Science, Engineering and Economic Growth in Africa: Development Cooperation Challenges and Opportunities

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Advances and innovations in science and technology have been essential catalysts of growth for developing societies; most readily apparent in the growth surge in Asia in recent decades. Yet sub-Saharan African countries continue to lag behind in science, technology, and engineering developments and applications.

On January 9, Dr. Calestous Juma, Professor of the Practice of International Development at Harvard's Kennedy School of Government, gave a talk on "Science, Engineering and Economic Growth in Africa" at the National Academy of Sciences. Brookings's Africa Growth Initiative—which conducts high-quality policy research and analysis focused on attaining sustainable economic development and prosperity in Africa—was a co-sponsor of this lecture.

As an internationally-recognized authority and leader in the application of science, engineering and innovation to sustainable development in developing and developed countries, Juma's lecture explored the role that emerging technologies can play in fostering economic growth and improving human welfare in Africa, and it focused on opportunities for development cooperation in light of the current global food and financial crises.

Professor Juma began by framing Africa as a continent that lags behind the rest of the world in terms of its contributions to scientific and technological advances, as indicated by the small number of scientific publications and patents emanating from Africa. Science and technology could have a great impact on development in African countries, and Juma suggests that the developed countries should look for areas of policy convergence with developing countries, in areas such as infrastructure, climate change and energy, agriculture, education, and business development.

Juma noted that a good example of policy convergence is China's substantial increase in investment in Africa in the last decade. China is interested in the vast natural resources of the continent, while Africa is interested in China's investment in infrastructure and also in their training of African engineers and workers. Other examples of policy convergence between the United States and Africa can be found in the Brookings Global publication "Top 10 Global Economic Challenges Facing America's 44th President." John Page, Distinguished Visiting Fellow in the Africa Growth Initiative, proposes several policy areas where the U.S. should partner with Africa to achieve development challenges in "Supporting Africa's Growth Turnaround."

Professor Juma remarked that we are living in an age of technological abundance, where technical knowledge doubles every 12–14 months, increasing exponentially, and over time the intervals between research and commercialization of new products are significantly decreasing. Moreover, globalization has linked networks of researchers worldwide that continue to advance scientific and technological innovation. Partnerships between developed and developing countries are a necessary part of this globalization and evolution.

In the area of infrastructure, Juma focused on the impact of cellular phones and high-speed internet access. Mobile phone technology is bypassing traditional technologies in some areas of Africa that never have had telephone lines. Few foresaw a market for cell phones in Africa, but now they are an integral part of Africa's development. There are even new technologies now that allow money to be transmitted via cell phones, completely changing traditional banking systems and the way payments are made and remittances are sent.

The next goal that Professor Juma looks forward to in Africa infrastructure and communication is substantially increased availability to high-speed internet access. Africa currently has very few points of connectivity with undersea cables for high-speed internet, drastically fewer than the U.S., Europe, and Asia. There are new proposals on the table by various companies to further link up the continent with the rest of the world, particularly Eastern Africa. Juma views this advancement as crucial to education and development in Africa.

Another area where developed and developing countries' interests converge is in energy and climate change solutions. According to the Brookings-Blum 2008 Roundtable report, "Double Jeopardy: What the Climate Crisis Means for the Poor," developing countries now emit approximately half of greenhouse gases worldwide. And in terms of climate change impact, the poorest countries will be the hardest hit. Professor Juma discussed the importance for Africa to explore new energy sources and make use of new technologies such as wind and solar power to reduce future emissions. Light emitting diode (LED) technology could be an efficient and practical replacement for fluorescent lighting. Professor Juma also envisions African partnerships with automobile manufacturers to produce more efficient and affordable transportation.

In health, Juma sees opportunities for science and technology partnerships, particularly in vaccine development and new diagnostic kits. He highlighted one specific advancement in DNA testing kits that scales down typical DNA separating centrifuges into portable CDs that can perform the same function. These compact kits will allow laboratories to be taken to the villages, rather than villagers having to travel to the laboratories.

And in education, Professor Juma is actively involved in the new "One Laptop per Child" initiative to make low-cost laptops available to every primary school child. It took 500 scientists 2 years to develop the technology for these new affordable laptops, and thus far 600,000 have been distributed all over the world through philanthropic donations. Juma is

excited about the prospect for revolutionizing the way students and teachers interact both in school and with the global network, changing the face of education in developing countries.

The possibility for all of these advancements however, is dependent on strategic partnerships with developed countries and leading research centers. Juma considers universities to be vital partners, both in terms of research and development, and in terms of educating a new generation of doctors, scientists and engineers. The United States and other countries should work with these partners to explore and advance their common interests.