

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

19th Meeting of the Agriculture Working Group

October 10, 2022 | Ankara

OUTLINE

1. Introduction

2. Agriculture Knowledge and Innovation Systems (AKIS)

3. Case Studies

3.1. Denmark

3.2. Türkiye

3.3. Egypt

3.4. Senegal

4. Policy Recommendations & Guide for Developing AKIS

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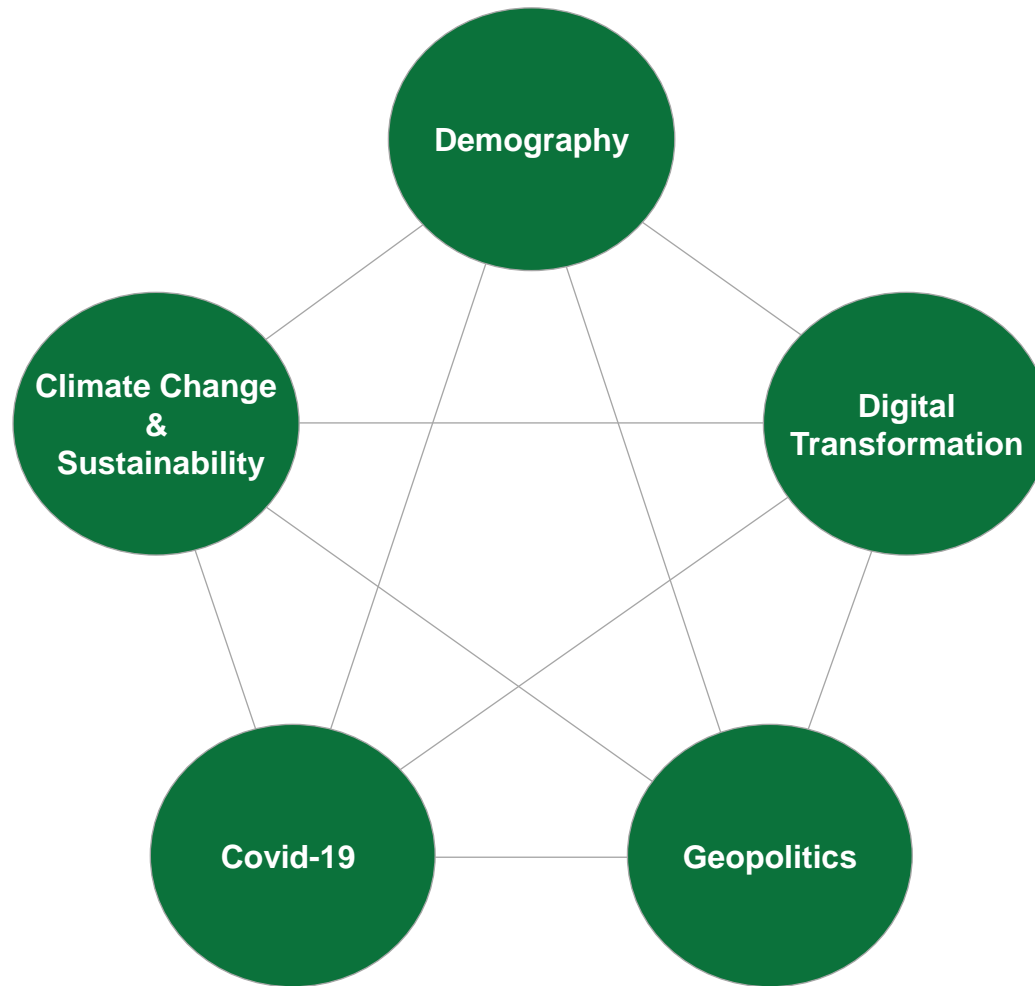
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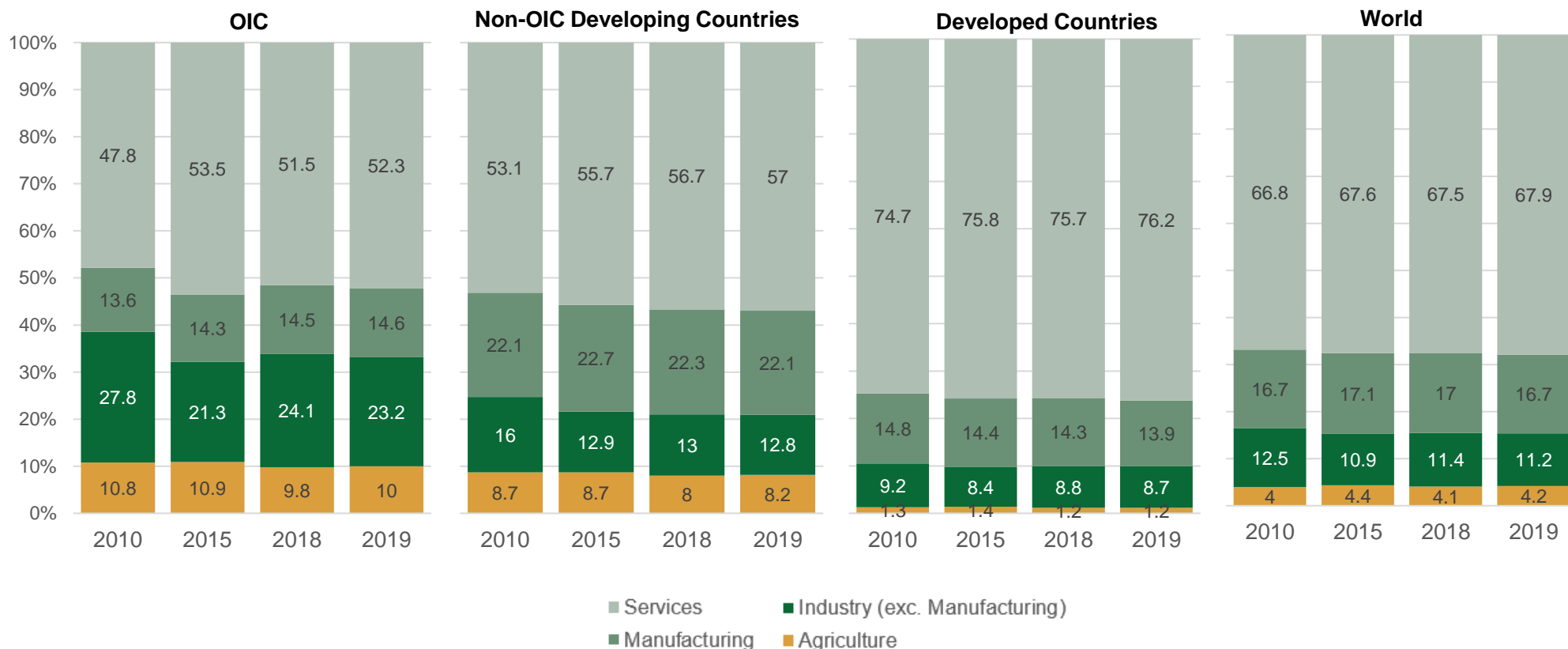
Context, Drivers & Trends for Agricultural Transformation



Outlook of Food and Agricultural systems in the OIC Countries

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

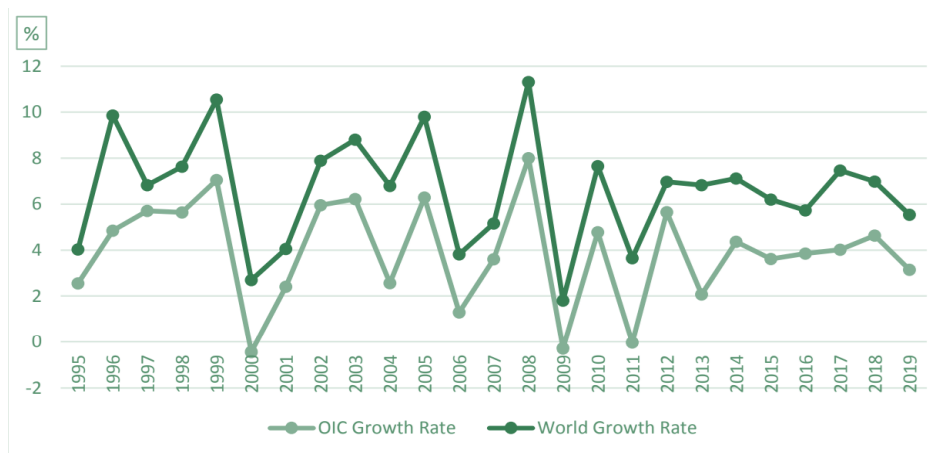
Value Added by Major Economic Activity (% of total) in OIC Countries



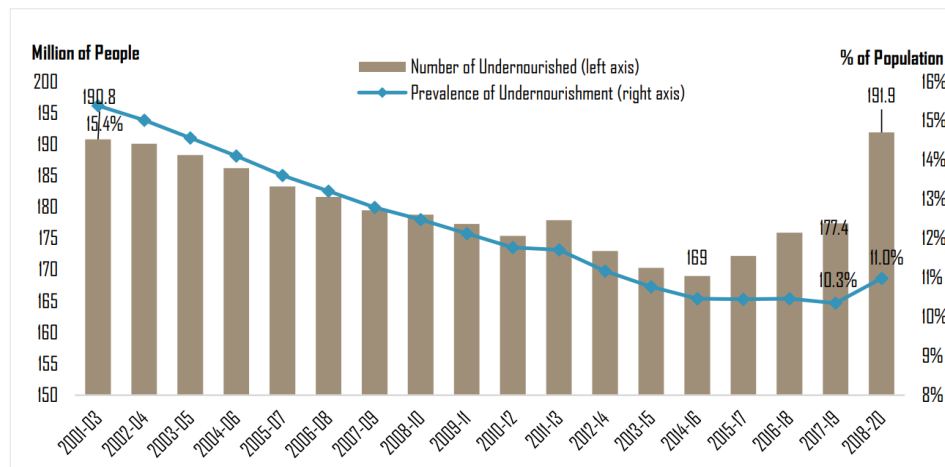
SESRI 2021

Slowing Growth, Decreasing Share in Employment in Agriculture & Food Insecurity

Agricultural Growths in the OIC and World

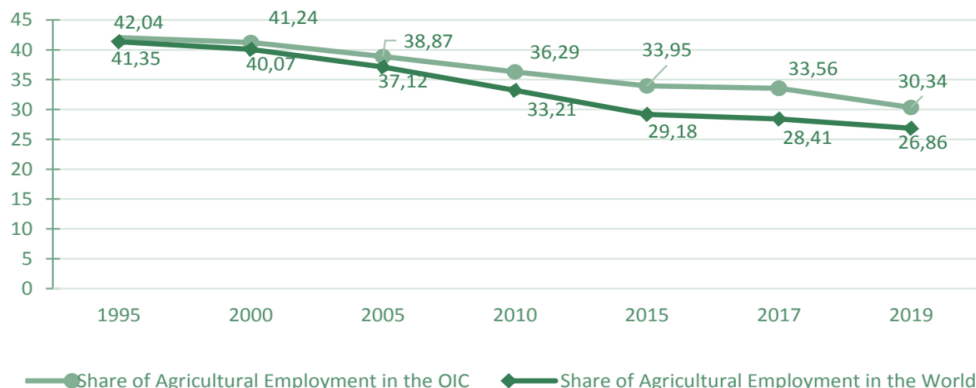


Undernourishment in OIC Countries



Source: SESRIC staff calculations based on FAOSTat

Share of Agricultural Employment



- 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

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How to Address These Challenges ?

- Need to;
 - › Enhance production
 - › Improve productivity
 - › Develop inclusive & resilient & sustainable & market-oriented value chain in food and agriculture



Agriculture Knowledge and Innovation Systems (AKIS)

- AKIS;
 - how people and organizations join together
 - to promote mutual learning, to generate, share, and use agriculture-related knowledge and information.
- Farmers, advisers, researchers, research institutes, education and training providers, input suppliers, retailers, media services, ministries
 - They all either need, produce or exchange knowledge and information
- technical, organizational and social dimensions
 - 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
- FAO and the World Bank (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

9 guiding principles of AKIS

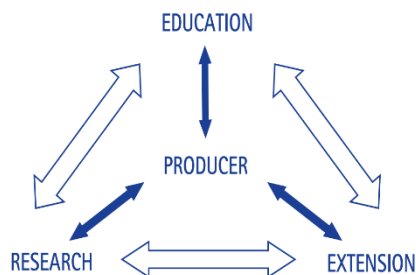
9 guiding principles of the FAO/World Bank (2000) to assist in;

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

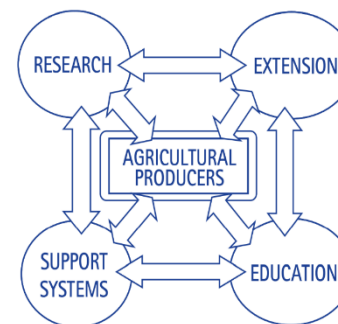
1. Economic efficiency,
2. Careful matching between the comparative advantages of organizations and the functions they perform,
3. Subsidiary,
4. Clear repartition of costs,
5. Careful assessment and optimal mixing of funding and delivery mechanisms,
6. Pluralistic and participatory approaches,
7. Effective 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

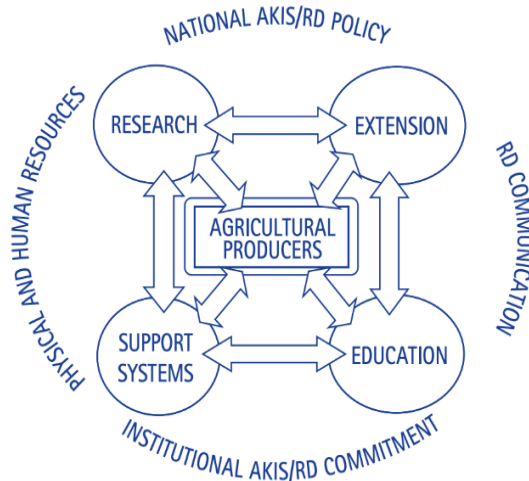


An idealized AKIS/RD model

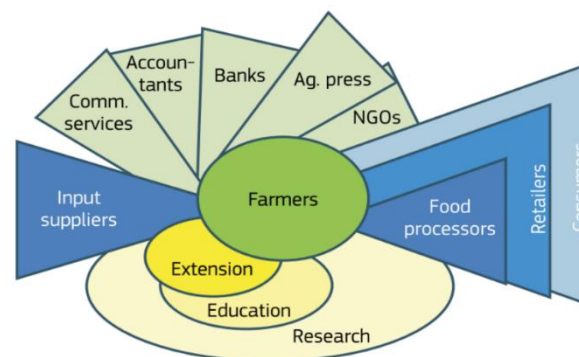


- The knowledge creation, diffusion, utilization subsystems;
- The agro support subsystem involved in credit, input and market functions.

A comprehensive AKIS/RD model

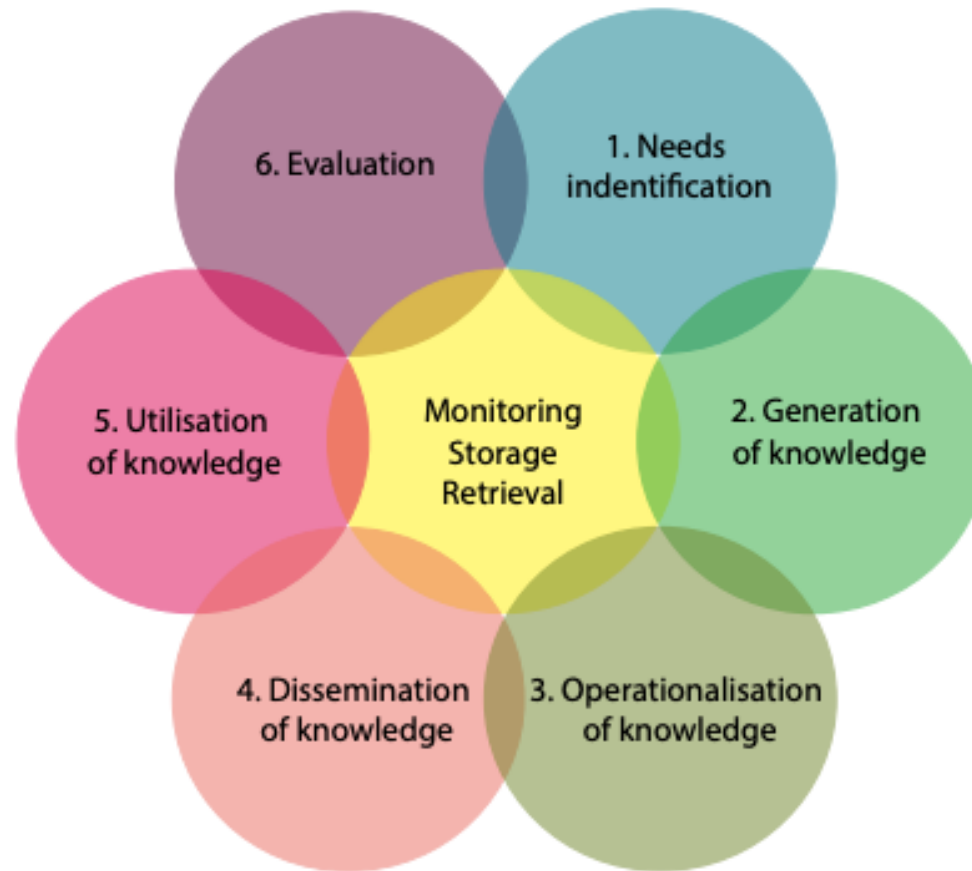


Participatory network approach



- ‘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

Functions within an AKIS



Germundsson 2021, p. 1

Successful implementations of AKIS

Recent trends & reforms in AKIS development and institutionalization:

- participation of farmers, the private sector, and other stakeholders,
- participation of women farmers,
- Decentralizing research systems,
- Decentralizing extension and advisory services,
- Establishing competitive funding mechanisms,
- Promoting farmer organizations to reach economies of scale,
- Mixing public and private systems.

Major issues & challenges in AKIS development:

- Inconsistent institutional structure with poor communication mechanism,
- Overlapping power, authority, jurisdiction,
- Weak human resource capacity,
- Weak and poorly defined linkages,
- Shifting policy and strategic framework.

AKIS in the EU

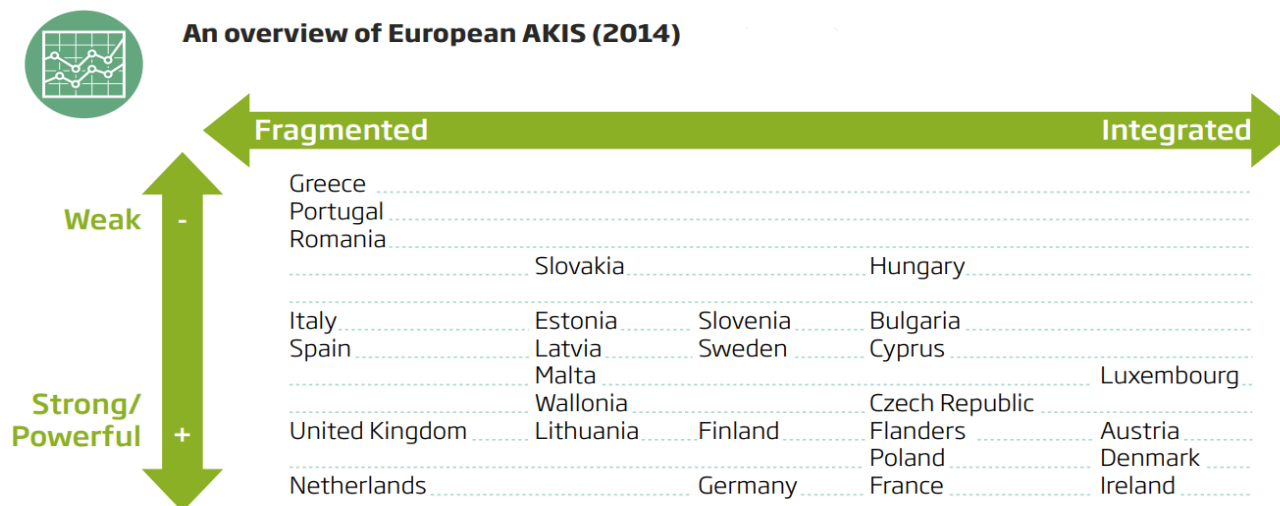
Types of dominant advisory organizations in the EU-27

Type of dominant advisory organisation	Country							
Public	Bulgaria	Greece	Hungary*	Ireland	Latvia*	Poland*	Romania*	Slovakia*
Private	Estonia*	The Netherlands						
Farmer-Based Organisation	Austria*	Belgium	Cyprus	Denmark	Finland	France*	Lithuania*	Portugal
	Slovenia*	Spain	Sweden					
Public/Private	Czech Republic*		United Kingdom					
Public/Private/FBO	Germany*	Italy	Malta					
Public/FBO	Luxembourg*							

Note: Countries with an agricultural chamber are marked with an asterisk. Croatia has not been included.

Selected Issues in EU AKIS Agenda

- Building multi-actor knowledge networks for farmers
- Farmer-to-farmer knowledge exchange
- Farmer-led interactive innovation
- Innovative agricultural media
- Social media by and for farmers
- Benchmarking for better farm performance



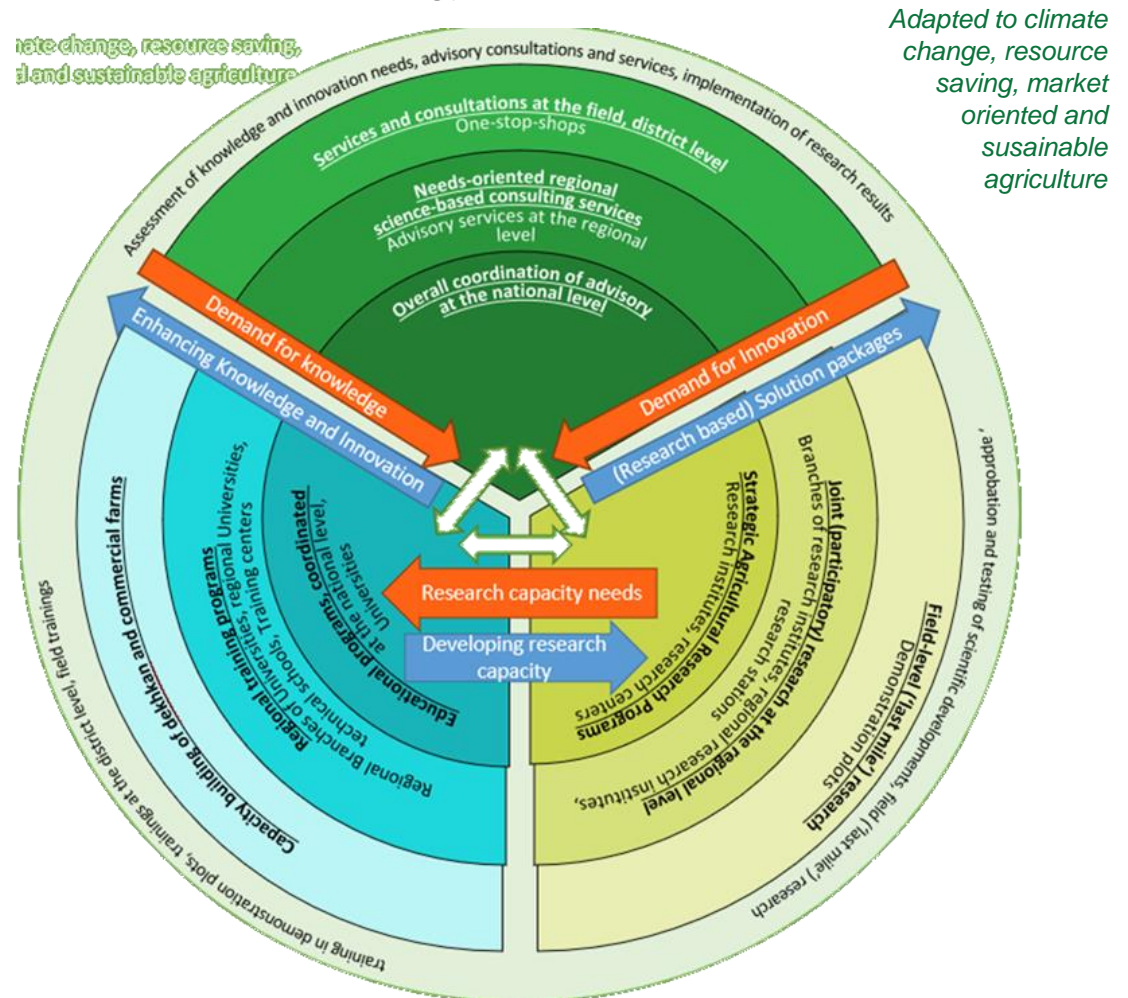
Source: PRO-AKIS 2016 report

Recent AKIS Development Projects in the OIC Member Countries

1) National Center for Knowledge and Innovation in Agriculture of Uzbekistan (UAKIS)

part of the implementation of the Agriculture Development Strategy for 2030

1. reforming agriculture research system
2. establishing a modern, functional agriculture education and training system
3. establishing an Uzbek advisory service
4. establishing an AKIS operational framework



The Green Innovation Centre for Agriculture and Food in Nigeria (GIAE)

- **Green Innovation Centers** for the Agriculture and Food Sector (GIC) in **14 African & Asian** countries
- to stimulate innovations in the agriculture and food sector to increase smallholder income, boost employment and improve regional food supply
- initiated by the **German Federal Ministry for Economic Cooperation and Development (BMZ)**
- co-funded by **European Union (EU)**, **Swiss Agency for Development and Cooperation (SDC)**

Services, facilities and events realized

- Farmer Business School (FBS)
- Good Agricultural Practice (GAP)
- SME Business Training & Coaching Loop
- 3D Animated Training Videos
- Contract Farming
- Processor Business School (PBS)
- Cooperative Business School
- The Mobile Cassava Processing unit (MOCAPI)
- Knowledge and information sharing on innovation,
- Introduction of innovations
- Advising Nigerian companies

Impact

- Capacity Development:
- Disseminating Good Agricultural Practice
- Agriculture as a Business
- Making Cottage industry fit for business
- Information and communication technologies

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Selection of Case Studies

3 OIC Countries From Each Group + Non OIC



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

Asian Group



TÜRKİYE

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

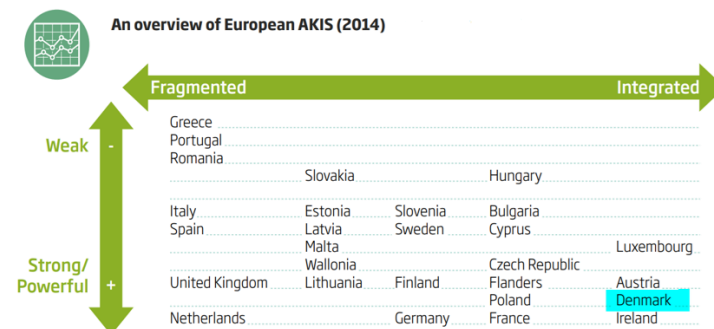
African Group



SENEGAL

- Expanding its food production
- Considerable agricultural GDP; Representing approximately 17% GDP, employing 70 % of the population

Non OIC DENMARK



Methodology of the Case Studies

Methodology

- Provide best available data on AKIS;
 - Policy environment for AKIS
 - Institutional structure for AKIS
 - Conditions for expressing demand for innovation
 - Partnerships and networks
 - Financing systems for AKIS
 - challenges faced over time
 - lessons to be learned
- Expert Interviews
- Surveys
- 2 Field Visits in Egypt & Senegal



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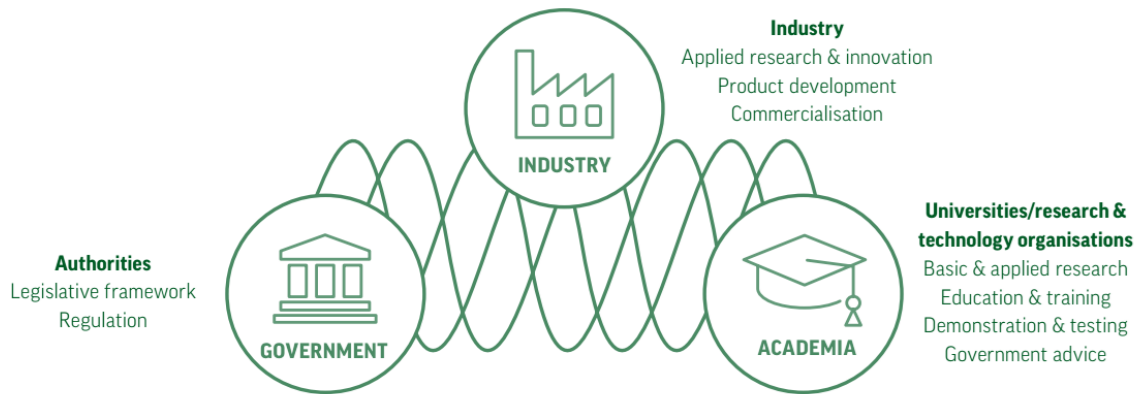
AKIS in Denmark (I)

- 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



Source: Food Nation Denmark, 2021

Top Priorities

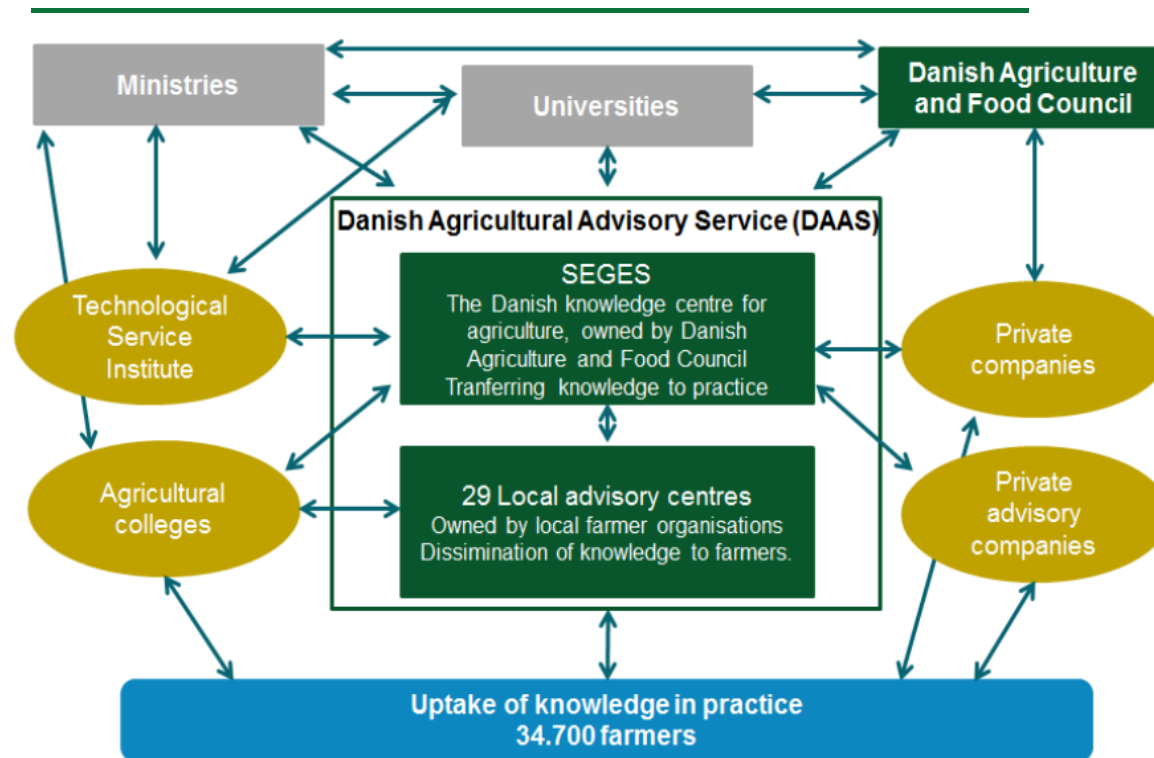
1. Reducing greenhouse gas emissions by 70% in 2030; green protein
2. Relieving the strain on nature; reduce water and energy consumption, cut carbon emissions and maximize raw material utilization.
3. Digital technology for sustainable food production

AKIS in Denmark (II)

Well-functioning AKIS with strong linkages

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

The knowledge channels of the Danish AKIS



AKIS in Denmark (III)

Characterized by:

- Its impartialness
- Being non-profit
- 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
- 2-layer system;
 - SEGES, first layer
 - 29 independent advisory companies, second layer
 - Ssupplemented by the GTS-institute, Technological Service Institute
- Its ability to produce and bring knowledge and value
- Being highly flexible to new needs, technologies and to the structural changes
- Its ability to 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.

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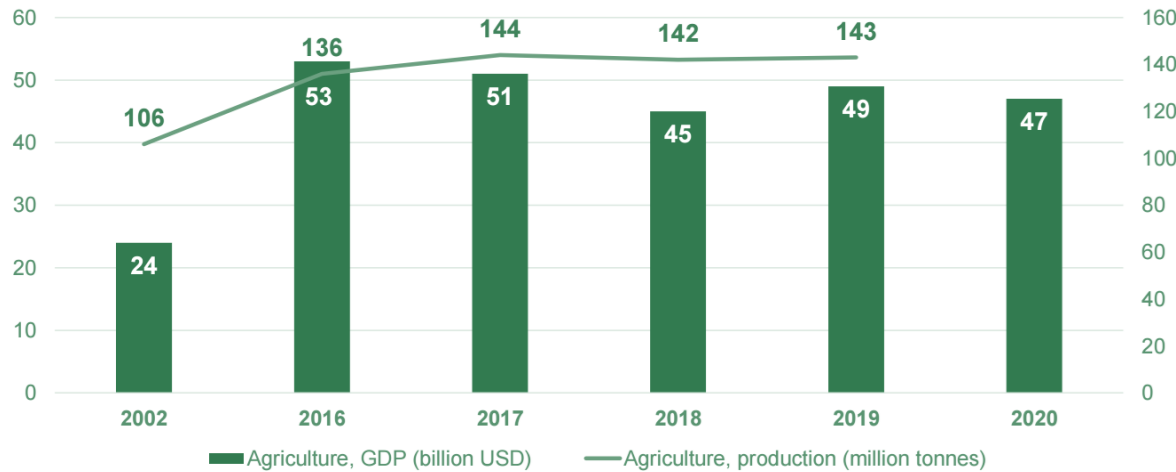
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AKIS in Türkiye (I)

- G-20 / upper middle-income economy with a liberal economic model for more than 4 decades
- Largest agricultural GDP in Europe
- Became a major player agricultural production in the last two decades
 - 18 % of employment (2021)
 - 5.65 % of GDP (2021)
 - 12 % of exports
- The sector's value increased by 96% between 2002 and 2020*



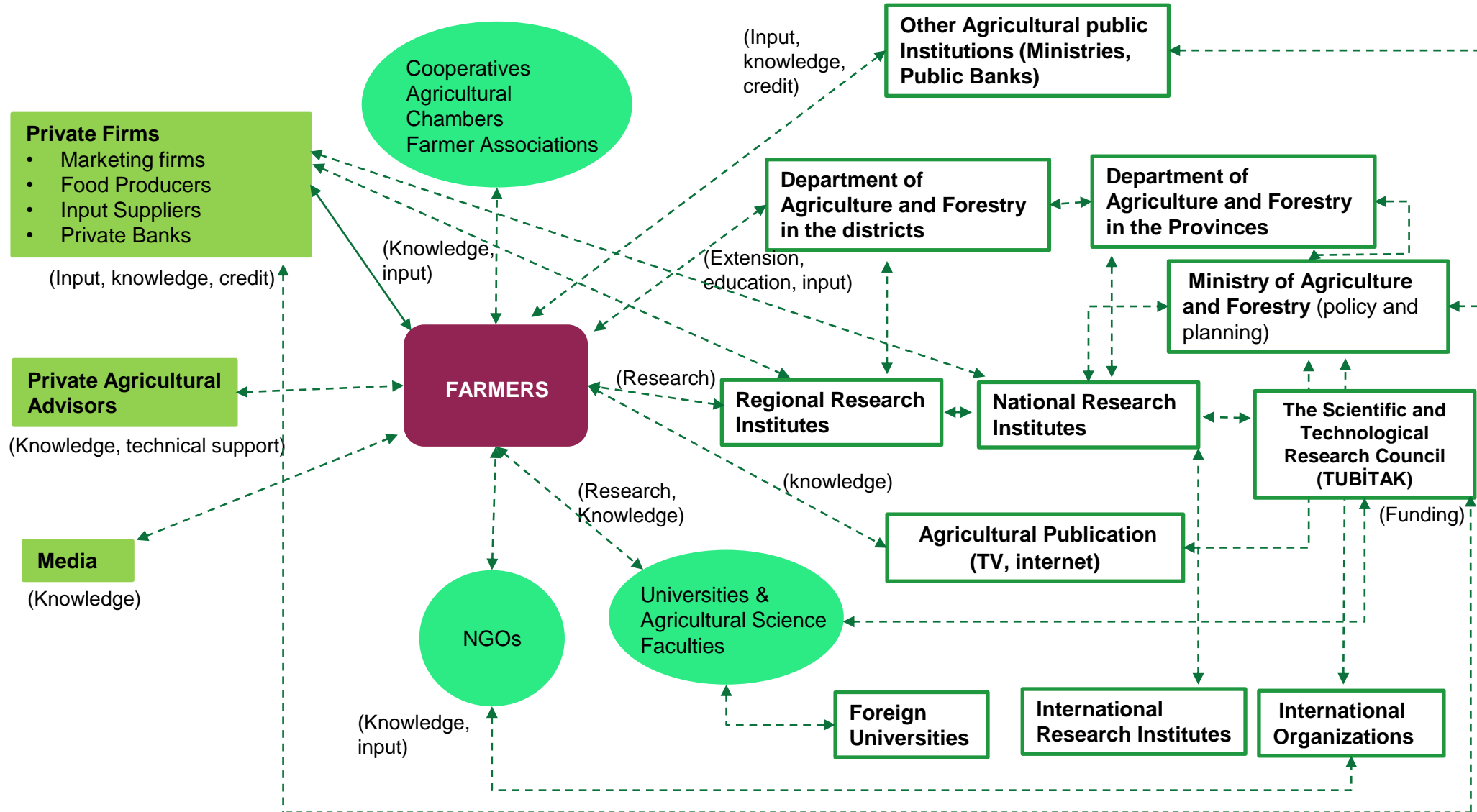
- Vertically and horizontally integrated agro-food value chain
- Strong presence of global agro-food companies
- Policy Alignment with the EU and other international institutions

*The Investment Office of the Presidency of the Republic of Türkiye

AKIS in Türkiye (II)

- Formal agricultural education since 1848
- Institutional agricultural research and extension since 1930
- New systems and approaches suggested by the WB and other int. org.
- Public domination, support of Int. org., involvement of MNCs and national private firms
- Weaker farmer organizations in compare to the Europe
- Evolving decentralization
- Ministry of Agriculture and Forestry (MoAF)
 - Division of Farmers' Education and Extension
 - Regional agricultural research institutes
- Experience of multi-stakeholder consultative mechanism, public-private partnership and localization.
- Participation of farmers in policy making process.
- remarkable progress on digitalization of agriculture
- Green transformation & sustainability
- Effective commercialization of agricultural research & increasing impact quality

AKIS Ecosystem in Türkiye



Challenges of AKIS in Türkiye

- Structural challenge: large number of small farms,
- Access to finance Challenge: due to prevalence of informality of agriculture,
- Productivity challenge: Productivity gap between small and larger farms,
- Sustainability challenge: Water scarcity & quality and soil erosion,
- Climate change challenges and opportunities: Increased water stress and temperature increase,

Lessons Learned

- › Geographic size and agricultural diversity of the country could be converted into an opportunity,
- › Productivity growth supported by better technologies, crop varieties and animal breeds,
- › Need to reduce the substantial technological and human resource disparities,
- › Quality and impact of R&D needs to be assessed for commercialization,
- › Political will of government together with financial support are important,

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AKIS in Egypt (I)

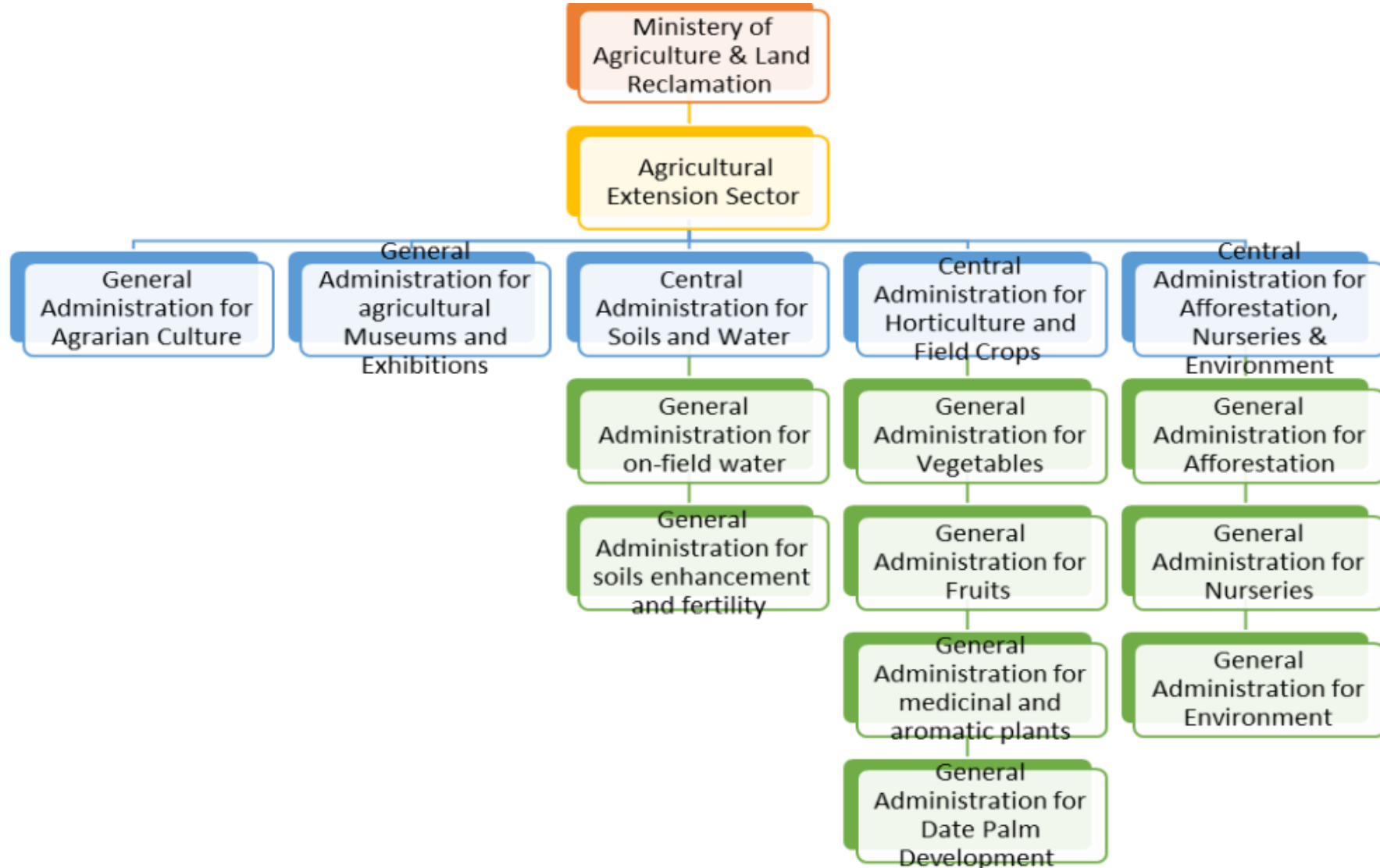
- With water from the Nile, fertile soil and a mild climate, a productive agricultural system,
- 2.5 million ha of land, mainly located in the Delta and along the Nile Valley,
- Land fragmentation is dominant (more than 80% of farmers own less than 2 hectares)
- The total land has increased
 - 2002= 34.23 million daa (8.15 million Fadden)
 - 2019= 39.18 million daa (9.33 million Fadden)
- the national agricultural projects to reclaim,
- The agricultural sector accounts for 20.1 percent of all jobs where the rural populations represent around 57% of the total population,
- Agricultura generates 12% of GDP,
- Agricultural exports of \$ 5.2 million tons in 2021 including 350 different agriculture products,



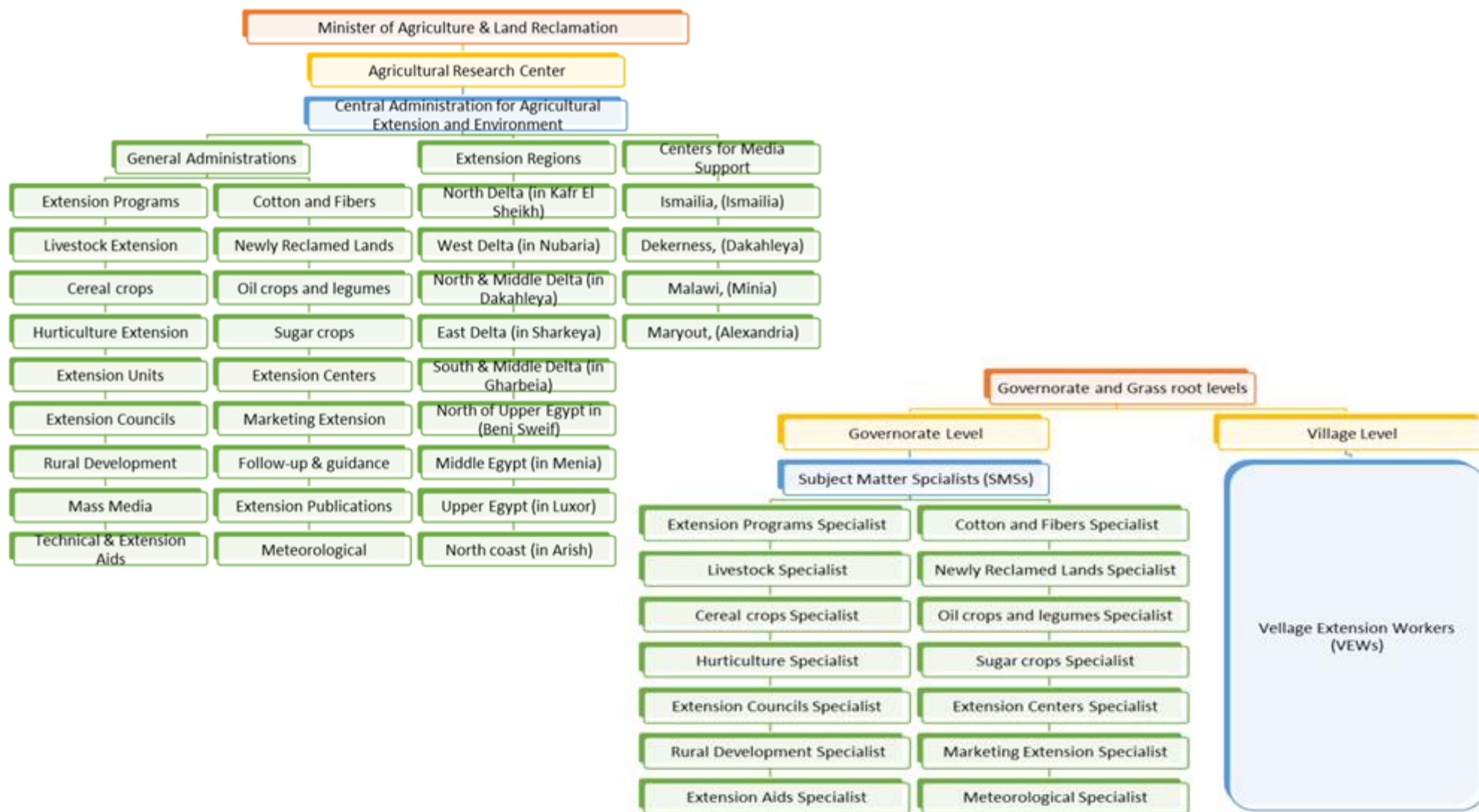
AKIS in Egypt (II)

- Still retains a traditional system oriented to technology transfer with decentralization efforts and digitalization agenda,
- Ministry of Agriculture and Land Reclamation (MALR)
 - › Central Administration for Agricultural Extension Services (CAAES),
 - › Extension Units and Agricultural Advisory Council Extension Programs,
 - › Extension Teaching Methods,
 - › Field Monitoring,
 - › Rural Development,
 - › Communities Department,
 - › Department of Marketing Extension.
- The Agricultural Directorate at the governorate level
- Regional Research & Extension Councils % the partition of the country into 9 regions for decentralization

Current structural hierarchy of the agricultural extension



Structural Hierarchy of the Central Administration of Agricultural Extension and Environment in Egypt



Digital Agenda

- **Farmer's card system**
 - › Allows the government to follow the land assets,
 - › Farmers can get credits from the agricultural bank & participate in the agricultural insurance programs

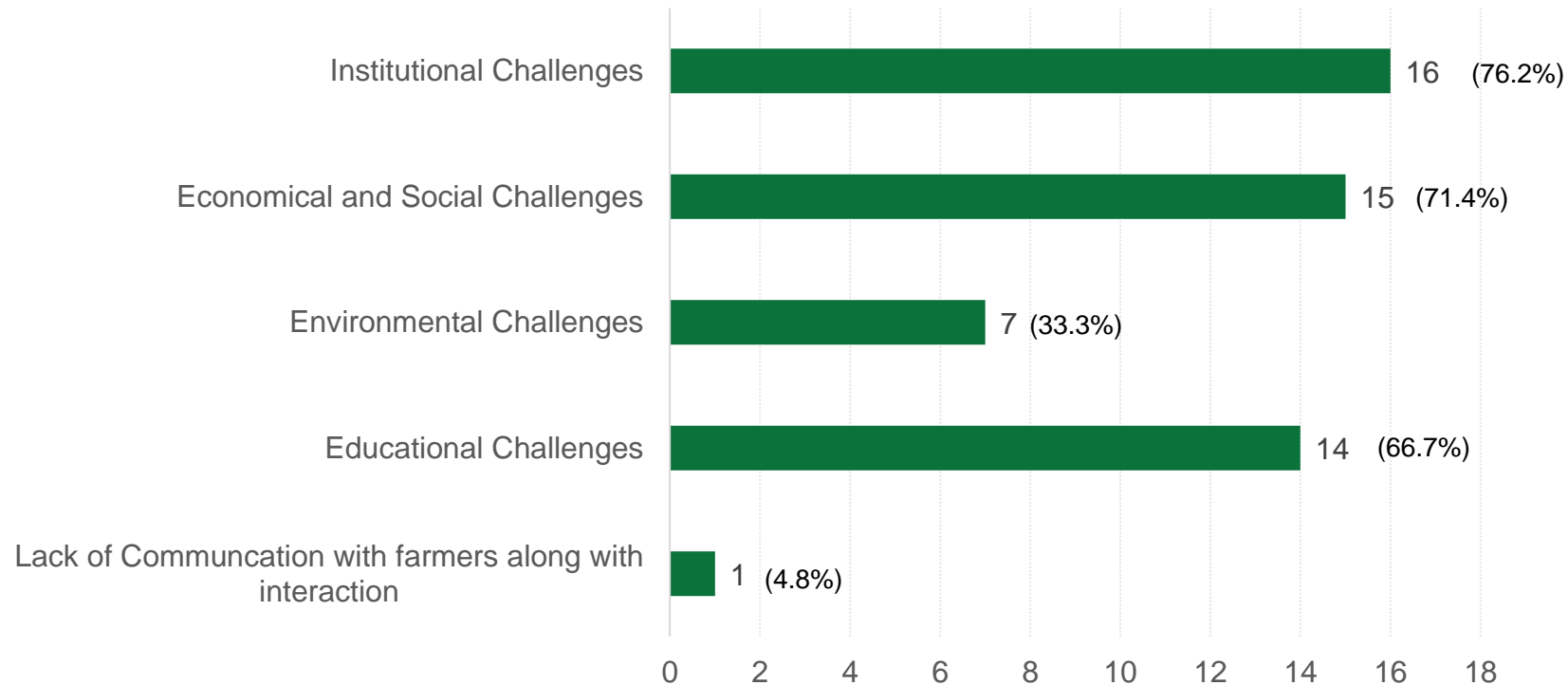
- **Platforms to disseminate the knowledge between farmers**
 - › Virtual Extension and Research Communication Network (VERCON,
 - › Rural Development Communication Network in Egypt (RADCON)
 - › Development of a National Agricultural Research Information Management System (NARIMS)
 - › Strengthening of the Horticulture information Support Network for Small Farmers in Egypt (HORTISUN)

- **Digital Agriculture Extension and Communication Services Project**
 - › El Mufeed mobile application
 - › Hodhud

- **Common mobile apps & TV channels**
 - › Mozare3, Mahsoly, Mazraty, El Mufeed, Zarie, Bashaier, Integrated Management of Olive, Integrated Mangment of Pomegranate, Hodhod, Shari, you100, Shader, What's app, Facebook, telegram, Hodhod,
 - › MISR AGRI, IrriWatch, WaPOR, Irrwi, Agro Get, Misr Elzeraeah TV channel

Challenges faced over time

Main challenges with AKIS in Egypt



Source: Survey data

Lessons Learned

- Developing online libraries for technical resources,
- A farmer field school is a very good model,
- Participation modules and in site meetings and farmer-farmer approach
- Determining responsibilities of stake holders
- Research should be linked with extension
- Utilizing overall available media and ICT through digital solutions or apps as extension services.
 - › voice agricultural guidance through the mobile phone: success,
 - › agricultural guidance through written messages: did not succeed (illiteracy and poor eyesight)
- Governmental support and government creates the necessary conditions for developing AKIS
- Coordination between government agencies
- Organic agriculture, Compost and solar energy and organic fertilizer
- Support businesses financially, build the capacity of start-ups, develop training programs and trainers, utilizing overall available ICTs and sharing lessons learned
- Encourage and support farmers' groups and organizations
- The support of the government and the rebilled the Agricultural guidance again
- There should be enough data about everything regarding the start-up, especially the risks
- More attention should go for post incubation for start-ups.

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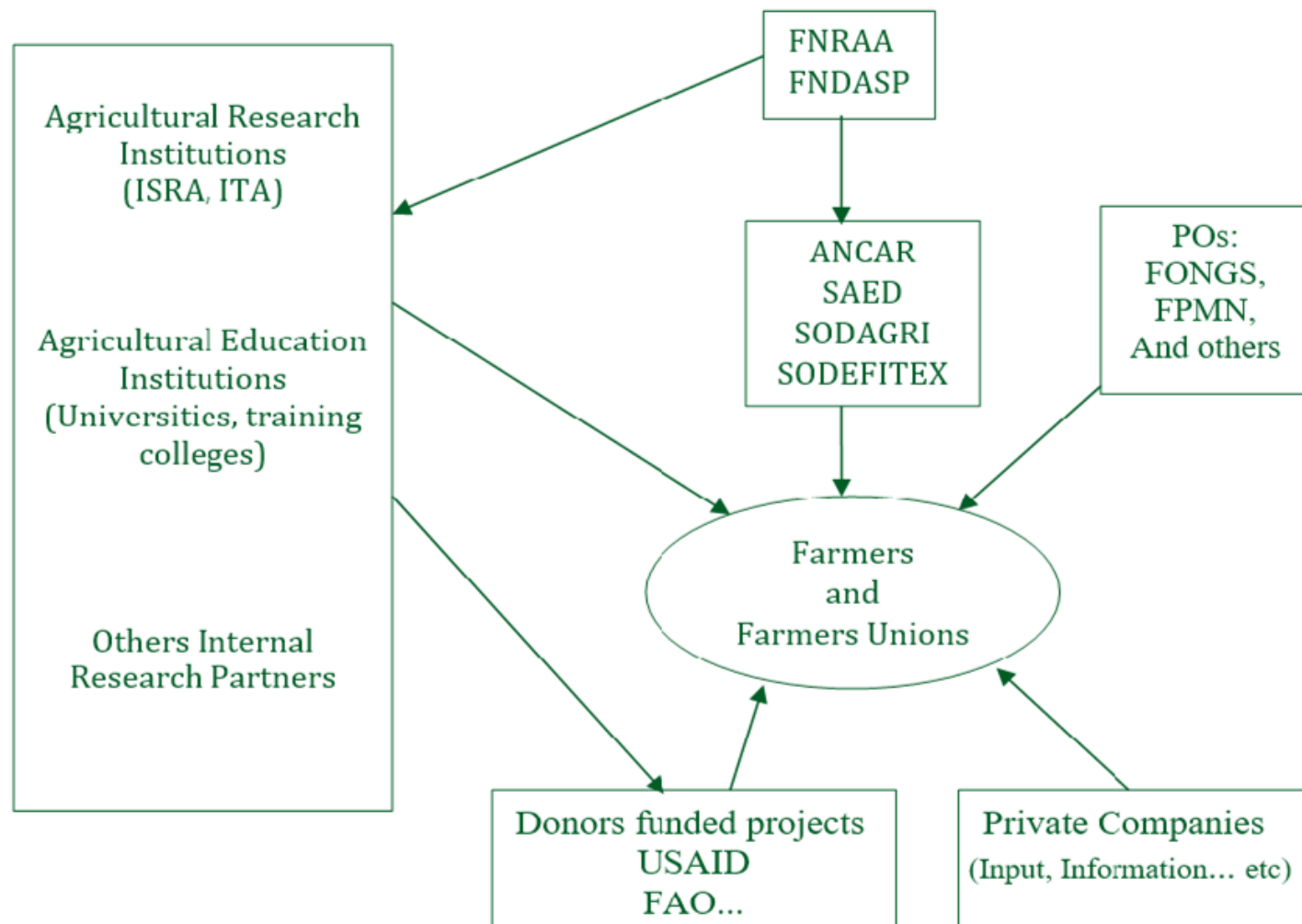
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AKIS in Senegal (I)



- The agricultural sector is of great importance to the national economy.
 - › It contributes 16 % of the GDP
 - › involves approximately 60 percent of the adult population.
 - › Among 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
 - › Groundnuts products

Current AKIS infrastructure in Senegal



Challenges faced over time

- The AKIS, not responsive enough in addressing the problems & opportunities facing farmers,
- The PSOAP reforms were appreciative regarding the approaches,
- The extension staff of ANCAR and others public agencies are not prepared to work on marketing,
- Technologies and practices focused on fertilizers use and increasing crop yield,
- Market linkages are essentially important for value chains development and poverty eradication,
- Irrelevant stakeholders' initiatives to the rural farmers,
- Underfinancing of public research and extension,
- Public institutions become more dependent to donors fundings,
- Quality of human capital is relatively low,
- The educational institutions agriculture don't have extension studies,
- Lack of systematic collaboration among educators, researchers, extension staff,
- The lack of effective coordination and linkage needed to be addressed.

Lessons Learned

- Research, education and extension still tend to operate here as three separate systems,
 - › Better coordination is needed
- Formulating a proper national policy for AKIS,
 - › To strengthen coordination between stakeholders and define their role in the system
- Promoting high degree of joint planning among public and private institution,
- New funding,
- Agricultural universities needs to integrate their programme's opportunities of courses towards extension,
- More investment to ICT is needed.

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Policy Recommendations on How to Develop / Improve AKIS in OIC Member Countries

- Robust policy recommendations that can substantially enhance AKIS across the OIC,
- The recommendations have been developed based on extensive examination of the necessary components and best practices of AKIS,
- The recommendations are synthesis of case studies and in depth interviews with the experts,

Policy Recommendations to OIC Members

1. Developing a sound stakeholder coordinating and consulting mechanism to provide a common framework in which all actors can operate in an aligned and harmonized way,
2. Making use of Public-Private Partnerships for effective AKIS governance and financing,
3. Investing in new talent for agriculture through developing connections and networks between youth and AKIS institutions to prepare workforce of the future,
4. Including seasonal agriculture workers into the AKIS for better harnessing their potential in terms of investment, job creation and agricultural productivity,
5. Developing a sound system for effective monitoring and evaluation from the beginning to better understand the impact of AKIS,
6. Strengthening the information and communications technology (ICT) Systems for AKIS to address the need for localized and customized information,
7. Developing an AgriTech & FoodTech ecosystem for the creation and growth of new companies and supporting the existing ones,
8. Developing a virtual network of OIC AKIS institutions to increase collaboration among OIC Member Countries.

Guide for establishing/improving AKIS systems in the OIC Member Countries

Setting the Context for AKIS

Defining features of an AKIS structure

Actors	research, extension, education bodies / professionals and farmers
Purpose	Strengthening communication and knowledge delivery services to farmers
Outcome / impact	Technology adoption and innovation in agricultural production
Organizing principle	Accessing agricultural knowledge, information, technology, solution
Mechanism for innovation	Knowledge and information exchange
Role of policy	Linking research, extension, and education
Nature of capacity strengthening	Strengthening communication among actors of agricultural value chain

Stages of AKIS

1

Design and Planning

- Considering Global Policy Context for Agriculture
- Alignment with the Broader National Development Context for Sustained Political Support
- Assessing the Policy Context for Agriculture
- Developing a Strategic Vision
- Considering 9 Guiding Principles for AKIS Design
- Employing Integrity of Programmatic approach
- Setting measurable goals for 5-10 years

2

Implementation

- Shaping the AKIS eco-system
- AKIS operational framework
- Building Linkages among the research, education, and extension
- Phasing of development
- Legal Framework for AKIS
- Managing structure of AKIS
- Designing Role of Government & Public
- Financing AKIS

3

Monitoring & Evaluation

- Comprehensive check list for M&E

Check List for Assessment of AKIS Structure

1) AKIS Properties

1 Research

- Existence of agricultural innovation policy [Y/N]
- Regular update of agricultural innovation policy [Y/N]
- Investment in agricultural innovation (total of public and private (% of agricultural GDP)
- Researchers in agriculture (in full-time equivalent) # per million farmers
- Connectivity between innovators and research actors
- Incentives for research and innovation [#]
- Scientific publications related to agriculture [#]
- Citations of scientific publications related to agriculture [#]
- Patents related to agriculture developed [#]

2 Education

- Access to ICTs [%]
- Farmer literacy rate / education level
- Public spending on professional vocational training (% to GDP or agricultural GDP)
- Existence of certification and licensing [Y/N]
- Farmers with certification [#]
- Training courses/workshops provided/attended [#]

3 Extension

- Existence of extension policy [Y/N]
- Public investment in extension (% to GDP or Agricultural GDP)
- Farmers reached by extension services (% of farmers)
- Capacity development interventions received by farmers (#)
- Incentives for disseminating innovations [Y/N]
- Digital platforms widely available (#)
- Farmers' queries addressed / problems solved (#)
- Research outputs tested on farms (#)
- ICT solutions/tools for farmers (#)
- Farmers using ICT solutions/tools (% of farmers)
- Grassroots innovations recorded and validated in the country (#)
- Use of innovations developed by farmers within the countries (#)
- Farmers reached by interventions [%]

4 Bridging institutions

- Farmer organized in groups (#)
- Enabling policies for farmer organizations [Y/N]
- Documentation of good practices [Y/N]
- Public-private partnerships and investments (#)
- Client satisfaction score (#)
- Existence of feedback mechanism[Y/N]
- Producer organisations (#)
- E-commerce platforms (#)
- Start-ups in the agrifood sector (#)
- Project collaborations (#)
- Multi-stakeholder platforms (#)
- Inclusiveness of agricultural innovation process [Y/N]
- Incubation centres for food-tech & Agri-tech (#)
- Inclusiveness of extension for women, youth, migrants, seasonal worker [Y/N]
- Incentives for scaling innovations through agribusiness actors [Y/N]

Check List for Assessment of AKIS Structure

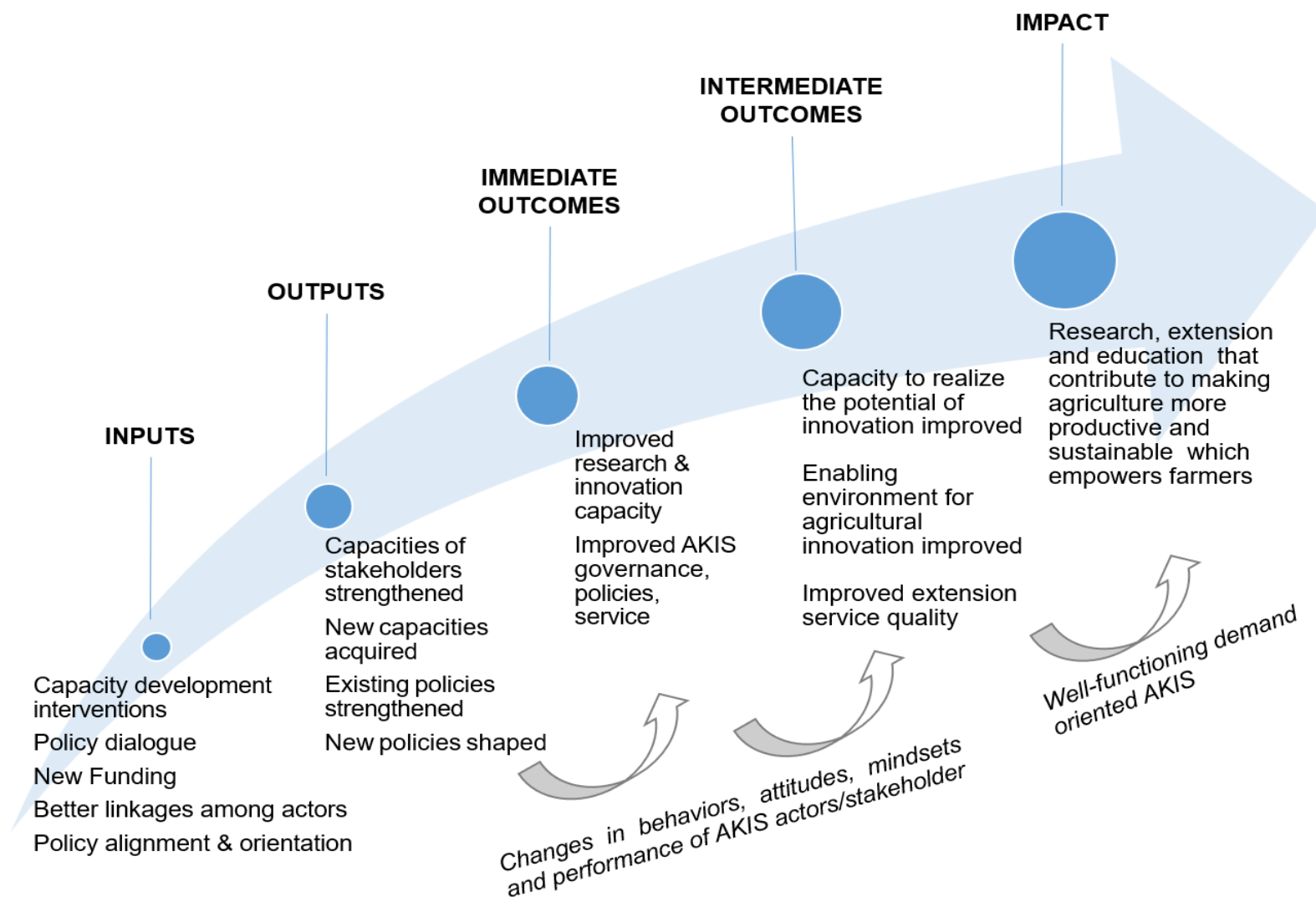
2) AKIS Properties

- Degree and intensity of interaction [meeting frequency]
- Multiplication of knowledge / Knowledge sharing platforms [#]
- Co-creation / uptake / adoption of institutional/ social/ technical innovations [%]
- Collaboration Platforms [#]
- Partnerships / joint activities / R&D Collaborations [#]
- Responsiveness to stakeholders needs [Y/N]
- Capacity to innovate [Y/N]
- Policy engagement [Y/N]
- Diversity of financing [Y/N]
- Institutionalized mechanisms [#]

2) AKIS Impact

- Growth of agricultural GDP (%)
- Yield performance (Kg per hectare)
- Volume of production per labour unit by classes of farming
- Increase average income of farmers (%)
- Performance of Food loss index
- Performance of food waste index
- Performance in The Global
- Food Security Index (GFSI)
- Graduation out of the Low-Income Food-Deficit Countries (LIFDCs) list

AKIS Impact Pathway



Thank you

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