The role of science, technology and innovation in ensuring food security by 2030
Challenge of Food Security

HUNGER WORLDWIDE

The number of people going hungry worldwide is 795 million, approx. 10.9% of the world’s population.

One person in 9 does not have the minimum required quantity of food available to them.

Acute hunger
Severe undernourishment over a definable period

Chronic hunger
Constant and/or regular undernourishment

Infographic available at www.welthungerhilfe.de
Source: FAO 2015 / Number of people who suffer from chronic calorie deficiency

Developing Countries
Of 795 million hungry people, 780 million live in developing countries.

Smallholder Farmers
More than 80% of the food in Asia and Sub-Saharan Africa is produced by smallholders.
Technologies for Food Security

Scientific and technical applications across the food system

- Genetic Modification
  Conventional cross-breeding and transgenic approaches for improving crop productivity

- Irrigation Technologies
  Water storage, micro-irrigation tech, groundwater detection sensors, renewable energy powered pumps

- Science for Soil Fertility
  Synthetic and organic fertilizers, biogas digesters, nitrogen fixation, zero/conservation tillage

- Post-Harvest and Agro-Processing Tech
  Storage, handling, refrigeration, transport, and agro-processing

- Biofortification
  Breeding of critical micronutrients and vitamins into staple crops

- Climate-Smart Solutions
  Precision agriculture, early warning systems, soil carbon sequestration
Technologies for Food Security

Potential profound impacts on the future of food

- Synthetic Biology: CRISPR/Cas9
- Big Data and IoT: Precision Agriculture
- Artificial Intelligence: "Robot" farmers
- Tissue Engineering: Lab-grown livestock
- 3D Printing: 3D printed food
- Drones: Hyperspectral imaging
Key Policy Issues

01. Building Innovative Food Systems
Creating and strengthening a multi-sectoral ecosystem of actors and institutions for pro-poor agricultural innovation

02. Making Innovative Investments
Promoting research and development, building human capacity, and investing in infrastructure

03. Supporting Gender Inclusion
Supporting access to agricultural science and technology and developing gender-sensitive agricultural innovation policy

04. Promoting Regional and International Cooperation
Promoting “knowledge aid” for agricultural STI support, facilitating regional cooperation, and conducting technology assessment
Building Innovative Food Systems

Agricultural Innovation System

Useful tool to analyse the ecosystem, supporting mechanisms, and infrastructure that facilitate agricultural innovation.

Multi-Sectoral  Participatory

Collaboration across ministries and sectors  Engagement of smallholder farmers

Knowledge Flows  Pro-poor/inclusive

Recognition of local and traditional knowledge and strong farmer-scientist links  Support for pro-poor innovations and link to economic development and livelihoods

Informal institutions, practices, behaviors, and attitudes
Examples: Organizational culture; learning orientation; communication practices

Agricultural research and education systems
Agricultural education system
primary/secondary
post-secondary
vocational/technical

Agricultural extension system
public sector
private sector
civil society

Agricultural research system
public sector
private sector
civil society

Bridging institutions
Political channels
Stakeholder platforms

Agricultural extension system
public sector
private sector
civil society

Cooperatives, contracts, and other arrangements

Agricultural value chain actors and organizations
Consumers
Processing, distribution, wholesale, retail
Agricultural producers (of various types)
Input suppliers

Agricultural innovation policies and investments
Links to science and technology policy
Links to international actors
Links to other economic sectors

General agricultural policies and investments
Links to political system

Source: Larsen et al., 2009
Innovative Investments

Key investments needed for food insecurity

**Science**
Promoting Research and Development
Addressing both productivity growth and production quality along with concern for climate change and biodiversity

**People**
Building Human Capacity
Talent-building efforts that strengthen agricultural capacities while creating STEM capabilities in emerging technologies

**Infrastructure**
Investing in Infrastructure
Enabling innovative food systems and fostering multi-sectoral development planning and capacity to innovate
Gender Inclusion

Agricultural Labor Force Participation
Women account for 43% of agricultural labor in developing countries and 50% in LDCs

Limited Access to Resources
Women often have limited access to technology, training, education, information, credit, and land

Gender-Sensitive Innovation Policy
Need to integrate a gender-sensitive lens into agricultural innovation policy.
Regional and International Cooperation

Knowledge Aid
Providing science, technology, and innovation support as part of official development assistance for agriculture.

Regional Cooperation for Collaborative Research and Data Sharing
Support for regional agricultural research institutions as well as access to agricultural data, esp. for disaster risk reduction.

Technology Assessment and Foresight
Regional and international studies to evaluate the immediate and long-term impacts of new technologies for food security.

Science and technology cooperation
Funding and partnerships for international collaboration among scientists in research institutes, universities, and the private sector.