790bed-RUFORUM+Weekly+-+Vol.3+No.25&utm_medium=email&utm_term=0_1fcfbb8a0b-5e7f790bed-346988153&ct=t()&goal=0_1fcfbb8a0b-5e7f790bed-346988153&mc_cid=5e7f790bed&mc_eid=7fd1789153

Omotesho, O. A., & Falola, A. (2014). National Agricultural Research Systems in Africa. In A. Akinyoade (Ed.), *Digging deeper : inside Africa's agricultural, food and nutrition dynamics*.

Osiru, M., Kalungi, J., & Adipala, E. (2016). African Higher Education in the 21st Century: Blending Optimism with Reality. ((ISSN 1607-9345)).

Owens, T. L. (2017). Higher education in the sustainable development goals framework. *52*(4), 414-420. doi:doi:10.1111/ejed.12237

Royal Society. (2011). *Knowledge, networks and nations: Global scientific collaboration in the 21st century.* Retrieved from London, United Kingdom: https://royalsociety.org/-/media/Royal_Society_Content/policy/publications/2011/4294976134.pdf

RUFORUM. (2017a). FAO and RUFORUM Sign a New Partnership to train the Next Generation of Agricultural Change Agents [Press release]. Retrieved from https://blog.ruforum.org/2017/11/03/fao-and-ruforum-sign-a-new-partnership-to-train-the-next-generation-of-agricultural-change-agents/

RUFORUM. (2017b). *Vision 2030*. Retrieved from http://www.ruforum.org/SHAEA/sites/default/files/Ruforum%20Vision%202030.pdf

RUFORUM. (2019a). Member Universities. Retrieved from https://www.ruforum.org/our-member-universities

RUFORUM. (2019b). SHAEA Strenthening Higher Agricultural Education in Africa. Retrieved from http://www.ruforum.org/SHAEA/

Salmi, J. (2017). *The Tertiary Education Imperative: Knowledge, skills and values for development*: Springer.

Schimel, J. (2012). *Writing science : how to write papers that get cited and proposals that get funded*: New York : Oxford University Press, cop. 2012.

Simis, M. J., Madden, H., Cacciatore, M. A., & Yeo, S. K. (2016). The lure of rationality: Why does the deficit model persist in science communication? *, 25*(4), 400-414. doi:10.1177/0963662516629749

Spaapen, J., Dijstelbloem, H., & Wamelink, F. (2007). *Evaluating research in context: a method for comprehensive assessment* (2nd ed.): Consultative Committee of Sector Councils for Research and Development (COS).

Spaapen, J., & Van Drooge, L. (2011). Introducing 'productive interactions' in social impact assessment. *Research evaluation, 20*(3), 211-218.

Straumann, R. (2017). World regions' access to the internet. Retrieved from https://www.oii.ox.ac.uk/blog/world-regions-access-to-the-internet/

Sustainable Development Goals Center for Africa, T. (2019). Reports. Retrieved from https://sdgcafrica.org/reports/

Tarabini, A., & Jacovkis, J. (2012). The Poverty Reduction Strategy Papers: An analysis of a hegemonic link between education and poverty. *International Journal of Educational Development, 32*(4), 507-516. doi:https://doi.org/10.1016/j.ijedudev.2012.02.014

Treise, D., & Weigold, M. F. (2002). Advancing Science Communication:A Survey of Science Communicators. *23*(3), 310-322. doi:10.1177/107554700202300306

UNESCO. (2015). *UNESCO science report: towards 2030* (9231001299, 978-92-3-100129-1). Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000235406

UNESCO. (2016). Global education monitoring report summary 2016: education for people and planet: creating sustainable futures for all. Retrieved from https://www.voced.edu.au/content/ngv:77813

United Nations. (2015a). *Resolution adopted by the General Assembly on 25 September 2015* New York Retrieved from http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E

United Nations. (2015b). Sustainable Development Goal 4.

United Nations. (2017). Sustainable Development Goals. 17 goals to transform our world. Retrieved from http://www.un.org/sustainabledevelopment/

University of Nairobi. (2019). Vision and Mission. Retrieved from http://www.uonbi.ac.ke/node/10

World Bank Group, T. (2019). Africa Higher Education Centers of Excellence Project. Retrieved from
    http://projects.worldbank.org/P126974/strengthening-tertiary-education-africa-through-africa-centers-
    excellence?lang=en&tab=details