TIPC POLICY BRIEF

TRANSFORMING SCIENCE, TECHNOLOGY AND INNOVATION POLICIES IN AFRICA: INSIGHTS FROM GHANA, KENYA, SENEGAL, AND SOUTH AFRICA

KEY MESSAGES AND RECOMMENDATIONS

Key message 1
Top down approaches to policymaking continue to dominate the African innovation policy ecosystem. This results in disconnecting policy actors, with potentially detrimental impacts on the implementation of policy initiatives, due to a lack of buy in from key actors.

Recommendation 1
Encourage policy learning, and policy experimentation in ways that combine top-down and bottom-up approaches in policymaking.

Key message 2
Transformative innovation must recognise and address the concerns of existing local cultures, practices and lifestyle; particularly those that enhance and/or help to address social, environmental, inclusion and sustainability challenges.

Recommendation 2
Consider the use of new policy instruments (that target inclusion and sustainability, i.e. SDGs) in existing and future policy mixes.

Key message 3
Co-creation of knowledge, agenda/priority setting and community driven learning, are essential to the success of transformative innovation. Individuals and communities are essential local agents for change, transformation and achieving the SDGs.

Recommendation 3
In formulating, implementing, evaluating or governing transformative innovation policies, policymakers must place strong emphasis on grassroots innovations and actors. In addition, innovation for transformative change must incorporate innovations from the informal economy, alongside a focus on innovation for inclusive development.

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TRANSFORMATIVE INNOVATION POLICY CONSORTIUM

TRANSFORMATIVE INNOVATION POLICY IN AFRICA: CONTEXT, CASES, AND COUNTRIES

Africa's transformation ambitions towards a knowledge economy that is underpinned by innovation is articulated in continental frameworks such as Agenda 2063 and Science, Technology and Innovation Strategy for Africa 2024 (STISA-2024), and the Continental Education Strategy for Africa (CESA 2016-2025). Moreover, science, technology and innovation (STI) are key pillars in facilitating countries capacity to meet their national development objectives, in addition to their Sustainable Development Goals (SDGs).

The Transformative Innovation Policy (TIP) research involves researchers and policymakers from across the globe. The research aims to contribute to improving our understanding on how to better STI policy formulation, implementation, evaluation, and governance.

Against this background, three African countries, Ghana, Kenya and Senegal were selected for the TIP Africa exploratory research project, focusing on country-level case studies. This exploratory TIP Africa research helps participating countries to: (1) understand the TIP vocabulary and criteria in relation to their local contexts, (2) map their STI policy ecosystem and actors, and (3) evaluate the readiness of their national STI policies to deliver on the SDGs.

The TIP Africa research countries were selected from the 15 countries involved in the Science Granting Councils Initiative (SGCI).

South Africa, as a founding TIPC member and having completed the pilot in 2017/2018, provided mentorship to the three pilot countries, through engagements with the National Research Foundation (NRF) and Department of Science and Innovation (DSI).

METHODOLOGY AND THEORETICAL FRAMEWORK

TIP research applies the Transformative Innovation Learning Histories (TILH) methodology. TILH adopts the case study approach. Data collection involves focus groups, workshops and interviews. The conceptual framing for TIP research is based on Schot and Steinmueller (2018) and related work on transformative innovation, which group STI policies into three frames. Frame 1, R&D and Regulation; Frame 2, National Systems of Innovation (NSI); and Frame 3, Transformative Change (still emerging).

Frame 3 place emphasis on addressing global grand challenges, as captured, by the SDGs. Frame 3 is based on the argument that although economic gains are vital, transformation must also seek to address social and environmental challenges. And that for STI policies to produce transformative change, they must focus on societal goals and sociotechnical systems change.

TRANSFORMATIVE INNOVATION POLICY CRITERIA

Transformation in the TIP approach is based on six criteria: directionality, societal goals, system level impact, learning and reflexivity, conflict versus consensus, and inclusiveness. These three countries selected case studies which had potential for satisfying the six transformative elements, as outlined in Table 1 below. To reiterate, South Africa, carried out her pilot in 2017 and 2018, using the same criteria presented in Table 1 below. Therefore, the cases below present a summary of the insights from Ghana, Kenya, and Senegal; excluding South Africa.

TABLE 1: TRANSFORMATIVE INNOVATION POLICY CRITERIA

CRITERIA	DIRECTIONALITY	SOCIETAL GOALS	SYSTEM LEVEL IMPACT	LEARNING AND REFLEXIVITY	CONFLICT VS CONSENSUS	INCLUSIVENESS
Elaboration	Innovation is process of accumulation towards a direction. This direction can be changed if alternative pathways are recognised and supported.	Transformative innovation policy needs to be directed in line with specific social goals	For innovation to be transformative, it must have a system level impact (i.e. cut across many sectors)	Reflexivity refers to the ability of actors to re-think, un-learn, and re-learn, routines and practices taken for granted	Transformative change requires a broad participation of many actors; and should encourage divergent views	It is essential to consider varying interests - as this reveals issues of legitimacy and accountability
Questions to ask	Are social choices chosen over alternative pathways of development?	Does it address the SDGs	Does transformative innovation or TIP have wide impact?	Does it allow for fundamental rethink of how problems are refined and deriving solutions?	Is participation democratised?	Do actors have access to policymaking and capabilities to participate?

Source: authors

COUNTRY CASE STUDIES:

GHANA

Ghana is currently facing an upward trend in e-waste generation due to increasing population growth, changing consumption patterns and high demand for electronic gadgets (such as mobile phones, fridges and computers).

Increasingly, Ghana has become one of the final destinations for e-waste products with the vast amount of electronic and electrical gadgets imported into the country. The presence of valuable metals such as copper, gold and platinum, however, makes it attractive to recycle e-waste. Ghana's e-waste policy has potential transformative innovation impacts in response to the systemic ways in which waste is addressed in society.

There are challenges associated with the operationalisation of an integrated and environmentally sound and sustainable e-waste management system. Recently, the government passed the Hazardous and Electronic Waste Control and Management Act, 2016 (ACT 917) and the Control and the Management Regulations (LI 2250), formulated to direct the application of ACT 917. These regulations provide the frameworks to help formalize the informal micro and small enterprises involved in e-waste activities, and in order to ensure adequate management of e-waste in Ghana. The various efforts to regularise the activities of the informal sector stems from the fear of job losses. Despite the challenges, many positive outcomes have been recorded.

There are for example:
- Instances of upcycling-providing alternative livelihood sources from e-waste management and the gradual involvement of women;
- Creation of an impact hub that supports early stage innovators to grow, have access to shared internet infrastructural support – that is provision of service to a cluster of early stage innovators, offering green energy support services;
- Upstream recycling, creating learning opportunities for early innovators and finding solutions to negative value fractions.

TABLE 2: INSIGHTS FROM GHANA'S TRANSFORMATIVE INNOVATION POLICY CASE STUDY

CRITERIA	DIRECTIONALITY	CRITERIA	SYSTEM LEVEL IMPACT	LEARNING AND REFLEXIVITY	CONFLICT VS CONSENSUS	INCLUSIVENESS
Ghana	Health, safety and the environment. Air, water, and land pollution Waste is a key issue	SDGs: 3, 6, 8, 11, 12, 14 Agenda 2063: 1, 3, 4, 6, 7, 12-14, 17-20 Ghana 7-year Co-ordinated Programmes of Economic and Social Development Policies (2017-2024)	Integration of e-waste policy with environmental sanitation and STI policies	Coordination, outcomes and impacts are being questioned (alongside duplication of roles among government institutions)	Recognised the fear in job losses and regulating the informal economy as a challenge	Bottom up approaches lacking in ability to challenge the more powerful actors

Source: authors

KENYA

In Kenya, the nomadic regions in the country are generally arid and semi-arid (ASAL) with high temperatures and low levels of annual precipitation. These regions are amongst the most marginalised districts in the country.

Moreover, these communities live a lifestyle which involves frequent resettlement in search of fresh water and pasture for their livestock. Due to the pastoralists' constant resettlement, children from these ASAL communities have found it difficult to access the Kenyan stationary and formal education system. In Kenya, existing government policies for improving access and equity of education are aimed at addressing an imbalance in enrolment, completion rates and academic achievement between children of ASAL and the rest of the country. However, these issues are usually addressed through a single delivery approach, where the norm is to teach in fixed classrooms, timings and locations. This is inflexible and in conflict with the nomadic lifestyle.

As a potentially transformative innovation initiative, mobile schools are essentially temporary structures. Mobile schools utilise materials that are portable and can easily be transported by camel as communities travel in search of water and pasture for their livestock. In this type of educational strategy, there is a recognition and respect for the economic, social, environmental, cultural fabric and religious norms in the nomadic lifestyle. The implementation of the nomadic education framework has led to the expansion of mobile schools in the form of tents, boats or buses depending on the local terrain. In addition, mobile school teachers are derived from within the nomadic community, and are trusted by the community elders to handle their children. This contributes to addressing sustainability concerns and inclusion, among other issues.

TABLE 3: INSIGHTS FROM KENYA'S TRANSFORMATIVE INNOVATION POLICY CASE STUDY

CRITERIA	DIRECTIONALITY	CRITERIA	SYSTEM LEVEL IMPACT	LEARNING AND REFLEXIVITY	CONFLICT VS CONSENSUS	INCLUSIVENESS
Kenya	Access to quality education is a priority Mobile schools complement the nomadic lifestyle, contributes to formal education and support national development	SDGs 1-6, 8, 10-13, 16-17 Agenda 2063: 1- 5, 7, 12-14, 17-19 STI Act, 2013 and the Big 4 Agenda (2018-2022)	System level impact in education, health, environment, peace, security and justice	Existing routines and practices are being questioned, because sedentary schooling may not be appropriate for the nomadic population	Recognition that there are differences in nomadic life. Trade-offs are recognised	Parents and local community are involved in the delivery

Source: authors

SENEGAL

Senegal has recently adopted a new development model to accelerate its progress towards economic growth. This strategy, known as Plan Senegal Emergent (PSE), is the benchmark for economic and social policy in the medium and long term with the aims to improve the well-being of the population through inclusive growth.

Faced with the growing and sustained trend in the number of students opting for traditional public universities and the shortage of spaces; the Senegalese authorities decided to integrate distance education into higher education. In this regard, the Virtual University of Senegal (UVS) serves as a case study on transformative innovation through the use of ICTs in higher education through.

The UVS is a public digital university, which aims to provide the Senegalese population, youths in particular, with equitable access to higher education. The UVS takes into consideration the population growth and rapid trends in ICT, which will require new ways of equipping students in the digital age. In the implementation of the UVS, the Ministry of Higher Education, Research and Innovation (MESRI), has provided the Espace Numérique Ouvert (ENO) (open digital spaces). The ENOs are physical infrastructures, facilitating access to digital materials for students and providing ICT equipment.

Learning at the UVS combines in person (i.e. physical presence) with online training, and progressively decreasing in-person sessions as the student advances in its curriculum.

The conceptualisation of the UVS started in the 2000s. It was eventually established in September 2013, by a presidential decree. The university started with an initial student registration of around 2,050. By 2018, the number of students associated with UVS has grown to more than 28,000 and the first cohort has since graduated. The UVS slogan in Wolof, "foo nekk foffu la" means literally "where you are, is where it happens" signifying that its aim is to socialize education within the local communities where students live, and in so doing, ensure that students are local agents for change. The UVS is a significant innovation in higher education in Senegal due to a dual need to absorb the growing number of new graduates and to consider societal concerns through the integration of technology enhanced teaching and learning.

TABLE 4: INSIGHTS FROM SENEGAL'S TRANSFORMATIVE INNOVATION POLICY CASE STUDY

CRITERIA	DIRECTIONALITY	SOCIETAL GOALS	SYSTEM LEVEL IMPACT	LEARNING AND REFLEXIVITY	CONFLICT VS CONSENSUS	INCLUSIVENESS
Senegal	Reduce (1) inequality of access to higher education; and (2) digital divide, in line with market demand (ICT) Education viewed as part of a knowledge economy Improving (1) access to higher education (enrolments) and (2) youth employability	SDGs 1-5, 8, 8-10, 16-17 Agenda 2063: 1, 2, 4, 7, 10, 11, 13, 14, 16-17 Plan Senegal Emergent (PSE), 2014	Strong focus on regional development- (revitalizing particularly rural, landlocked or remote areas)	Historically, distance learning projects in Africa have often been aimed at passing on courses created in European or American universities to African students UVS courses are entirely designed and delivered by Senegalese teachers	Parents at first hesitant or lack understanding of distance/ virtual learning. Over time this perception had changed. Parents' teachers association are critical for bridging this divide (parents association and unions)	Reducing gender inequalities in access to education

Source: authors

LESSONS LEARNT AND INSIGHTS FROM THE COUNTRY CASE STUDIES

The three-country case studies have provided useful lessons on the prospects for transformative innovation and possible pathways to the formulation, implementation, evaluation and governance of transformative innovation policies in Africa.

The one-year exploratory research revealed that top down approaches in Ghana's case study, had some actors dominating the policy space, at the expense of less powerful groups (e.g. beneficiaries) are still prevalent within the Africa TIP policy ecosystem. This disconnect – among strong actors, weaker actors, and beneficiaries – could potentially have a detrimental impact once initiatives are implemented, because of a lack of buy-in from users. Another key insight from Kenya's case study is the strong recognition that existing culture and lifestyle is preserved among the local communities in the formulation, implementation, evaluation and governance of innovation (but also, public) policies.

Therefore, mobile schools complement the nomadic lifestyle by providing flexibility, job opportunities for the pastoralists, and a break from the traditional way of learning. Furthermore, in Senegal, by recognising that students, and individuals in general, are local agents for change, placing a strong emphasis on community-driven learning for example, can be a major factor in the success of innovation for transformative change programmes. In recognising this key element for transformation, the ENO model facilitates a regional approach to education, and thus mitigates youth migration to the cities.

OUTCOMES FROM THE TIP AFRICA EXPLORATORY HUB

1

Capacity building on TIP with a group of Sub-Saharan Africa (SSA) countries involved in the SCGI

2

Three African countries that have taken part in a deeper analysis of the prospects for TIP through a country review and Transformative Innovation Learning Histories (TILH) methodology

3

More explicit linkages between the work of SGCI and TIPC in SSA countries

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TILH Ghana http://www.tipconsortium.net/publication/transformation-innovation-learning-history-of-ghanas-e-waste-management-system/

TILH Kenya http://www.tipconsortium.net/publication/nomadic-education-in-kenya-a-case-study-of-mobile-schools-in-samburu-county-as-a-transformative-innovation-policy/

TILH Senegal http://www.tipconsortium.net/publication/ict-in-higher-education-in-africa-example-of-the-virtual-university-in-senegal/

TIPC website – http://www.tipconsortium.net/

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FURTHER INFORMATION