Accelerating and amplifying systemic transformation of agri-food systems with the digitalization of research and advisory services in Senegal

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FSD7, Morocco
The map highlights, in red, areas where food insecurity is potentially at risk due to climatic factors. The map shows areas where there is high variability in the start of the rainy season, a poor growing season in two out of ten years, and a dry spell length of 4 days. [NB: at this stage, we consider that if a poor growing season occurs more frequently or there is a longer dry spell, it is not feasible to carry out insurance projects.]
Coping with climate risk – tactical?

- Selection of crop types and varieties, animal breeds
- Timing of planting, harvesting, breeding, gestation and birthing
- In-season adjustment of inputs or target output (e.g. grain vs graze)

Risk reducing measures

- Insurance
- Forward selling, contracts,
- Climate knowledge, digital ag and ICT

Coping with climate risk – strategic?

Re-designing farming systems

- Historical and future climate analyses and modelled scenario analysis
- Co-design of the farm system for resilience and market opportunities
- Infrastructure and institutions to enhance adaptive capacity
1. Intelligent agricultural Systems Advisory Tool (ISAT): Tool to respond to Tactical+ Strategic

- ISAT: Next-generation digital advisory tool (ISAT) designed to help smallholder farmers in managing climate risks through timely, location- and crop-specific forecast-based agro-advisories

- Feature:
  1. Data Analytics
  2. Decision Tree
  3. Messages
  4. Dissemination

1. Identify farmers' strategic and tactical decision
2. Analyses of variability and trends in the historical climatic conditions
3. Assess the climate impacts in crop productivity using crop simulation models
4. Establish thresholds and triggers for key drivers that influence farmers’ decisions.
1.1. Intelligent agricultural Systems Advisory Tool (ISAT): Data Analytics

1.1.1. Seasonal rainfall characteristics

Rainfall Z-score: 1.81
*p-value: 0.07*

Rainy day
Z-score: 1.06
*p-value: 0.29

Fig 1: Seasonal rainfall distribution and trends in Kaffrine from 1981 - 2020

1.1.2. Maize yields distribution

Mean: 3.31 t ha⁻¹
CV : 59%

Fig 2: The relationship between maize observed yields and the amount of rainfall during the crop season in Kaffrine
1.2.1. Pre-season

Fig 3 Decision tree for pre-season *Note: SSTa over Atlantic from ECMWF, SCF from ANACIM*
1.2.1. In-season

**Fig 4 Decision tree for in-season**
1.3.1. Advisories: Pre-season (Strategical)

Dagua Birame - Kaffrine: Normal to above-normal forecasted. High probability of high rainfall, at least 450mm. The season is potential to grow short to medium duration maize, sorghum, millet, peanut, and cowpeas in the 15 June to 31 July planting window when you receive at least 20mm of rain.

Advisories: In-season – 16 – 22 July 2022 (tactical)

Dagua Birame - Kaffrine: Dry periods dominated with few rainy days observed in some areas in the past 10 days. Light to moderate rainy days is expected in the next seven days. Get ready for fertilizer application, weeding, and replanting. However, these operations should be performed when an adequate amount of rain is received and there is enough soil moisture on your farm.
2. Leveraging farmer demand to drive scaling and sustainability

![Bar chart showing the use of different dissemination methods in treatment and control groups.]

3. Dissemination

- IVR (18,994 voice messages in local languages-Wolof, Pula) to 2720 (23.5% women led farms) registered users via agri-tech company
- July-Sept 2022: 4 radio stations in the focus regions broadcast a total of 60 programs on CSA and CIS, reaching 328,104 listeners.

Fig 4 Baseline information on the use of CIS
Source: Jokalante, profiling survey July-August 2022

<table>
<thead>
<tr>
<th>Districts</th>
<th>Rated Best time for listening to information</th>
<th>% of respondent</th>
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<tbody>
<tr>
<td>MABO</td>
<td>07h to 10h</td>
<td>57%</td>
</tr>
<tr>
<td>MBEULEUP</td>
<td>11h to 13h</td>
<td>53%</td>
</tr>
<tr>
<td>NDIOGNICK</td>
<td>07h to 10h</td>
<td>80%</td>
</tr>
<tr>
<td>THIEL</td>
<td>20h to 22h</td>
<td>55%</td>
</tr>
</tbody>
</table>
4. Developed partnerships and mechanisms for mainstreaming climate services and agro-advisories

Fig 5 PPP business model for dissemination of CIS
5. Conclusion

1. **Key innovations**
   - Embedding climate services in agricultural extension
   - Balancing public and private sector comparative advantage
   - Exploiting digital innovation within a diverse delivery strategy

2. **Key opportunities**
   - Bundle CIS and CSA to support sustainable agrifood transformation
   - Content upgrades of CIS within the SAIDA app (FAO tool for Senegal administered by ANCAR) with a potential national reach of 84,000 producers.

3. **Perspectives**
   Upgrading key decision points that relate to weather or forecasts in tree-crop-livestock systems: (1) Understanding of life cycle of a product line, (2) co-development of new decision trees. e.g. fodder harvesting; points in the reproductive cycle where temp stress may be important