



American Society of  
Agricultural and Biological Engineers

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# MODERNIZING AFRICAN AGRICULTURE

*Building on ASABE Global Initiatives in the context  
of sub-Saharan Africa*

A Special Session of the ASABE virtual 2020 Annual International  
Meeting

**Monday, July 13: 2:30-5:30 pm EDT; 6:30-9:30 pm GMT**

*Sponsors: ANGASABE and E-2050*

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***Program Booklet***



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## OVERVIEW

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It is expected that the population in sub-Saharan Africa (SSA) will grow to 2 billion by 2050—a 100% increase from its current population. Nearly 80% of farmers in SSA are classified as small holders. While nearly 70% of farm work is performed manually, agricultural modernization at a scale appropriate in sub-Saharan Africa (SSA) needs to take a systems approach to address issues beyond the farm and includes the entire food value chain. At the same time, technologies such as ICT, IoT, AI and sensors etc. are evolving at a rapid rate and are playing a critical role in agriculture. This initiative takes a holistic approach and seeks to explore and introduce modern technologies to improve the food value chain in SSA. It is expected that modern agriculture - in addition to increasing food security, will reduce poverty of rural populations, and can be an engine for economic growth in SSA countries. A modern agriculture will be productive, efficient and resilient.

This proposed initiative builds on ASABE's Global Initiatives in the context of SSA and will be a prelude to a day-long event to be held at the 2021 Annual International Meeting in Anaheim, California.

This session has been laid out based on three key guiding principles:

- (1) Agricultural producers (small-holder farmers) are central in the process of modernizing agriculture.
- (2) Innovations (technologies, methodologies, policies and organizations) should be relevant, transformational, sustainable, cost effective.
- (3) Innovations should foster environmental protection and economic empowerment.

## 1. KEYNOTE SPEAKER

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Since 2004, Soji Adelaja has been the John A. Hannah Distinguished Professor in Land Policy in the Department of Agricultural, Food and Resource Economics (AFRE) at Michigan State University (MSU). He founded and served as the Director of MSU's Land Policy Institute from 2006 to 2011. On leave from MSU, he spent five years as Special Adviser on Economic Intelligence at the Presidency in the Federal Republic of Nigeria, where he also led federal efforts in the areas of economic and social security, food security, economic stability, conflict prevention and management, and Countering Violent Extremism (CVE). There, he also spearheaded and chaired the Presidential Initiative for the Northeast (PINE), which developed and implemented the resettlement strategy and the economic revitalization plan for the region of Nigeria affected by the Boko Haram terrorist insurgency. Soji also helped design PINE's successor organization, the Presidential Committee for the Northeast Initiative (PCNI). Prior to MSU, Soji spent 18 years at Rutgers University where he served as Executive Dean of Agriculture and Natural Resources, Dean of Cook College, Executive Director of the New Jersey Agricultural Experiment Station, Cook College Dean of Research, and Chair of the AFRE department. He also founded the EcoPolicy Center, Food Policy Institute and Food Innovation Center. Soji received his BS in Agricultural Mechanization from the Pennsylvania State University (PSU), an MS in Agricultural Economics from West Virginia University (WVU), and both an MA and a Ph.D. in Economics from WVU.

## 2. PROGRAM

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### PROGRAM

- 2:30-2:40 pm **Welcome** – Sue Nokes, President, ASABE  
**Opening comments** – Background, mission, vision, goals and objectives of ASABE Global Initiative on Modernizing African Agriculture. Introduction of Keynote Speaker (*Ajit Srivastava, Michigan State University*)
- 2:40-3:10 pm **Invited Keynote Presentation.**  
*Dr. Soji Adelaja, John A. Hannah Distinguished Professor in Land Policy at Michigan State University.*
- 3:10-3:20 pm **Transition** (Senorpe Asem-Hiablie)
- 3:20-4:40 pm **Breakout Working Sessions.** Focused on ideation, identifying knowledge gaps and potential solution approaches. Two concurrent sessions each lasting half an hour. Each thematic area listed below will have two leading facilitators:  
**3:20-3:50 pm Concurrent Sessions I and II** (Senorpe Asem-Hiablie)  
I. Taking stock of the current agricultural landscape (Food Security, Nutrition, Climate Change, Land, Water Security, Desertification, Energy, etc.) in Africa. (*Facilitators: Margaret Gitau, Purdue University; Kifle Gebremedhin, Cornell University*)  
II. Cultivating entrepreneurship and fostering private investment (*Facilitators: Klein Ileleji, Purdue University; Terry Howell, University of Nebraska Lincoln*)  
**3:50-4:00 pm Break/Recap** (Common Room Summary)  
Summary from first set of breakout sessions (Kifle Gebremedhin, Terry Howell)  
**4:00-4:10 pm Transition** (Klein Ileleji)  
**4:10-4:40 pm Concurrent Sessions III and IV** (Klein Ileleji)  
III. Appropriate capacity building and workforce development (*Facilitators: Senorpe Asem-Hiablie, Penn State University; Daniel Uyeh, Kyungpook National University*)  
IV. Public and Private Partnerships and Policy needs to support agricultural development (*Facilitators: Michael Ngadi, McGill University; Kumar Mallikarjunan, University of Minnesota*)  
**4:40-4:50 pm Break/Recap** (Common Room Summary)  
Summary from second set of breakout sessions (Daniel Uyeh, Kumar Mallikarjunan)
- 4:50-5:20 pm **Roundtable Working Group:** The goal is to prioritize action items and use these to plan for the next round of efforts in 2021. Group will be made up of MAA Initiative leads and organizing team, facilitators, and any anyone else who might be interested. (*Moderators: Ajit Srivastava, Michigan State University; Margaret Gitau, Purdue University*)
- 5:20-5:30 pm **Closing comments**  
*Klein Ileleji, Purdue University*
- 5:30 pm **Adjourn**

## 3. BREAKOUT SESSION I

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### Taking Stock of the Current Agricultural Landscape in Africa.

(Facilitators: Margaret Gitau, Purdue University; Kifle Gebremedhin, Cornell University)

We have identified the following categories of major challenges which hinder the modernization of agriculture and the food system in sub-Saharan Africa: Food insecurity and inadequate nutrition; Climate change, desertification, vulnerability of communities, lack of adaptive capacity; Land availability and access; Water availability and access; Inadequate availability of energy; Post-harvest losses; Lack of on-farm processing technology; and, Adding value to farm products.

#### Discussion Questions/Topics:

- (1) Staying with the broad categories outlined above, **have we missed any other broad category of challenges?** Our next step will be to discuss each of these categories in more detail.
- (2) **Identify specific issues** under each of the broad categories as outlined.
- (3) **Identify/propose potential innovative solutions** that will lead us towards modernizing African agriculture. In each category, please propose, potential innovative technologies or solutions that will lead us to accelerate the modernization of African agriculture.

Following is an initial listing of potential innovative solutions to consider in preparation for the discussion. This list is not exhaustive. Participants may add to the listing or simply react to the content. Participants are encouraged to think about/consider their perceptions of modernizing/modernization of agriculture.

#### Potential Innovative Solutions:

- (1) Vertical farming for plants, animals, vegetables and ornamental flowers
- (2) Collective community farming that lends itself for mechanization and crop storage facilities
- (3) Use of solar and geothermal energy sources
- (4) Sensor technology to enable precision agriculture (precision farming, irrigation, pest control etc.)
- (5) Employ advanced water conservation, storage, reuse, and multiple use factors
- (6) Diversification of crops, vegetables, flowers, etc.
- (7) On-farm processing to add value to harvested products
- (8) Information systems to get around lack of extension and outreach services
- (9) Cross-country agricultural research and outreach centers with information sharing across countries
- (10) Ocean farming for crops and vegetables.

## 4. BREAKOUT SESSION II

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### Cultivating Entrepreneurship and Fostering Private Investment

(Facilitators: Klein Ileleji, Purdue University; Terry Howell, University of Nebraska Lincoln)

In the context of sub-Saharan Africa, improving the investment climate to support technology development and adoption is an important objective. Cultivating entrepreneurship and fostering private investments has been identified as an important issue.

#### Discussion Questions/Topics:

- (1) How would you **rate the extent of entrepreneurship**, vis a vis the optimal level? Identify key (product, service, technology) areas where entrepreneurial and FDI gaps exist.
- (2) List **new strategies** that should be pursued to:
  - a. encourage entrepreneurship in the agri-food system
  - b. encourage foreign direct investment in the agri-food system
- (3) What is the current **enabling environment for entrepreneurs and private investment** to thrive? How can the role of women and youth be integrated? How much are African governments doing?

Following are some factors to consider in preparation for the discussion. Participants may add to the content or simply react to the content.

**How is Africa Investing?** Addressing Africa's agricultural challenges has the potential to unlock inclusive economic growth, benefit smallholder farmers, boost food production and end hunger.

The Maputo Declaration, signed by African Heads of State and Government, called for a pan-African flagship programme to enhance agriculture production and bring about food security on the continent. As a result, the Comprehensive Africa Agriculture Development Programme (CAADP) was born with the aim to increase public investment in agriculture by a minimum of 10 per cent of national budgets, and to raise agricultural productivity by at least 6 per cent. To this date, 44 African countries have signed the CAADP Compact to allocate 10 per cent of their national budgets to agriculture, and 39 countries have formulated national agriculture and food security investment plans.

#### Overarching themes:

Food security, nutrition and health

Economic and rural development

Sustainability and environmental stewardship

Women and youth empowerment

Using technology to target local needs

## 5. BREAKOUT SESSION III

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### Appropriate Capacity Building and Workforce Development

(Facilitators: *Senorpe Asem-Hiablie, Penn State University; Daniel Uyeh, Kyungpook National University*)

In the context of education and training, workforce development and capacity building are important issues that must be addressed. We define capacity as encompassing knowledge-based capacity (including education and training, research, extension and outreach programs, as well as cross-country collaborations), infrastructural support, capital capacity (including tuition and technology support), and social capacity (opportunities and barriers based on perceived norms). Workforce is defined as including farmers, growers, and pastoralists, and agricultural support occupations.

#### Discussion Questions/Topics:

- (1) Keeping in mind the presentation by our keynote speaker about the future of Africa's agri-food system, **identify specific areas where there are significant gaps** in capacity building and workforce development.
- (2) For each of the areas as identified, **provide specific examples of activities and programs** which if implemented will be transformational.
- (3) What are the **main considerations for implementing** long-term capacity building and workforce development plans?

Following are some things to consider in preparation for the discussion. Participants may add to the content or simply react to the content.

#### Premise

The Modernizing African Agriculture initiative, using a holistic approach, seeks to explore and introduce modern technologies to improve the food value chain in sub-Saharan Africa leading to improved food security and poverty reduction in this region. To serve as an engine for sustainable economic growth, modern African agriculture needs to be productive, efficient, and resilient. The right skill set is vital to driving and maintaining this transformation and growth.

This session seeks to identify priorities for appropriate capacity building and workforce development systems fit for African agriculture and includes:

- (1) Assessing the current status of capacity (knowledge-based, infrastructural and capital, and social) for modernization across Africa and identifying gaps.
- (2) Identifying priority areas and stakeholders for the development of a roadmap towards short-, medium- and long-term transformation and relevant indicators along the way.
- (3) Capacity building and workforce development over the long-term.

## 6. BREAKOUT SESSION IV

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### Public and Private Partnerships and Policy Needs to Support Agricultural Development

(Facilitators: Michael Ngadi, McGill University; Kumar Mallikarjunan, University of Minnesota)

Africa's agri-food system is evolving rapidly. Appropriate, well conceptualized technologies can quicken the pace of progress as Africa's agri-food sector moves toward profitability, viability and self-reliance. As we are seeing from case studies around the world, public-private partnerships and an enabling policy environment are two key areas where innovations are needed to advance the agri-food system.

#### Discussion Questions/Topics:

- (1) List the **most important areas** where public partnerships are needed to advance African agriculture, especially in the development, evaluation, transfer and adoption of existing and new technology.
- (2) Provide **specific ideas of Public and Private Partnerships** that are needed to advance African agriculture, especially in developing, evaluating, transferring and adopting technology.
- (3) What would you consider as a **possible creative destructive 4P model** in Africa?

Following are some considerations in preparation for the discussion.

#### Background:

The challenge of meeting the food security and nutrition needs of over 237 million people suffering from chronic undernutrition in sub-Saharan Africa remains stark. Appropriate strategy must address the root causes of hunger, poverty and dependency by focusing on inclusive economic growth and inequality reduction. It has been recognized that public-private partnerships and an enabling policy environment are key areas where innovations are needed to advance the agri-food system. This session will explore: the impact of engineering focused 4P on agricultural development; success and failure stories; best practices; and, which sectors might benefit most from 4P strategies. Key considerations include: how 4P work in Africa and their impacts; how development, evaluation, transfer and adoption of existing or new technologies are integrated in each of the identified areas of partnership; and, what would be considered as best practices, best (or worse) models with respect to 4P?

#### Suggested Reference Materials:

Camagni M., Kherallah M. (2016). How to do: Public-Private-Producer Partnerships (4Ps) in Agricultural Value Chains. IFAD Policy and Technical Advisory Division, IFAD, Rome. Weblink:

<https://www.ifad.org/documents/38714170/40314128/Public-Private-Producer+Partnerships>

Rankin, M., Gálvez Nogales, E., Santacoloma, P., Mhlanga, N. & Rizzo, C. (2016). Public-private partnerships for agribusiness development – A review of international experiences. FAO, Rome, Italy. Weblink:

<http://www.fao.org/3/a-i5699e.pdf>

## 7. ACKNOWLEDGEMENTS

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### ORGANIZING COMMITTEE

Klein Ileleji (Co-Lead), Purdue University, USA  
Margaret Gitau (Co-Lead, Moderator), Purdue University, USA  
Ajit Srivastava (Co-Lead), Michigan State University, USA  
Michael Ngadi, McGill University, Canada  
Kifle Gebremedhin, Cornell University, USA  
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Lalit Verma, University of Arkansas; 2013-2014 President, ASABE

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