

AGRICULTURAL INNOVATION IN AFRICA PROJECT

# THE NEW HARVEST

## AGRICULTURAL INNOVATION IN AFRICA



**BELFER CENTER**  
for Science and International Affairs  
John F. Kennedy School of Government  
Harvard University



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## PROJECT BACKGROUND AND RATIONALE

African agriculture is at the crossroads. Persistent food shortages are now being compounded by new threats arising from climate change. But Africa faces two major opportunities that can help transform its agriculture and use it as a force for economic growth. First, advances in science and technology worldwide offer African countries new tools needed to promote sustainable agriculture. Second, efforts to create regional markets will provide new incentives for agricultural production and trade. This is the focus of the Agricultural Innovation in Africa (AIA) project. The project seeks to disseminate policy-relevant information on how to align science and technology missions with regional agricultural development goals. It does so in the context of the larger agenda to promote regional economic integration and development.

The AIA project builds on the findings of the expert report *Freedom to Innovate: Biotechnology in Africa's Development* prepared by the High Level African Panel on Modern Biotechnology of the African Union (AU) and the New Partnership for Africa's Development (NEPAD). The panel's main recommendations include the need for individual countries in central, eastern, western, northern and southern Africa to work together at the regional level to scale up the development of biotechnology. The upcoming study, *The New Harvest: Agricultural Innovation in Africa*, is a continuation of that effort. As detailed in the chapter outline that follows, it positions the agriculture at the center of efforts to spur economic development in Africa. It outlines the policies and institutional changes needed to promote agricultural innovation.

# THE NEW HARVEST

## AGRICULTURAL INNOVATION IN AFRICA

### 1. AGRICULTURE AND ECONOMIC GROWTH

The current global economic crisis, rising food prices and the threat of climate change have reinforced the urgency to find lasting solutions to Africa's agricultural challenges. Africa is largely an agricultural economy with the majority of the population deriving their income from farming. Most policy interventions have focused on "food security", a term that is used to cover key attributes of food such as sufficiency, reliability, quality, safety, timeliness and other aspects of food necessary for healthy and thriving populations. This chapter outlines the critical linkages between food security, agricultural development and economic growth and explains why Africa has lagged behind other countries in agricultural productivity. It argues that improving Africa's agricultural performance will require deliberate policy efforts to bring higher technical education, especially in universities, to the service of agriculture and the economy. It focuses on how to improve the productivity of agricultural workers, most of whom are women, through technological innovation.

### 2. TECHNOLOGICAL ADVANCEMENT

The Green Revolution played a critical role in helping to overcome chronic food shortages Latin America and Asia. The Green Revolution was largely a result of the creation of new institutional arrangements aimed at using existing technology to improve agricultural productivity. African countries are faced with enormous technological challenges. But they also have access to a much larger pool of scientific and technical knowledge that was not available when the Green Revolution was launched. The aim of this chapter is to review major advances in science, technology and engineering and identify their potential for use in African agriculture. This exploration will also include an examination of local innovations as well as indigenous knowledge. It will cover fields such information and communications technology, genetics, ecology and geographical sciences. It will emphasize the convergence of these and other fields, and their implications for African agriculture.

### 3. ENABLING INFRASTRUCTURE

Enabling infrastructure (covering public utilities, public works, transportation and research facilities) is essential for agricultural development. Infrastructure is defined here as facilities, structures, associated equipment, services, and institutional

arrangements that facilitate the flow of agricultural goods, services and ideas. Infrastructure represents a foundational base for applying technical knowledge in sustainable development and relies heavily on civil engineering. The aim of this chapter is to outline the importance of providing an enabling infrastructure for agricultural development. Modern infrastructure facilities will need to reflect the growing concern over climate change. In this respect, the chapter will focus on ways to design “smart infrastructure” that takes advantage of advances in the engineering sciences as well as ecologically-sound systems design. Unlike other regions of the world, Africa’s poor infrastructure represents a unique opportunity to adopt new approaches in the design and implementation of infrastructure facilities.

#### 4. AGRICULTURAL INNOVATION SYSTEMS

The use of emerging technology and indigenous knowledge to promote sustainable agriculture will require adjustments in existing institutions. New approaches will need to be adopted to promote close interactions between government, business, farmers, academia and civil society. The aim of this chapter is to identify novel agricultural innovation systems of relevance to Africa. It will examine the connections between agricultural innovation and wider economic policies. Agriculture is inherently a place-based activity and so the study will seek to outline strategies that reflect local needs and characteristics. Positioning sustainable agriculture as a knowledge-intensive sector will require fundamental reforms in existing learning institutions, especially universities and research institutes. Most specifically, key functions such as research, teaching, extension and commercialization need to be much more closely integrated.

#### 5. HUMAN CAPACITY

Some of Africa’s most persistent agricultural challenges lie in the educational system. Much of the focus of the educational system is training young people to seek employment in urban areas. Much of the research is carried out in research institutions that do not teach while universities have limited access to research support. The aim of this chapter is identify new ways to enhance competence throughout the agricultural value chain. The chapter stresses the need to build the capacity of rural women who perform most agricultural tasks. The chapter will take pragmatic approach that emphasizes competence-building as a key way to advance social justice. Most of the strategies to strengthen the technical competence of African farmers will entail major reforms in existing universities and research institutions. In this respect, the proposals will need to be considered in the context of agricultural innovation systems.

## 6. BUSINESS DEVELOPMENT

The creation of agricultural enterprises represents one of the most effective ways to stimulate rural development. The chapter will review the efficacy of the policy tools used to promote agricultural enterprises. These include direct financing, matching grants, taxation policies, government or public procurement policies and rewards to recognize creativity and innovation. The chapter will draw on examples such as China's mission-oriented "Spark Program" which helped to popularize modern technology in rural areas and has spread to more than 90 percent of the country's counties. Inspired by such examples, this chapter will explore ways by which African countries could create incentives that stimulate entrepreneurship in the agricultural sector. The chapter will take into account new tools such as information and communication technologies and the extent to which they can be harnessed to promote entrepreneurship.

## 7. REGIONAL INNOVATION SYSTEMS

African countries are increasingly focusing on promoting regional economic integration as a way to stimulate economic growth and expand local markets. Considerable progress has been made in expanding regional trade through regional bodies such as the Common Market for Eastern and Southern Africa (COMESA) and the East African Community (EAC). There six other such Regional Economic Communities (RECs) that have been recognized the African Union as building blocks for pan-African economic integration. So far regional cooperation in agriculture is in its infancy and major challenges lie ahead. This chapter will explore the prospects of using regional bodies as agents of agricultural innovation through measures such as regional specialization. The chapter will also explore ways to strengthen the role of the RECs in promoting common regulatory standards.

## ACKNOWLEDGMENTS

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## PANEL MEMBERS

**Calestous Juma** is Professor of the Practice of International Development and Director of the Science, Technology, and Globalization Project at the Harvard Kennedy School. He also directs the Agricultural Innovation in Africa Project funded by the Bill and Melinda Gates Foundation.

**N'Dri Assié-Lumumba** is Professor of African and Diaspora Education at the African Studies and Research Center of Cornell University. She is editor of *Women in Higher Education in Africa: Reconceptualizing Gender-Based Human Capabilities and Upgrading Human Rights to Knowledge*.

**Zhangliang Chen** is Vice Governor of Guangxi Province, China. Professor and former President of China Agricultural University, Professor Chen was appointed as Vice Governor of Guangxi Province in 2008, in charge of agriculture, rural development as well as science and technology in the province.

**Daniel Kammen** is Professor in the Energy and Resources Group; Professor of Public Policy, Goldman School of Public Policy; Professor of Nuclear Engineering; and Director of the Renewable and Appropriate Energy Laboratory at the University of California, Berkeley.

**Margaret Kilo** is Head of Fragile States Unit, African Development Bank. Margaret Kilo holds a PhD in International Development Education from Stanford University and a Masters in Sociology of Education from the University of London Institute of Education.

**Hiroyuki Kubota** is the current Executive Advisor to Director-General for Rural Development Department at the Japan International Cooperation Agency (JICA). He has extensive experience in international agricultural cooperation in Asia, Africa and Latin America.

**Magdy Madkour** is Professor and Head of Biotechnology, Arid Lands Agricultural Research Institute, Faculty of Agriculture, Ain Shams University, Egypt. He was the Assistant Director General for International Cooperation at the International Center for Agricultural Research in the Dry Areas (ICARDA) from 2004-2006.

**Francis Mangeni** is Director of Trade, Customs and Monetary Affairs, with the Common Market for Eastern and Southern Africa (COMESA) in Lusaka Zambia. Dr. has previously worked for the African Union and the Economic Commission for Africa in Addis Ababa.

**Venkatesh Narayanamurti** is Benjamin Peirce Professor of Technology and Public Policy; Professor of Physics, Harvard; Director, Science, Technology, and Public Policy Program; Co-Principal Investigator, Energy Research, Development, Demonstration, and Deployment Policy Project.

**Robert Paarlberg** a researcher and consultant on international food and agricultural policy, is Professor of Political Science at Wellesley College. His most recent book, *Starved for Science: How Biotechnology is Being Kept Out of Africa*, was published in 2008 by Harvard University Press.

**Maria Jose Sampaio** is a Senior Intellectual Property Manager at the Brazilian Agricultural Research Corporation (EMBRAPA). She has extensive international experience in regulatory matters and has represented Brazil in a wide range of institutions dealing with intellectual property and biosafety.

**Greet Smets** serves as Biosafety and Regulatory Specialist at Perseus, a Belgian consulting firm. Dr. Smets obtained her PhD in Agronomy at the Catholic University of Leuven, Belgium. She has been working in plant biotechnology research at Advanta Seeds company for more than 15 years.

**Bothale Tema** is Managing Director of African Creative Connections in Cape Town. Dr. Tema was Director of the Department of Human Resources, Science and technology at the African Union Commission and General Manager in South Africa's Department of Science and Technology.

# ABOUT THE SCIENCE, TECHNOLOGY, AND GLOBALIZATION PROJECT

## Science Technology and Globalization Project

The Science, Technology, and Globalization Project (STG) is based at the Harvard Kennedy School's Belfer Center for Science and International Affairs and is the institutional home of the AIA project. The aim of STG is to undertake research, conduct training, provide policy advice, and disseminate information on interactions between technological innovation and globalization, with particular emphasis on implications for developing countries.

<http://www.belfercenter.org/global>

## Belfer Center for Science and International Affairs

The Belfer Center for Science and International Affairs is the hub of the Harvard Kennedy School's research, teaching, and training in international security affairs, environmental and resource issues, and science and technology policy. The Center has a dual mission:(1) to provide leadership in advancing policy-relevant knowledge about the most important challenges of international security and other critical issues where science, technology, environmental policy, and international affairs intersect; and (2) to prepare future generations of leaders for these arenas.

<http://belfercenter.ksg.harvard.edu>

## John F. Kennedy School of Government

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Science, Technology, and Globalization Project  
Belfer Center for Science and International Affairs  
Harvard Kennedy School of Government  
Harvard University  
79 John F. Kennedy Street, Mailbox 53  
Cambridge, MA 02138