

Transforming Food Systems after COVID-19: Agricultural Knowledge and Information Systems (AKIS) in the OIC Member Countries

Project Synopsis

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OUTLINE

1. Context, Drivers & Trends for Agricultural Transformation

2. OIC Agricultural Outlook; Challenges Ahead

3. AKIS; Linking Education, Research, Extension to Boost Agricultural Productivity

4. Our Report: Transforming Food Systems after COVID-19: Agricultural Knowledge and Information Systems (AKIS) in the OIC Member Countries

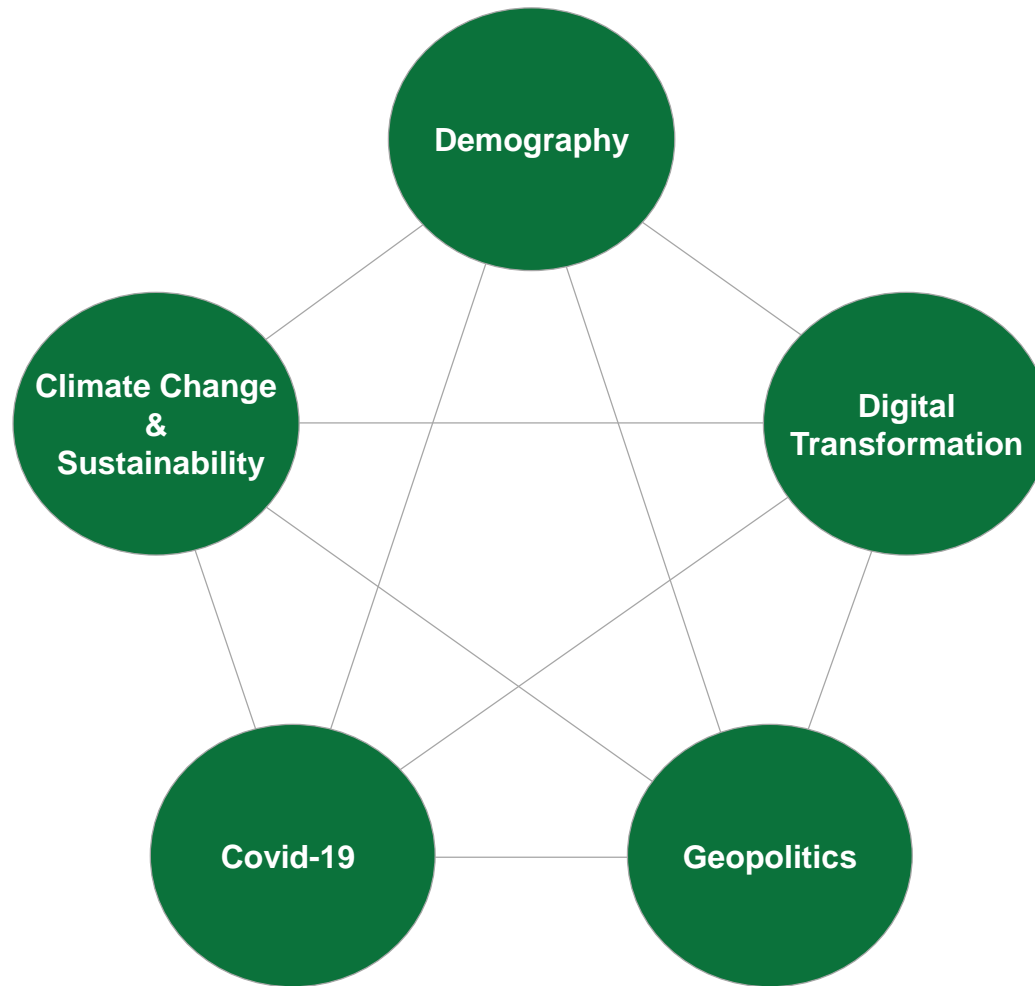
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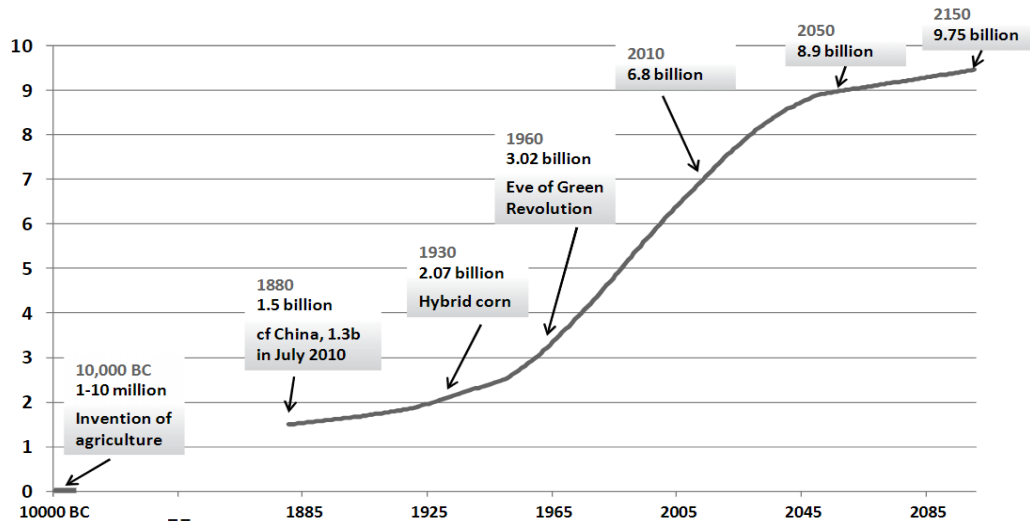
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Context, Drivers & Trends for Agricultural Transformation



Demography; Feeding 9 Billion in 2050

Long Term World Population (10.000 BC to 2150)



- **+3 billion** people **cannot afford a healthy diet**, and more than **1.5 billion** people **cannot afford a diet** with even the minimum level of essential nutrients
- UNESCO has predicted that globally, **food demand** will increase by **70%** by 2050
- In the next 40 years, the world's farmers need to **produce more food** than they managed to produce in the **previous 10.000**.
- Agriculture needs to become more **productive and sustainable**.

Year	Population (Billion)	Share % of Global Population
2000	1,28	21,1
2019	1,87	24,4
2050	2,9	29,5
2010	4	35

10 billion

people will inhabit the Earth by 2050

60% more food

will be needed by 2050 to meet the food requirements of a growing global population

700+ million

people will have diabetes by 2050 if no action is taken to change eating habits

Source: Pardey (2011) and United Nations (1999 and 2004).

Climate Change

- Agriculture is vulnerable to **climate change**
 - Climate has been rapidly changing and undermining the sustainability of the agriculture sector
- Agriculture as a source of **emission**
 - Food and land use drive climate change
 - After energy, the land sector is the second largest source of GHGs and accounts for just under a quarter of global GHGs emissions
- Enhancing **innovation for climate change** adaptation in the agriculture sector
- Aligning agriculture and the broader food system with the **Paris Agreement**
 - Agriculture and the broader food system are not on a pathway compatible with the Paris Agreement:
 - A rapid and far-reaching transition of agriculture is key to achieving the objectives of the Paris Agreement
 - through minimizing direct emissions from agriculture, reducing land use and induced land use change's impact on deforestation,
 - through enhancing carbon sink capacity of lands and soils.
- Significant and rapid change in **land management, farming practices, and livestock production** and consumption to reduce emissions

The water-energy-food (WEF) nexus

- Water, energy, and food are the basic resources on which human beings depend for **survival** and development.
- Agriculture already places a significant amount of pressure on the world's freshwater reserves; it accounts for nearly **70% of global water withdrawals**.
- Efforts to feed a growing and increasingly affluent global population will inevitably result in increasing demand for water and energy,
 - at a time when **worsening climate** change is **poised to dramatically** alter the availability of water resources.
- Integrated management strategies centered on the “**Water-Energy-Food Nexus**” framework needed to address resource challenges.



Farm to Fork Strategy under EU Green Deal

Overall Goals



climate footprint

Reduced the environmental and climate footprint of the food system



global transition

Lead a global transition towards competitive sustainability from farm to fork



new opportunities

Tap into new opportunities



resilience

Create a robust and resilient food system

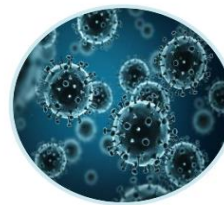
2030 Targets for Sustainable Food Production



Reduce by 50% the overall use and risk of **chemical pesticides** and reduce use by 50% of more hazardous **pesticides**



Reduce **nutrient losses** by at least 50% while ensuring no deterioration in soil fertility; this will reduce use of **fertilisers** by at least 20 %



Reduce sales of **antimicrobials** for farmed animals and in aquaculture by 50%



Achieve at least 25% of the EU's agricultural land under **organic farming** and a significant increase in **organic aquaculture**



2030 Agenda: The UN's 17 Sustainable Development Goals

- **Goal 2:** End hunger, achieve food security and improved nutrition, and promote sustainable agriculture
- **Goal 6:** Ensure availability and sustainable management of water and sanitation for all
- **Goal 12:** Ensure sustainable consumption and production patterns
- **Goal 13:** Take urgent action to combat climate change and its impacts
- Achieving the ambitious goals of the 2030 agenda requires:
 - Global support and partnerships
 - Extensive collaboration throughout the food value chain and
 - Among industry, academia, NGOs and government



Digital Transformation; Smart & Connected Agriculture to foster growth

- Agriculture needs **digital transformation** and has lagged behind many other sectors in digitalization and application of digital technology.
- It is not too late to catch up; more investment, more new ideas and greater participation is needed
- Enabling and expanding **data-driven food systems** offers an unparalleled approach to building back stronger, more resilient, more informed, inclusive and equitable systems for the future.
- The current crisis is an opportunity to strategically rethink and retool the food systems to enable widespread digitalization and **data-driven transformation along the agricultural value chain** and beyond
- Emerging data-driven digital solutions for food and agriculture
 - real-time weather forecasting helps farmers with day-to-day decisions on when and how much to irrigate, fertilize and apply pesticides to their crops
 - Completely automated smart greenhouses run by algorithms that ensure optimal conditions for plant growth by adjusting inputs like roof ventilation, artificial lighting and heating.
 - Ultra-high resolution imaging can spot early symptoms of disease, water stress and soil degradation
 - Drones spray fertilizer, pesticides, and water with pinpoint accuracy.
 - By reducing the guesswork in farming, smart agriculture enables crops to reach their full genetic potential without the excessive use of chemical inputs.
 - Advances in seed science are making crops more resistant to drought, pests and infestation
- By 2030, enhanced connectivity in agriculture could add +\$500 billion to global GDP.

Opportunities for data-driven value creation in food systems

Archetype	Opportunity	Food resilience application
Better decisions	<ul style="list-style-type: none"> Analytics-based insights for better contextualized decision-making Improvements to operational efficiency within the ecosystem Enhanced monitoring and evaluation process 	<ul style="list-style-type: none"> Early warning/early action for rapidly evolving situations Enabling real-time and precision data on which to apply government, NGO or business support Applied farming decisions and targeted extension services Flexible supply chains and logistics, rewired to route food and inputs more dynamically Repository of shared experience and lessons learned during recurring challenges and crises
Enhanced business, product and partnership models	<ul style="list-style-type: none"> New business models, enabled by data insights and analytics New revenue streams, products and services for a broader range of stakeholders Combining data sets Public-private partnerships 	<ul style="list-style-type: none"> Reach extension (last mile/rural) User-side (farmer/SME, etc.) application for data and information De-risking capabilities and tailored finance products through comprehensive risk profiles, credit scoring, insurance models and data clearing houses <ul style="list-style-type: none"> Greater efficiency in allocation of public and private resources to support the best opportunities and to target the most vulnerable (e.g. warehousing utilization) Interoperability and maximized return on investment on applications Expanded and efficient intra-trade in agricultural and food products
Empowered stakeholders across the value chain	<ul style="list-style-type: none"> More meaningful, personalized engagement and experiences Lower barriers to entry and ongoing usage <ul style="list-style-type: none"> Commercial incentives aligned with user protections Trustworthy interactions and information Increased transparency and fairness 	<ul style="list-style-type: none"> Responsive two-way value flow, including continuous improvement on behalf of the user (farmer/SME, etc.) Privacy and intellectual property protection, safeguards in the system, trusted information (e.g. how to prevent spread of COVID) Single sign-on (SSO) and digital identity to leverage existing systems and to meet stakeholders where they are

Source: Data-Driven Food Systems for Crisis Resiliency, WEF WHITE PAPER, SEPTEMBER 2020

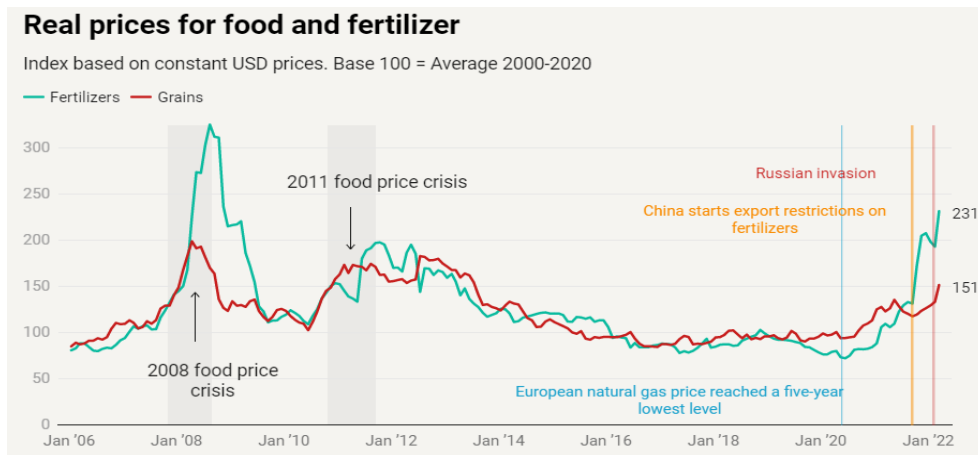
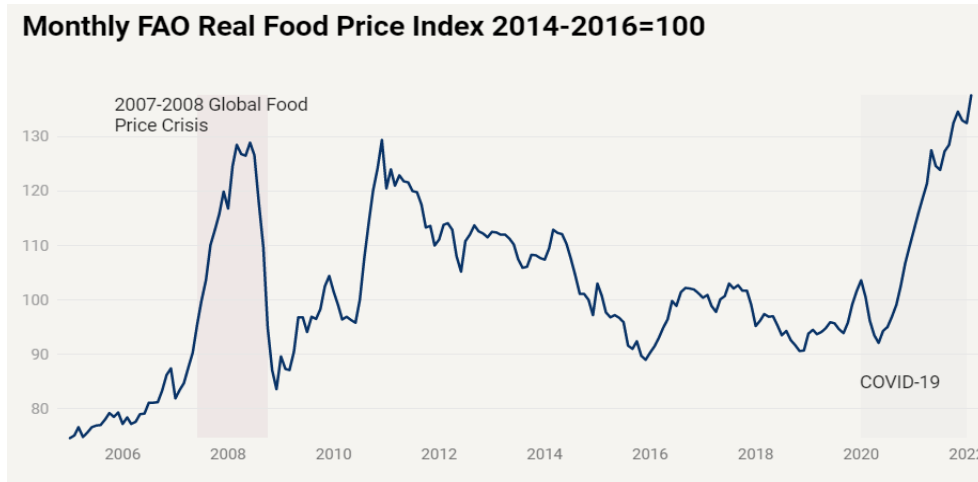
Global Covid-19 Pandemic

- **COVID-19** is dramatically accelerated weaknesses in food systems, driving risk of future widespread food insecurity beyond the current immediate **logistical roadblocks**
- **World hunger** increased after the onset of COVID-19;
 - In 2020 between 720 and 811 million people went hungry globally
- The pandemic had a direct impact on food and agriculture **supply chains**;
 - **On the supply side**: shocks in factors of production such as intermediate inputs, fixed capital and labour.
 - **On the demand side**: disturbances in consumption

Impact of Geopolitics

Overcoming the threats to global food systems from the Russian invasion of Ukraine

- Skyrocketing costs of food for consumers or fertilizers for producers.



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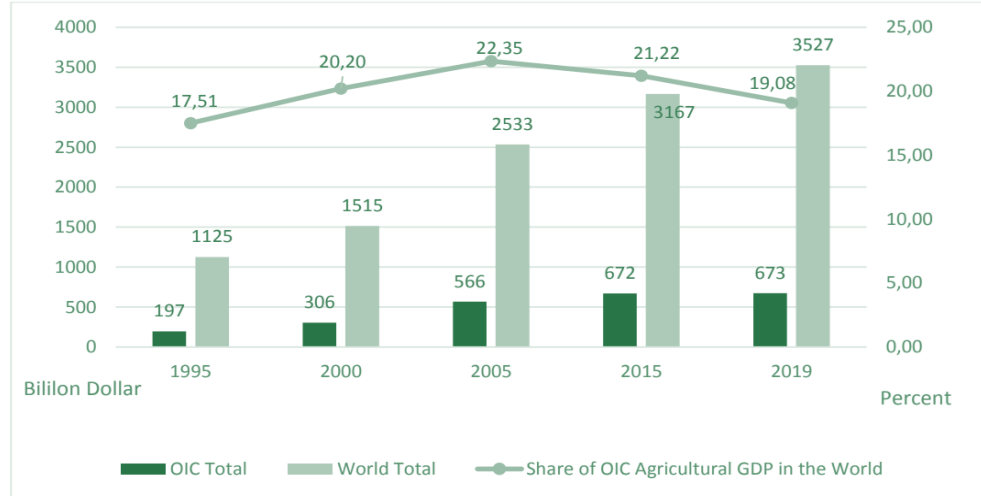
Insufficient agricultural productivity

OIC countries accounted for more than one-fourth of the world's agricultural land area.

Share of Agricultural GDP in the OIC and World



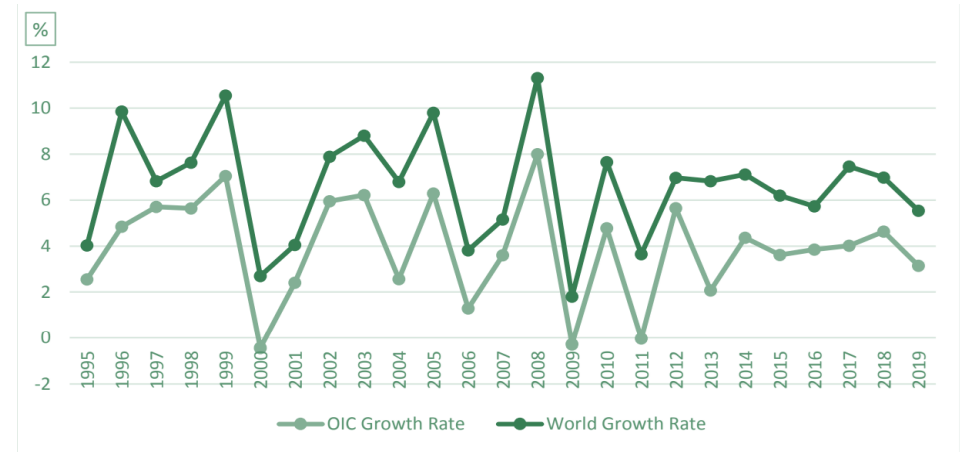
OIC Agricultural GDP and its Share in the World



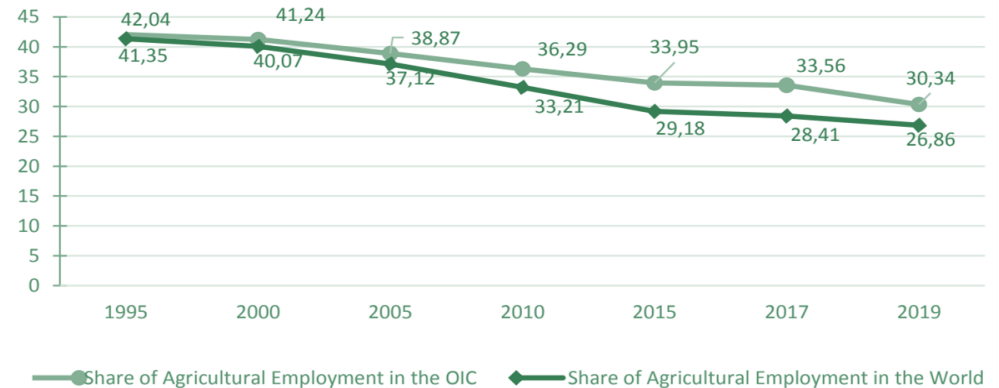
Slower Growth & Decreasing Share in Employment



Agricultural Growths in the OIC and World



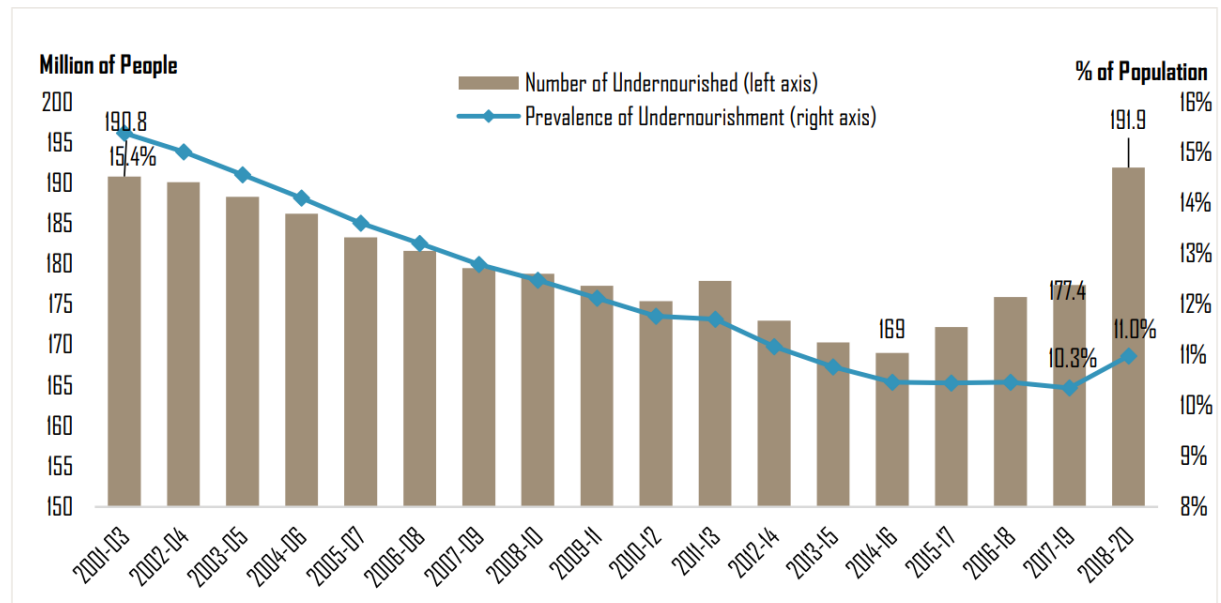
Share of Agricultural Employment



Food Security

- Many OIC member countries still heavily rely on food imports to meet their local demand.
- 28 OIC Low-Income Food Deficit Countries (LIFDCs) are vulnerable to any sharp rise in the international food prices, trade restrictions

Undernourishment in OIC Countries



Source: SESRIC staff calculations based on FAOStat

How to Address These Challenges ?

- Health is a precondition for economic recovery; and food is a precondition for health.
- Need to;
 - Enhance production
 - Improve productivity
 - Develop inclusive & resilient & sustainable & market oriented value chain in food and agriculture



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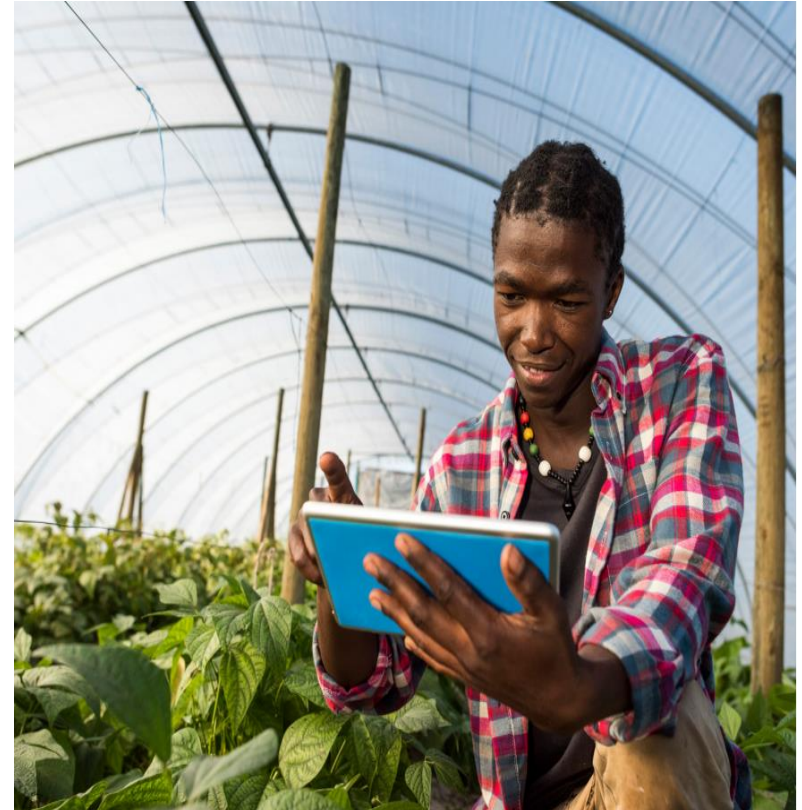
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Agriculture Knowledge and Innovation Systems (AKIS)

- AKIS is used to describe how people and organizations join together to promote mutual learning, to generate, share, and use agriculture-related knowledge and information.
- Farmers, advisers, researchers, education and training providers, input suppliers, retailers, media services, ministries are all part of a national or regional AKIS
 - They all either need, produce or exchange knowledge and information
- When developing new AKIS, technical, organizational and social dimensions should be taken into account to bridge the gap between science and practice.



Evolving approaches to knowledge exchange, learning and innovation in agriculture

Agricultural Knowledge System (AKS): 1960s, scholarly work on agricultural advice and extension

- to accelerate agricultural modernization
- strong integration of public research, education and extension
- Often under the control of Ministry of Agriculture

Agricultural Knowledge and Information System (AKIS)

- I (Information) added in 1970s
- Linked to large scale introduction of computers
- popped up in policy discourse at OECD and FAO
- seminal text published by FAO and the World Bank in 2000: AKIS/RD: Strategic vision and guiding principles.

Agricultural Knowledge and Innovation System (AKIS)

- «I» replaced by Innovation
- the linear model was replaced by a participatory network approach

Principles of FAO & WB

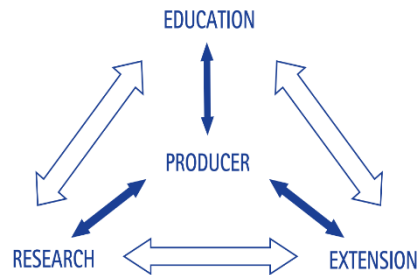
Nine guiding principles of the FAO/World Bank document to assist in;

- **achieving poverty reduction,**
- **agricultural productivity gains,**
- **food security**
- **environmental sustainability**

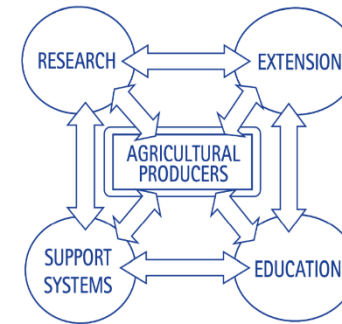
1. Economic efficiency
2. Careful matching between the comparative advantages of organizations and the functions they perform
3. Subsidiary
4. Clear repartition of costs
5. Careful assessment and optimal mixing of funding and delivery mechanisms
6. Pluralistic and participatory approaches
7. Effective linkages among farmers, educators, researchers, extensionists and other AKIS stakeholders
8. Building human and social resources
9. Sound monitoring and evaluation (M&E)

Shaping The AKIS “knowledge triangle ”

Agricultural Knowledge and Information System for Rural Development

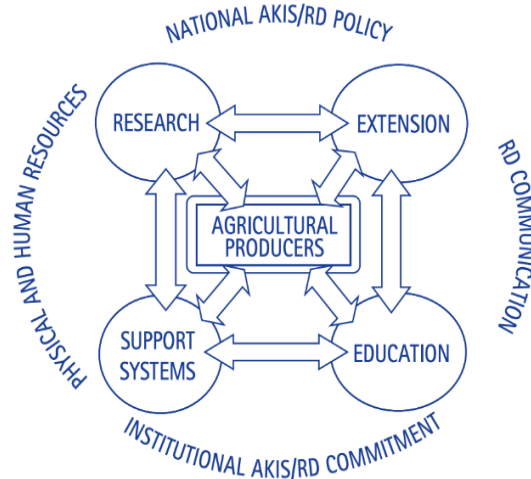


An idealized AKIS/RD model

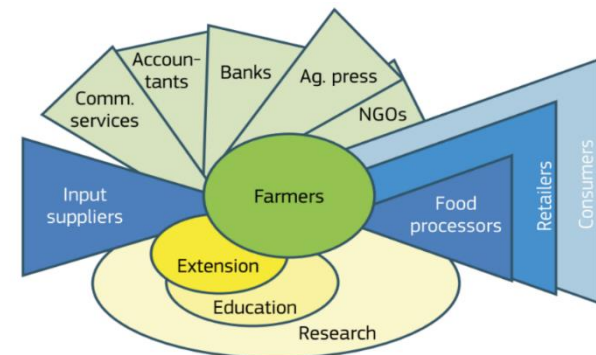


- The knowledge creation, diffusion, utilization subsystems;
- The agro support subsystem involved in credit, input and market functions.

A comprehensive AKIS/RD model



Participatory network approach



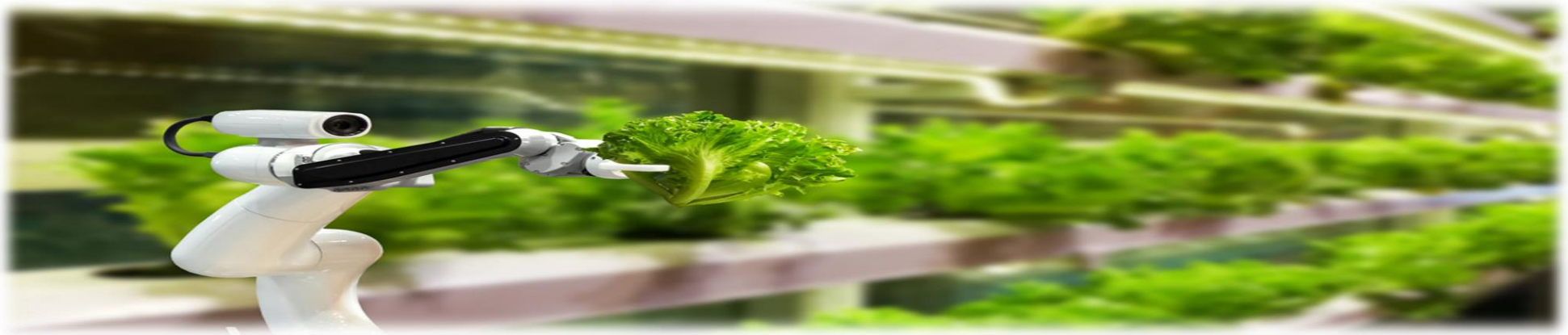
- 'Linear knowledge transfer' model is becoming increasingly outdated.
- Peer-to-peer learning between farmers is more and more important and advisers are starting to work with interactive methodologies to better support innovation and change.
- New forms of media and information technology are also providing exciting new possibilities for co-creating knowledge and sharing the expertise needed to tackle the complex challenges we now face

Bridging the gap between current agricultural & food system and future needs

“The future agriculture will be an agriculture of knowledge. But we need to make sure we get it right”

Phil Hogan, European Commissioner for Agriculture and Rural Development (2014-19)

- As the world's population is projected to reach **10 billion people** in 2050, an AKIS is an essential component to increasing the **productivity** and the **profitability** of farmers
- More efficient in production; promoting sustainable agriculture requires a renewed focus on **innovation** and investment in **research, technology and capacity** development



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Our Approach

- A practical, effective, impact oriented research report
- Aims to guide the member countries on how to develop knowledge and information systems and applicable practices in the agriculture sector to enhance the production and improve the productivity in agriculture.
- To assess the current situation of agricultural production systems in the OIC Member States, challenging issues in agricultural knowledge and information systems and good practices across the world as well as the OIC that can be applied and contribute to improve the productivity and increase the production volume in the OIC



Content

The report will consist of 4 parts;

1) Conceptual Framework and Methodology

- The concept of AKIS and its role and function in production management;

2) Overview and Analysis of AKIS across the globe and in the OIC Member Countries

- Evolution of AKIS over time will be elaborated on and good examples from various countries that can be benefitted

3) In-depth assessment of the AKIS practices in four selected countries

- Evaluation of good practices and systems in the OIC Member Countries that will be examined for case analysis

4) Policy Recommendations/Guide for developing AKIS in the OIC Member Countries

- Concrete and step-by-step policy options to show the way the OIC Member Countries on how to develop such systems or improve the existing ones considering various development levels on the issue.

Methodology

For drafting the proposed report, 8 methodological tools will be utilized

1. Review of existing academic literature,
2. Analysis of the open sources and reports on AKIS produced by international institutions
3. Analysis of the publicly available data provided by international institutions such as FAO, WB, OECD, CECRIC, African Development Bank,
4. Analysis of similar projects such as Pro-AKIS funded by the EU¹ Agrilink - Agricultural Knowledge ²,
5. Analysis of development project reports funded by IFIs and donor organizations such as GIZ,
6. Review of government papers/documents,
7. In-depth interviews with the key informants and experts to gather data on their countries' AKIS institutions and outlook. For the interviews, a questionnaire will be prepared.
8. Consultation with the subject matter and country experts at the national ministries and other related public bodies as well as other international institutions.

Experts who involved in AKIS related projects will be in case study countries will be selected.

1. Consultations and interviews will be mainly held online.
2. Field visit to one country. This will be the one selected among the COMCEC Africa Group where publicly available data is limited and difficult to reach relevant informant experts via online channels.

¹www.proakis.eu

² www.agrilink2020.eu

Selection & Methodology of the Case Studies

- 1 non-OIC country; as a benchmark for the OIC member countries.
- 3 OIC member countries were selected;
 - one from COMCEC Arab Group,
 - one from COMCEC Asia Group
 - one from COMCEC Africa Group.



Methodology

Provide data on agriculture;

- agriculture's relation to national economy
- the government structure as it relates to public sector agricultural research, education and extension institutions
- the operation of public sector institutions
- the role of private sector companies, NGOs and agricultural producers and their organizations.

Non OIC: Denmark



An overview of European AKIS (2014)



Source: PRO-AKIS report

3 OIC Countries From Each Group: Turkey, Egypt & Africa

Arab Group



EGYPT

- Largest Arab Country by population
- Largest agricultural GDP among Arab countries
- The combination of water from the Nile, fertile soil and a mild climate for productive agricultural system
- On the road towards developing an AKIS

Asian Group



TÜRKİYE

- Largest Agricultural GDP in Europe
- Strong partnership with relevant institutions such as FAO, WB, EU
- Recent Digitization boost
- Facing all challenges and capacity to address these challenges
- Export capacity
- Vertical and horizontal industry integration
- Institutional development model

African Group



SENEGAL

- Expanding its food production
- Considerable agricultural GDP; Representing approximately 17% GDP employing 70 % of the population
- On its way to digitalization of agriculture

Country Case Study Worksheet

1. **POLICY environment**

- 1.a Title of the national AKIS policy, plan or formal agreement
- 1.b Public goods targeted by AKIS policy
- 1.c Indication of economic efficiency of agriculture sector, given AKIS

2. **INSTITUTIONAL structure for support of innovation**

- 2.a Name/number of public sector AKIS/RD units
- 2.b Who responsible for central and branch supervision
- 2.c What initiatives taken to build AKIS institutional resources (leadership/staff HRD)
- 2.d What type/level of programme decentralization/subsidiarity
- 2.e Who responsible for M&E and impact assessment
- 2.f Indication of functional performance of AKIS entities

3. **CONDITIONS for expression of demand for innovation**

- 3.a Evidence of demand-driven orientation in public programmes
 - b. Investment in agricultural market development
 - c. Availability/access to input supplies (credit, supplies)
- 3.d Adequate physical infrastructure
- 3.e Joint planning between which agencies/how effective are linkages?
- 3.f Agricultural producers HRD
- 3.g Indication of gender inclusion

4. **PARTNERSHIPS and NETWORKS**

- 4.a What structures for effective institutional cooperation
- 4.b Example of strong public–private partnerships (pluralism)
- 4.c Evidence of programme participation by APs (and RPOs)
- 4.d Example of effective use of traditional communication technology
- 4.e Example of effective use of modern computer/internet technology

5. **FINANCING systems for innovation**

- 5.a Figures showing adequate funding for AKIS/RD
- 5.b Type of repartition of costs (fee-based cost-sharing)
- 5.c Type of investments to develop stakeholder capacities

Text in bold italics indicates the original nine principles of AKIS.

AP = agricultural producer; HRD = human resource development; M&E = monitoring and evaluation; RPO = rural producer organization

Expert Interview Questionnaire

- 1) Current status of AKIS in your country
- 2) What are the main challenges with AKIS in your country (up to 3)
- 3) Who are the actors in the AKIS system?
- 4) How do the different actors perceive their roles in the AKIS system?
- 5) What institutional or technical arrangements are in place to facilitate/ensure the integration of AKIS components?
- 6) How effective and efficient are the present linkages/arrangements?
- 7) What are the modalities for sharing responsibilities and resources?
- 8) Is there any evidence of AKIS impact, especially at the farmer level?
- 9) Strengths & Weaknesses for AKIS; Opportunities & Threats; Good & Bad AKIS practices
- 10) Contact with different domestic and international stakeholders
- 11) Further thoughts

Targeted Deliverable

A 80-100 pages-long (except Annexes) research report in English

The report will follow the outline below:

- Executive Summary
- Introduction
- I. Conceptual Framework and Methodology
- II. Overview and Analysis of AKIS across the globe and in the OIC Member Countries
- III. In-depth assessment of the AKIS practices in selected countries
- IV. Policy Recommendations/Guide for developing AKIS in the OIC Member Countries
 - Conclusion
 - References
 - Annexes
 - Index

Final report will be presented orally during the 19th Meeting of the COMCEC Agriculture Working Group in September 2022.

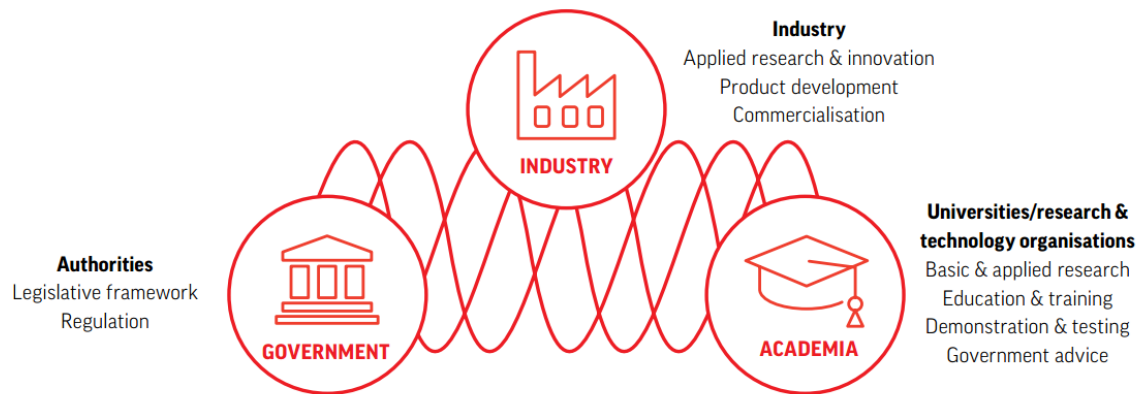
AKIS in Denmark (I)

- A European hotspot for innovative food & agricultural products, services and technology.
- Challenges transformed into production advantages and innovations
- Innovation rooted in the Danish collaborative culture
- From research to value



The Triple Helix Model

The triple helix model



Innovative technology, Steering the green agenda in farming and food, Food Nation Denmark, 2021

Top Priorities

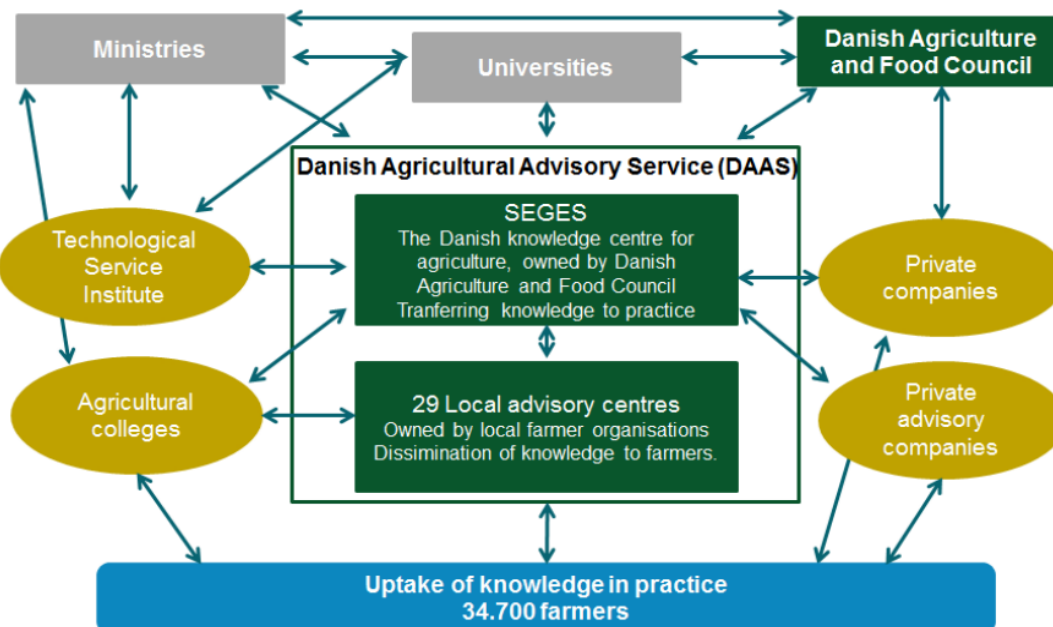
1. Reducing greenhouse gas emissions by 70% in 2030; green protein
2. Relieving the strain on nature; reduce water and energy consumption, cut carbon emissions and maximize raw material utilization.
3. Digital technology for sustainable food production

AKIS in Denmark (II)

Well-functioning AKIS with strong links between universities, public ministries and agencies, agricultural knowledge centres, agricultural colleges and vocational schools, advisory companies, and farmers

- demand-driven system
- needs of the farmers drive the system
- both very informal and strong linkages

The knowledge channels of the Danish AKIS

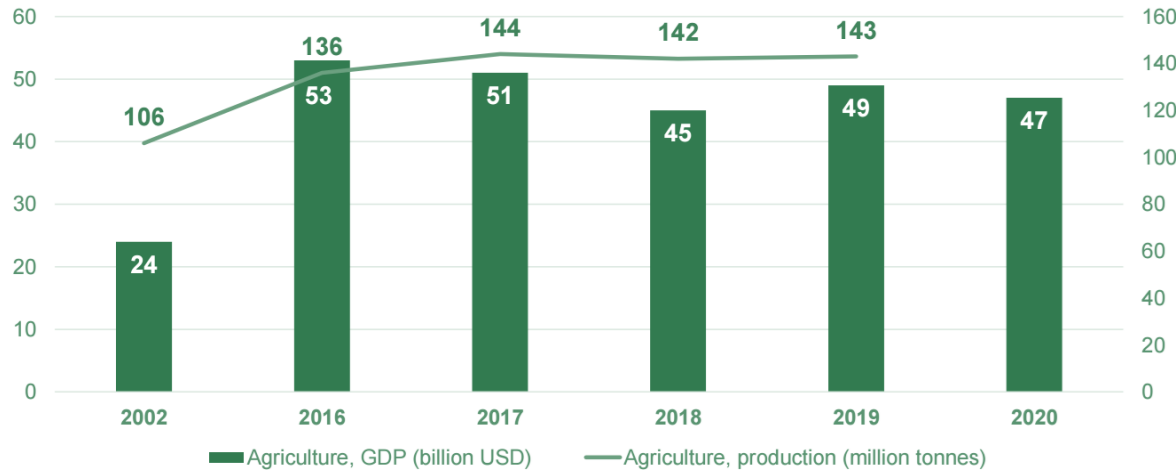


Characterized by:

- Its impartialness.
- Being non-profit.
- Its ability of fast and effective implementation of the newest knowledge.
- Its high impact in terms of reaching the desired goals of the sectors.
- An effective channel for knowledge transfer through the 2-layer system within Danish Agricultural
- Advisory Service made up of;
 - SEGES, the Danish knowledge centre for agriculture and as first layer
 - 29 independent advisory companies in the DAAS-cooperation.
 - Supplemented by the GTS-institute, Technological Service Institute.
- Its ability to produce and bring knowledge and value to the Danish agricultural sector and the Danish society,
- Being highly flexible to new needs, technologies and to the structural changes within Danish agriculture
- Its ability to quickly and effectively initiate research and innovation activities based on farmers' needs.
- Being based on the cultural heritage characterized by independence, mutual trust and a deep rooted tradition for cooperation.

AKIS in Türkiye (I)

- Largest Agricultural GDP in Europe
- Become a major player agricultural production in the last two decades
 - 18 % of employment (2020)
 - 6,6 % of GDP (2020)
 - 12 % of exports
- The sector's value increased by 96% between 2002 and 2020



- Vertically and horizontally integrated agro-food value chain
- Strong presence of global agro-food companies
- Policy Alignment with the EU and other international institutions

AKIS in Türkiye (II)

- Emerging market economy with a liberal economic model for more than 4 decades
- Formal agricultural education since 1848
- Institutional Agricultural research and extension since 1930
 - Influenced by the USA and western countries
- New systems and approaches in agricultural extension suggested by the World Bank and other international donor institutions
- Alignment with the EU policies as an accession country
- Public dominated system with the support of International institutions and involvement of private firms such as Bayer, Syngenta, Dow, and Monsanto
- Weaker farmer organizations in compare to the European model
- Growing involvement of regional development agencies and local municipalities
- Ministry Of Agriculture And Forestry
 - Division of Farmers' Education and Extension
 - Regional agricultural research institutes

AKIS in Egypt (I)

- With water from the Nile, fertile soil and a mild climate, a productive agricultural system
- 2.5 million ha of land, mainly located in the Delta and along the Nile valley.
- Small farm size: 1 ha average
- Agriculture sector employs about 31% of the labour force and generates 14% of GDP
- Egypt's research system for knowledge generation in agriculture has led to;
 - productivity increases in most crops,
 - enlarging the cultivated area in the desert
 - conserving natural resources



AKIS in Egypt (II)

- Still retains a traditional system oriented to technology transfer with decentralization efforts and digitalization agenda
- Ministry of Agriculture and Land Reclamation (MALR) is at the center of the system
- Egyptian Agricultural Extension Service (EAES) established in 1953
- EAES comprised of four central administrations:
 - The Central Administration for Horticulture and Field Crops,
 - The Central Administration for Afforestation, Nurseries, and Environment,
 - The Central Administration for Soils and water,
 - Central Administration for Agricultural Extension and Environment (CAAEE)
- The Agricultural Directorate at the governorate level is the key organization for the implementation of agricultural field activities, including national campaigns and foreign financed projects.
- Regional Research and Extension Councils (RRECs) in six distinct climate zones.
 - To bring research and extension services closer to the farmer and to open up the decision-making process to local interest.

Digital Agenda

- **"Virtual Extension and Research Communication Network" (VERCON)**
 - promoted by FAO and piloted in Egypt
 - significant innovation to be adopted by other countries
 - to strengthen and enable linkages among the research and extension components of the national agricultural knowledge and information system.
 - to improve the agricultural advisory services provided to Egyptian farmers and in particular to resource poor farmers
- **Digital Agriculture Extension and Communication Services Project**
 - Introduction of a model for high quality digital content of rural advisory services through enhancement of the local institutional and technical capacities.
 - **El Mufeed** app to disseminate among targeted groups
 - to help farmers and rural communities coping with the COVID-19 pandemic to continue the production and marketing processes

AKIS in Senegal (I)



- The agricultural sector is of great importance to the national economy.
 - It contributes 17 % of the GDP
 - involves approximately 60 percent of the adult population.
 - main driver of the economic & social development
- The Senegal's economic growth strategy identifies agriculture as the key driver for poverty reduction
- Senegal has its sights set on becoming an emerging economy by 2035
 - a goal that will rest heavily on the development and success of its agricultural sector.
 - Senegal Emergent Plan (PSE) through the program component of Recovery and Acceleration of the Agricultural Cadence in Senegal (PRACAS).
- Value chains are being set up and processing industries are already operational;
 - mango,
 - onions,
 - potatoes,
 - European Summer vegetables
 - poultry & eggs

AKIS in Senegal (II)

- The Decentralized demand-led public services with structures and procedures for farmer participation
- Agricultural research and development; the Senegal Institute of Agricultural Research (ISRA) under the Ministry of Agriculture and Rural Equipment's (MAER)
- Farmer organizations are successful in advocating for the need for reforms towards greater farmer ownership and control towards the end of the 1990's.
- Since 2000, the Agricultural Services and Producer Organizations Support Programme (PSAOP) has supported strengthening of the demand side of agricultural advisory services.
- PSAOP to promote a new approach to agricultural advisory services.
 - institutional reform of agricultural services, particularly with ANCR, ASPRODEB and FNRAA,
 - the development of demand-driven agricultural advisory services
 - capacity development of FOs in order for them to formulate their requests for advice and to contract a service provider of their choice.
- PSAOP has had five components:
 - Support for Research (Senegalese Agricultural Research Institute (ISRA) and Institute of Food Technology (ITA);
 - Support for Advisory Services (ANCAR);
 - The creation of the National Fund for Agricultural Research and Agrifood (FNRAA);
 - Support to FOs for capacity development through the Senegalese Association for the Promotion of Small Development Projects (ASPRODEP);
 - Restructuring and capacity building of human resources of the Ministry of Agriculture
- The National Rural and Agricultural Advisory Agency (ANCAR), created in 1997
 - Government: 51 % of the capital; the FOs 28 %; the private sector 7 %; local communities 14 %
- The agency provides national coordination of service provision through the Regional Rural Agricultural Advisory Services (CRCAR).
- Involvement of MNC and Foreign Donors
 - **Syngenta Foundation for Sustainable Agriculture**; providing access to mechanization for rice farmers.
 - **French Agricultural Research Centre for International Development & the Senegalese Institute for Agricultural Research**: advanced modeling software to help farmers estimate the value of their potential crop production just by taking photos of their trees.

Thank you

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