



American Society of  
Agricultural and Biological Engineers

# MODERNIZING AFRICAN AGRI- FOOD SYSTEM

A Business Case for Investment in Agri-Food System  
Technologies in Africa

*Building on ASABE Global Initiatives in the  
context of Africa*

## STRATEGIC PLAN



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## Preface

Africa currently imports \$35B worth of food products equating to a third of calories consumed on the continent (AfDB, 2016). The continent's population is expected to exceed 2 billion by 2050 which is nearly a 100% increase over the current population level and at the same time, its middle class is growing at a rapid rate. Furthermore, the proportion of Africans living in urban areas is projected to increase to above 60% by 2030 increasing demand for imported, high value processed foods due to changing diets linked to middle-class urban lifestyles (UN DESA, 2019; AfDB, 2016). The combined spending power of Africa's top 18 cities could be \$1.3 trillion by 2030 (Economist Intelligence Unit, 2012). It is estimated that food imports will increase to \$110B by 2025 (AfDB, 2016). Investments of \$ 315 to 400 bn in transforming 18 agricultural value chains over a ten-year period will create markets worth \$80 bn per annum for Africa (AfDB, 2016).

African agriculture employs a significant portion of the labor force (as much as 70% in some countries) but contributes an average of only 15% to the continent's gross domestic product ranging from 2.4% to 53% (OECD/FAO, 2016). On an average, about 70% of farm work is performed manually, 20% by draft animals, and only 10% by mechanical power leading to low labor productivity in agriculture. Non-farming activities account for 38% of the agricultural value chain in Africa compared to 78% globally, an indication of the potential for significant growth in the agribusiness sector (AfDB, 2016). Sixty five percent of the world's uncultivated arable land is in Africa, and 79% of the arable land was estimated to be uncultivated (Mo Ibrahim Foundation, 2011). Over the last five decades, Agricultural productivity has significantly increased in North America, Europe, and Asia but has woefully lagged in Africa. Increase in Africa's cereal yields have been slow standing at 56% of the international average (AfDB, undated).

African agriculture faces many social, political, environmental, and economic challenges. Eighty percent of Africa's fifty-one million farms (41 million farms) are small holders (< 2 hectares each in size). Only 3% of the farms are larger than 10 hectares (NEPAD, 2013). In terms of relative contributions, small farms produce 30% of the total agricultural output, medium-scale farms (2 - 20 hectares in size) produce about 50%, and large farms (> 20 hectares) produce 20%. Although the percentages vary among countries, farming is essentially a small holder activity in Africa (Lowder et al., 2016). All farm sizes, small, medium, and large are growing across the continent. Small farms employ about 175 million people directly (AGRA, 2014). Changing climate will have varying impacts on crops across the continent with expectations of a higher probability of 10% lower yields by 2030 in East Africa (McKinsey Global Institute, 2020).

Over the last 50 years, significant progress has been made to overcome many of these challenges and to lay the groundwork for an intentional, transformational change in the African agri-food system to take place. In the short (<5 years) to medium (5 to 15 years), terms Africa is not in a position to compete in the manufacturing sector with current global manufacturing hubs (for example, China, South Korea and India) due to factors such as poor business environment and infrastructure; high transportation costs and inadequate/costly

port facilities; unreliable power supply and inadequate access to finance; land acquisition difficulties and rising labor costs; and shortage of skilled labor. Agriculture will, thus, be the engine of Africa's economic transformation for the next 20 years or more. In addition to increasing agricultural productivity through technology and innovation, developing a sustainable agri-food value chain is crucial to food security, economic development, and poverty alleviation. To modernize African agriculture, we must think of technologies that are appropriate, affordable and sustainable in the African context. As agriculture's contributions to society fully mature, transitions may begin to happen into other sectors. It will not be surprising that Africa would leapfrog into service and other industries. However, it will take a coordinated, concerted, and collaborative effort to realize the vision of a modern African agri-food system.

The Modernizing African Agri-food System initiative (MAA) takes a holistic approach in exploring the adoption of modern technologies to accelerate improvements in the food value chain in Sub-Saharan Africa (African countries located south of the Sahara). This is a long-term initiative and will require continued effort and perseverance to be successful.

## Vision

A modern, productive, and profitable agri-food system in sub-Saharan Africa that ensures food security, provides economic growth, and improves quality of life in a sustainable, equitable, and responsible manner.

## Mission

To promote modernization of African agri-food value chains from production to consumption through development and deployment of modern technologies and methodologies.

## Organization

The MAA initiative is organized under the American Society of Agricultural and Biological Engineers (ASABE). Agricultural and biological engineers have played critical roles in transforming the American agri-food system into a global force it is today by developing and deploying technologies and innovations that are critical to keeping the agri-food system productive, resilient, sustainable, and profitable. ASABE, the leading professional society of agricultural, food and biological engineers, has played a critical role in supporting the profession since its inception in 1907. The ASABE has a long history of working collaboratively with our international partners to address global challenges in agricultural and food systems. Most recently, the ASABE organized a global food security conference in Stellenbosch, South Africa in October 2016. The ASABE has now undertaken this initiative to modernize African agri-food system. Figure 1 below outlines the timeline, activities, and milestone of the initiative.

## Activities and Milestones



Figure 1: Timelines, activities, and milestones of the Modernizing African Agriculture Initiative

## Goals

The overall goal of this initiative is to create a framework that brings together stakeholders including entrepreneurs, innovators, investors/financial institutions, academic institutions, policy makers and farmers to create an ecosystem to promote modernization of African agri-food system. Specific goals include:

1. To create an ecosystem of innovation to promote technology development, assessment and deployment appropriate for African agri-food system
2. To promote public-private sector partnership to enhance entrepreneurship and business development
3. To identify training needs and to build capacity to promote and sustain a modern agri-food system in sub-Saharan Africa
4. To identify critical infrastructure and policy framework necessary for a modern agri-food system in sub-Saharan Africa

## Guiding principles

To modernize the African agri-food system, it is imperative to follow a holistic approach and hold true to the following guiding principles:

1. Agricultural development is intrinsically linked to economic development
2. Agricultural producers (smallholder farmers) are central in the process of modernizing agriculture
3. Growing agricultural productivity and profitability is central to the initiative
4. Innovations (technologies, methodologies, policies and organizations) must be, transformational, sustainable, and cost effective and relevant in the local/regional context
5. Innovations should foster environmental protection, economic growth, and human-capital empowerment

## Approach

ASABE will provide leadership through E-2050/MAA subcommittee and will facilitate the following activities towards modernizing the African agri-food system:

1. Promote technology development, assessment and deployment appropriate for African agri-food system
  - a. Identify potential partners (African institutions, professional organizations, financial institutions farmers) in the target countries/regions in sub-Saharan Africa
  - b. In collaboration with partners, identify technology and methodology needs to meet local/regional needs and develop strategies to meet such needs
  - c. Coordinate and manage responses to Request for Applications from funding agencies as appropriate and in special circumstances undertake special projects such as developing standards for more uniform development and uptake of technology

2. Enhance entrepreneurship and business development
  - a. Facilitate technology evaluation/transfer/scaling as appropriate
  - b. Help create international public/private partnership by identifying such opportunities
  - c. Play an advocacy role to funding agencies, investors, and local governments on setting investment priorities and fund allocation strategies
3. Capacity building and workforce development
  - a. In collaboration with academic institutions and research centers in the region, develop training/educational programs that meet the local/regional technology and entrepreneurial/business/workforce needs of the agri-food system
  - b. Through the network of international partners identify and create funding opportunities for training of professionals, e.g. the Master Card program.
4. Communication and information dissemination
  - a. Organize conferences, technology showcases, and workshops regionally (rotating among African countries in the region)
  - b. Establish a platform for communication including website, newsletters, dedicated magazines, and other print and digital media as needed
  - c. Produce position papers to inform policies to guide foreign and domestic investments
5. Facilitate establishing a network of Modernizing African Agri-Food System (MAA) Innovation Hubs in the East, West, Central and Southern African regions. These hubs will be located on the campus of carefully selected progressive universities or research centers with a clear track record of innovation and translational research. These hubs will collaborate with the various entities in the region and across regions to achieve the MAA goals, mission, and vision. Each hub will conduct the following activities:
  - a) Conduct a Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis: Conduct appropriate survey and prepare a report that clearly outlines social, agro-ecology, economic/business, natural resources (land, water, energy), technical capabilities, in the region and prepare, on an on-going basis, a status report clearly outlining the reality of agri-food system in the region in terms of its economic value, areas of technological and methodological interventions, business development and investment opportunities especially direct foreign investments (FDI), infrastructure needs and related policy framework, and work with regional institutions to set growth/investment targets. Also, develop appropriate metrics/score card to monitor progress.
  - b) Technology and methodology development and innovation:
    - Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) type grants program development and implementation
  - c) Promote business development entrepreneurship
    - Small business administration type program that will provide support to small/budding businesses in areas such as developing business plans and seeking investment funding
  - d) Capacity building and workforce development

- Development and implementation of programs that combine technology and business management, and entrepreneurship -Agricultural Technology Management
- Enhancing the agricultural and food engineering and technology profession to serve African agri-food system
- Short courses and training programs in Entrepreneurship
- Integrated education campaign materials in local languages to disseminate innovative solutions to stakeholders (e.g. farmers, Small and Medium Enterprises, and consumers).
- Innovation boot camps and farmer field schools

## Funding model

1. **Planning funding:** We are requesting \$125,000 to conduct a detailed assessment and develop a strategic plan for Modernizing the African Agri-food system. Activities will include consulting with key organizations/experts/agri-food system producers, organizing focus groups, and collecting and organizing relevant data and laying out a short-term, medium term and long-term plan. Funds will be used to cover travel as necessary, time for ASABE support staff, and other incidental costs but not salary of ASABE members. All MAA planning committee members will contribute their time on a voluntary basis. This period will be less than 12 months.
2. **Recurring Base Funding:** This will be a yearly funding to deliver items 1 through 8 listed above under 'Approach'. We are estimating this amount to be \$250,000/year with a 5-year commitment. This will include personnel and operating costs. This will include a part-time Director (25% or summer faculty support), post doc, visiting scholars, travel, and ASABE support staff. We are proposing an organizational structure within ASABE dedicated to the proposed mission of Modernizing the African Agri-food system.
3. **Project Based Funding:** This will be pursued on a case-by-case basis.
4. **Innovation Hub Funding:** We are recommending that each regional MAA Hub as suggested earlier be funded at about \$50M-level for 5 years. This funding will be a partnership among development banks, donor agencies/foundations, and participating countries in the region. No more than 5% of the funding will be spent on administration of each hub. Funds will be used to support activities outlined below:
  - Hub infrastructure establishment
  - Capacity building and training program development and implementation
  - Technology and methodology development, testing and de-risking activities - SBIR type grants programs
  - Low cost business loans
  - Knowledge sharing – Technology/Innovation fairs
  - Services – feasibility studies, market analysis, business plan development, incubation and consultation

## Outcomes and Impact Assessment

- Identification of the bottlenecks that hold African agriculture backward and develop African-centered technological solutions to address these issues

- Portfolios of innovations – technologies, methodologies, processes, policies, standards etc. that will propel transformation in the African agriculture and food system
- Establishment of innovation hubs in strategic locations on the continent
- Networks of potential research collaborations (e.g. university researchers, research centers, industry, farmers and non-profit/non-governmental organizations)
- Knowledge-based transformation where the stakeholders develop skills through training
- Business and investment opportunities and providing support (infrastructure, funding and training) for entrepreneurs and subsequent establishment of Small to Medium scale Enterprises
- Impact assessment conducted through considered metrics and score cards

### Advisory committee

The MAA Initiative will have an advisory committee representing key partner organizations. Each regional innovation hub will also have an advisory committee of local partner institutions.

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## Appendix

### POTENTIAL PARTNERS

#### Core Partners

- Pan-African Society of Agricultural Engineers
- International Commission of Agricultural and Biosystems Engineering (CIGR)
- European Society of Agricultural Engineers (EurAgEng)
- National and regional agricultural engineering professional societies such as The South African Institute of Agricultural Engineers (SAIAE) and The Nigerian Institution of Agricultural Engineers (NIAE)

#### Strategic Partners

- Regional Universities Forum for Capacity Building in Agriculture (RUFORUM)
- New Partnership for Africa's Development (NEPAD)
- African Union (AU)
- CGIAR (Consultative Group for International Agricultural Research)
- Africa Research in Sustainable Intensification for the Next Generation (Africa RISING)
- International Food Policy Research Institute (IFPRI)
- West Africa Trade and Investment Hub
- East Africa Trade and Investment Hub
- Development Organizations (Chemonics International, DAI, Fintrac, etc.)
- Other professional societies such as Agricultural, Food, and Resource Economics (AFRE)

#### Academic Institutions and Research Institutions in Africa

- Federal University of Agriculture Makurdi, Nigeria
- ISRA/Centre National de Recherches Agronomiques (CNRA)
- Jomo Kenyatta University of Agriculture and Technology, Kenya
- Kenya Agricultural and Livestock Research Organization
- Kwame Nkrumah University of Science and Technology, Ghana
- Landmark University, Nigeria
- Lilongwe University of Agriculture and Natural Resources, Malawi
- Makerere University, Uganda
- National Center for Agricultural Mechanization, Nigeria
- Nigerian Stored Products Research Institute, Nigeria
- Sokoine University of Agriculture, Tanzania
- University of Ibadan, Nigeria
- University of Ilorin, Nigeria
- University of Kwazulu Natal, South Africa
- University of Stellenbosch, South Africa
- University of Uyo, Nigeria
- University of Zambia, Zambia

## Funding Partners

- African Development Bank
- World Bank
- United States Agency for International Development (USAID) and similar international funding agencies (CIDA, DFID, NORAD, GiZ, etc.)
- Rockefeller Foundation
- Bill and Melinda Gates Foundation
- DANGOTE Foundation
- Tony Elumelu Foundation
- Private Sector
  - Nestle Nutrition
  - Unilever
  - Land O'Lakes
  - AGCO
  - John Deere
  - SIMA
  - TATA
  - Diageo