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**Technology assessment in Africa  
CSTD side event organised by UNCTAD**

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**Background document**

- Technology assessment is a problem-oriented process that examines the societal effects when technologies are introduced, extended, or modified. It provides effective, pragmatic, socially, and environmentally sustainable options for policy action.
- Lack of technology assessment approaches that can consider different contexts and settings holds back the broader use of assessments of critical technologies.
- As UNCTAD launches its technology assessment project in the energy and agricultural sectors in Africa, this policy brief looks at the state of technology assessment in the continent.

Technology assessment (TA) is a multidisciplinary, inclusive, interactive, and communicative approach that helps form public and political opinions about the risks and benefits of technologies when they are introduced, extended, or modified. The main feature that distinguishes TA from other tools like risk assessment is that TA is participatory, allowing a diverse range of voices to be heard. The information that TA provides can play an essential role in the formulation of science, technology, and innovation (STI) policies, but also agricultural, energy, and other sectoral policies. TA is a method that can help countries to evaluate the impacts and possible systematic and unintended effects of technologies and bring these issues into development plans at all levels.

Only a few countries in the world have consolidated capacities for TA in place, and it is often not being conducted in developing countries owing to a lack of capabilities and institutions. A new UNCTAD project on technology assessment will support STI policymakers and other stakeholders in selected African countries to design and implement a technology assessment exercise in the energy and agricultural sectors.<sup>1</sup>

**Why does TA matter for policymaking and technology governance?**

Technology assessment is vital for policymaking and technology governance to ensure that we design technologies in an inclusive and sustainable manner or to put it simply, design technology for good. The COVID-19 pandemic has increased the relevance of proper planning and strategic resource allocation to technologies that better respond to health, economic and social challenges, especially considering the pandemic-induced disruption of global value chains. TA is a critical tool that contributes to establishing technologies and related policies and ethical standards that are best suited for society. TA has a bearing on policymaking regarding knowledge commercialization, domestic investment in research and innovation, environmental regulation, foreign direct investment, and many aspects of sustainable development. In some countries, increased awareness of social, environmental, and health risks associated with some technologies or technological changes contributed to the broader use of TA. Several

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<sup>1</sup> For more about the project see: <https://unctad.org/project/technology-assessment-energy-and-agricultural-sectors-africa-accelerate-progress-science>.

developing countries have witnessed unsuccessful investment projects in dams, irrigation schemes<sup>2</sup>, and telecommunications<sup>3</sup> because they did not make appropriate technology choices. In many parts of the world, significant investments in transport, agriculture, and energy have disrupted habitats and wildlife and led to environmental degradation<sup>4</sup>. There are also cases of social resistance to new technologies because they are introduced into communities or economies without appropriate or adequate engagement with intended users<sup>5</sup>. The rationale for technology assessment is to consider expert knowledge and public opinion that can inform policy.

### The state of TA in Africa

TA activities in Africa are minimal as the process is relatively new and less institutionalized on the continent than in other regions. When stakeholders attempted to consolidate TA as a policy tool, several barriers emerged. Most of the TA exercises or TA-like activities (such as public forums and multistakeholder dialogues) conducted in Africa are ad hoc, often framed as risk assessment or cost-benefit analysis. The definition and practical use of TA is unsystematic on the continent despite pockets of TA-like activities.

Several initiatives focused on biotechnology, nanotechnology, and advanced manufacturing technologies (see Table 1). Still, they were not integrated into the design of STI policies or did not feed into specific policy agendas. This may be attributed to the specialized, technical nature of the existing TA knowledge and methodologies primarily found in academic publications which are inaccessible or little-known to policymakers. There is a lack of awareness and understanding of the vast research and latest discourses surrounding TA, particularly in STI government departments and STI parliamentary committees in Africa, which present an obstacle for TA activities. There have been some efforts to increase awareness and encourage multi-stakeholder participation in TA activities. One example is the Africa Forum on Science, Technology and Innovation hosted by the African Development Bank (AfDB), that allows state actors to engage with experts, the private sector, and civil society to create a common roadmap for scaling up STI in Africa.

Table 1: Examples of TA-like activities in Africa

Country	Sector	Project
Kenya	Biotechnology	Community engagement in the adoption of new agricultural biotechnologies by farmers encouraged more widespread adoption of tissue-culture banana by smallholder farmers in Kenya. <sup>6</sup>

<sup>2</sup> Djangba J F et al. (2014). Failure and success factors of irrigation system developments: a case study from the Ouémé and Zou valleys in Benin. *Irrigation and drainage*. 63(3): 328-339.

<sup>3</sup> Herselman M (2003). ICT in Rural Areas in South Africa: Various Case Studies. InSITE 2003. Volume 3.

<https://doi.org/10.28945/2680>.

<sup>4</sup> Lucas P S et al. (2017). Railway Disturbances on Wildlife: Types, effects, and mitigation measures. In: Borda-de-Água L et al. (eds). *Railway Ecology*. Springer. Cham.

<sup>5</sup> Mosala K and E Chinomona (2020). Motorists' attitudes towards implementation of e-tolls in Gauteng Province, South Africa. *International Journal of eBusiness and eGovernment Studies*. 12(1): 48-62.

<sup>6</sup> Bandewar S V S et al. (2017). The role of community engagement in the adoption of new agricultural biotechnologies by farmers: The case of the Africa Harvest tissue-culture banana in Kenya. *BMC Biotechnology*. 17(1).

Mali	Biotechnology	Male and female farmers provided policy recommendations to expert studies on the use of genetically modified organisms through citizens' juries. <sup>7</sup>
South Africa	Advanced manufacturing technologies	Through the "infrastructure dialogues", senior government, private sector, and civil society stakeholders exchange ideas on modern technologies in the infrastructure sector. <sup>8</sup>
Uganda	Energy	The Uganda Christian University run a survey to measure local acceptance of energy produced from waste material. <sup>9</sup>
Zimbabwe	Nanotechnology	A series of "nano-dialogues" allowed local community members to engage with scientists and members of government on debates around nanotechnologies. <sup>10</sup>

To understand the place of African TA in the broader national, regional, and international context, it is helpful to take stock of some policy frameworks containing provisions for TA that can guide the design and implementation of TA exercises.

International environmental, health, technology, and trade policy frameworks like the 1992 Convention on Biological Diversity<sup>11</sup> and its Cartagena Protocol on Biosafety<sup>12</sup>, the 2030 Agenda for Sustainable Development, the 2015 Paris Agreement, and WTO agreements on trade<sup>13</sup> have all some provisions for TA that concern African countries. Regional economic and trade integration frameworks such as the Agreement Establishing the African Continental Free Trade Area (AfCFTA) could also guide African TA. They contain some direct and indirect TA provisions.<sup>14</sup>

Only a few African countries, including Kenya, Namibia, Uganda, and Tanzania have explicit national policies and legislation related to TA. The few explicit national TA policy and legislative frameworks make it difficult to institutionalize and implement TA in more African countries. It is common for energy, health, ICT, and transport ministries or government agencies to keep TA-related activities in their silos despite conducting similar activities on an ad hoc basis. There are also weak links between executive arms like STI departments and parliamentary committees on STI at the national level. Fragmentation of the institutional arrangements and actors may undermine learning, anticipation, and feedback from TA exercises in Africa.

<sup>7</sup> Pimbert M (2007). A citizens' space for democratic deliberation on GMOs and the future of farming in Mali: background information for an IIED critical theme. Available at <https://pubs.iied.org/sites/default/files/pdfs/migrate/G02367.pdf>.

<sup>8</sup> Development Bank of South Africa et al. (2017). The South African Conversations on Infrastructure. A Compendium of the Infrastructure Dialogues. Available at [https://www.sacities.net/wp-content/uploads/2019/12/201705\\_SACN-Infrastructure-Dialogues-2017-Compendium-WEB.pdf](https://www.sacities.net/wp-content/uploads/2019/12/201705_SACN-Infrastructure-Dialogues-2017-Compendium-WEB.pdf).

<sup>9</sup> Agunyo M, E K Bacwayo and S Kizza-Nkambe (2020). Assessment of the socio-cultural viability of integrated-to-energy systems for Uganda. *International Journal of Renewable Energy Technology*. 272-294.

<sup>10</sup> Grimshaw D J, J Stilgoe and L D Gudza (2006). Globalization and the diffusion of nanotechnologies to help the poor. Report on the nano-dialogues held in Harare, Zimbabwe, 15, 16 and 22 July 2006. Available at <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.615.6542&rep=rep1&type=pdf>.

<sup>11</sup> See Articles 14 and 25.

<sup>12</sup> See Article 26.

<sup>13</sup> See Article 12 of the WTO Agreement on Technical Barriers to Trade.

<sup>14</sup> See Articles 2, 21 and 26 of the Protocol on Trade in Goods under the AfCFTA.

TA capacity will become increasingly important for African countries that seek to accomplish the aspirations of the Sustainable Development Goals (SDGs) and the African Union's Agenda 2063. Both agendas recognize STI as a critical enabler of sustainable development. Despite the sparse TA activity in Africa seen today, the continent has the necessary actors, capacity-building programs, and political will to develop a framework for TA policy and practice suited to the realities on the ground. The aim of UNCTAD's recently launched technology assessment project in Africa is indeed to support countries in developing the capacity to design and run TA exercises.

### **How to address challenges surrounding TA in Africa?**

Given the far-reaching social and developmental benefits of TA, African countries could strengthen their TA capacity by raising awareness of TA and broadening the continent's TA knowledge base. This can be done by conducting public hearings, soliciting written inputs through a call, creating an online TA newsletter, policy briefs, or virtual forums. Such awareness-raising initiatives would go a long way in ensuring equitable participation of different stakeholders from various African countries and encouraging information sharing. Countries need to make a conscious effort to create a conducive environment for inclusive learning, discussion, and feedback while ensuring that gender perspectives and perspectives of marginalized groups are included in public discourses around TA. Designing and disseminating technologies in a gender-sensitive manner considers that technologies may impact men and women differently. Taking this approach would help support the uptake of some new technologies in society, especially for women who have lower technology adoption rates than men.<sup>15</sup>

There is an opportunity to draw on regional arrangements for TA. African countries need to take ownership of their TA activities by developing and implementing guidelines for TA that take into account local contexts, needs, and realities. Procedures need to draw on insights from international good practices and methodological tools for TA worldwide. A systematic approach will help to institutionalize TA in Africa and ultimately allow government officials to support the safe, inclusive, and sustainable technology introduction in societies through strategic and carefully planned TA missions. An African network for technology assessment could be established with UNCTAD's technical support, including other stakeholders such as the African Union or the UN interagency task team on STI for the SDGs. The network could counterbalance the different levels of STI policy development of African countries, which create disparities in the expertise and institutional capacities required for TA. There is also a need for regional and international partnerships to strengthen policy and legislative frameworks for TA.

Technology assessment taking place in silos could be remedied by developing partnerships across various institutions, which include but are not limited to government ministries, parliament, research institutions, funding institutions, regional economic communities, citizen juries, and international organizations. Skills can be enhanced through short-term training courses and at universities that are already active in research on TA, as revealed by a bibliometric analysis<sup>16</sup> which found public universities to be the primary institutional actors for TA in Africa at the moment. Governments and parliaments need to be encouraged to support their officials to attend and participate in such courses by providing fellowships, scholarships, or other incentives.

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<sup>15</sup> See UNCTAD (2011). Applying a gender lens to science, technology and innovation. Available at <https://unctad.org/news/applying-gender-lens-science-technology-and-innovation>.

<sup>16</sup> Ouma-Mugabe J, A Pouris and N Mizeru Hakizimana (2021). An exploratory review of technology assessment in Africa.

This policy brief provides a starting point to help various stakeholders understand the current TA ecosystem in Africa. The above recommendations and UNCTAD's technology assessment project could place African countries in a better position to benefit from TA activities.