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Building Capacity in Science, Technology, and Innovation for Africa's Transformation:

The Role of Private Sector

Contributed by the Knowledge and Learning Department

The Issue

The call to industrialize and modernize Africa has become popular in recent years, and the African Union's Agenda 2063 and the Common African Position on Agenda 2030 identify science, technology and innovation (STI)[1] as key enablers. Many African countries fail to achieve their development targets partly as a result of underdeveloped and underused science and technology as well as limited invention and innovation by both the private and the public sectors.

For most African countries, the major proportion of domestic contribution to research and development (R&D) activities is provided by the government, with little from the private sector. The Africa Capacity Report 2017 (ACR 2017) found that underdevelopment in Africa is closely linked to the limited capacity to deploy STI for inclusive sustainable development and transformation. The Report helps policymakers draw conclusions critical to STI issues, and derives policy recommendations that strengthen the policy formulation, implementation, and impact of STI.

The Study

The ACR 2017 is based on a survey of 44 African countries profiling the STI dimensions in Africa. It examines the status of STI, delving into initiatives, challenges, and capacity gaps for African countries, regional economic communities, the African Union, and nonstate actors to pursue STI-driven activities. And it puts forward several policy options for institutions of higher learning, governments, the private sector, the civil society and development partners to integrate STI into Africa's growth and build the required capacity in STI as a key enabler to achieving Africa's development targets.

Key Emerging Issues

Africa accounts for about 5 percent of global gross domestic product, but is responsible for only 1.3 percent of global expenditure on Research and Development (UNESCO 2015). The continent has been slow to develop its science and technology sectors and to commercialize its innovations. For example, only about 0.45 percent of Africa's GDP is allocated as expenditure on (R&D), far from the global average of 1.70 percent and way below Brazil's 2.08 percent. The figure is even distant from the 1 percent target set by the Lagos Plan of Action and the AU 2007 initiative.

Only 12 African countries of the 141 countries surveyed for the 2015 Global Innovation Index were ranked among the top 100 innovation achievers. Africa's performance on the 2016 Network Readiness Index ranking was very poor. Only one out of the 31 African countries surveyed was in the world's top 50 network-ready countries. In particular, Africa has poor STI infrastructure, a small pool of researchers, low patronage of science and engineering programs, weak intellectual property frameworks, and low scientific output relative to the rest of the world.

The Africa Capacity Report 2017 shows that STI capacity is the biggest challenge in Africa. The limited STI capacity is a result of numerous factors largely within the control of African governments and other key stakeholders. Overall, Africa lacks the required capacities to develop effective STI policies and strategies and to implement them. The annual survey of 44 African countries undertaken by ACBF in 2016 to produce the ACR 2017 showed that African countries consider training as a High or Very High priority area in STI, so institutions of higher learning should tailor-make their training approaches to meet Africa's STI needs. African countries take a short-term approach in developing STI skills development, evident in low public spending on research and development and visibly poor scientific infrastructure.

Patent rights and trademarks need to be developed and that production of scientific papers increased. Yet, African countries have weak capacity to retain their few qualified scientists and engineers, and mass migration of African skilled scientists and other experts—called the "brain drain"—has further depleted Africa's STI capacity. For instance, from 2007 to 2011, the number of tertiary-educated African migrants from the continent who had migrated was estimated at 450,000, exceeding the number of equivalent Chinese migrants (375,000).

Africa incurs a net loss in skilled human capital with the critical technical skills required to foster Africa's sustainable development. Zimbabwe (43 percent), Mauritius (41 percent), and the Republic of the Congo (36 percent) recorded the highest proportions of educated persons living in OECD countries. Burundi, Algeria, Mauritania, Chad, and Guinea are the top five African countries least able to retain their top talent. So, Africa's training institutions are somehow subsidizing other developed regions.

Another challenge in Africa is the lack of accurate data to enable targeting of STI policies and strategies due to the multi-sector nature of STI. The lack of a robust common set of African STI indicators has constrained the continent's capacity to make evidence-based decisions on STI.

1 Science, technology, and innovation refers to all systematic activities concerned with generating, advancing, disseminating, and applying scientific and technical knowledge in all fields of science and technology—the natural sciences, engineering, medical, and the social sciences and humanities (ACBF 2017).

The number and composition of female researchers show a huge disparity between the participation of females in research and that of their male counterparts—a result of the underrepresentation of females in STEM education and in higher and tertiary education more generally.

Capacity Imperatives for the Private Sector

The private sector in Africa has limited innovation capacity, so it cannot leverage STI to be efficient and competitive. The business focus is largely on primary industries and processing and high-tech industries limits the scope for R&D and the use of STI. Due to funding challenges, the private sector can use the centers of excellence as entry points to increase their generation and application of S&T and to promote technology-based entrepreneurship. Monitoring business activities at all levels and evaluating the whole business model is a critical STI capacity needed most for STI governance. Strong monitoring and evaluation systems are essential to strengthen national planning and budgeting.

Intellectual property protection encourages the use and development of local inventive and artistic talents and assets. It also nurtures and safeguards local IP assets such as traditional knowledge and folklore. And it attracts investment, providing stable environment for investors, local and foreign, to be confident that their rights will be respected.

IP infrastructure allows participation in the exchange of commercially valuable information at the international level as promoted by the World Intellectual Property Organization, including quick and easy access to information in new technology such as international patent applications and abstracts. A well-functioning IP system also contributes to stability and security for protected rights and can combat illegal activities such as counterfeiting and piracy.

The ACR 2017 found that significant support is needed for sustainable partnerships, especially for human capital development through training, knowledge, and experience sharing and through facilitating the mobility of scientists and engineers. Private sector strategies should be in line with the government policy on STI, so that STI interventions complement each other (box 1).

Implications

Africa has made some improvement in developing STI capacity at all levels, though progress is limited by capacity challenges. The capacity challenges at national, regional and international levels revolve around STI training and development, knowledge production, and technological innovation. Thus, partnerships (especially private-public) become important interventions. The private sector has a critical role in building Africa's capacity in science, technology, and innovation. So it must be committed to taking the responsibility (together with governments) for investing in science, technology, mathematics, and engineering to boost the skills base of human capital that can innovate and apply scientific methods. Entrepreneurs should have a long-term vision and view investment in human capital yielding positive returns in increased productive efficiency.

The private sector should see leveraging science, technology, and innovation as essential in a global economy driven by technological advance.

It should constantly monitor implementation of STI plans at firm level to keep abreast of economic and technological transformations, to anticipate emerging socio-economic developments, and to use the outcomes to select areas for further innovation and investment in partnership with the public sector.

Box 1: Private–public investments in STI in Africa

In most African countries, the major proportion of domestic contribution to R&D activities is provided by the government, with little from the private sector. But the private sector can do a lot to build capacity in STI. For instance, the interventions can set up institutions of research and higher learning that focus on science education or award scholarships to students studying science and technology, mathematics and engineering and innovation systems at Masters and PhD levels.

Benin, Cameroon, the Republic of Congo, Togo, and Zambia have privately owned science and technology specialized institutions. Egypt, Kenya, Nigeria, Sudan and Tanzania have a combination of private and public specialized S&T universities, with a growing emphasis on private-public partnerships. In Nigeria, the African University of Science and Technology, founded in 2007 with ACBF support, is a private educational and applied research university offering courses in science, technology and engineering. The private sector can also play a leading role in the application of STI, as with the development of M-PESA in Kenya, a mobile money phone application that has supported massive financial inclusion in Kenyans rural areas.

For greater gender inclusion in STI, the private sector can award scholarships to female students pursuing science, technology, mathematics, engineering, and innovation systems at Masters and PhD levels.

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