Bridging the disconnect between agricultural research and extension through digital development in low- and middle-income countries

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CABI

- **not-for-profit** intergovernmental organisation, established by a United Nations-level agreement
- owned by **48 member countries** (G20: Australia, Canada, China, India, South Africa, UK), which have an equal role in the organisation’s governance, policies and strategic direction
- **over 500 staff worldwide** in 12 centres
- addresses issues of global concern such as **food security** and **food safety**, through research and international development cooperation
- major publisher of scientific information – books, ebooks, full text electronic resources, compendia and online information resources
The value of extension

- **Extension services play a key role** in technology and information transfer to lift people out of poverty

  - *Some of the most relevant and appropriate information isn’t high tech or innovative, but that doesn’t mean the farmer knows about it - the role of extension in informing farmers is therefore crucial*

- Direct evidence linking extension and productivity increases is thin, but existing studies show positive returns
The value of extension

<table>
<thead>
<tr>
<th>USA</th>
<th>China</th>
<th>Uganda</th>
<th>Ethiopia</th>
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<tbody>
<tr>
<td>**Extension alone accounted for 7.3% of annual productivity growth from 1949-2002 and high estimated rates of return (with high variability) of 7-110%**¹</td>
<td>Chinese extension, combined with R&amp;D and new technology packages led to &gt;96% adoption of improved varieties of key staple crops by the 1990s, which contributed to 30-40% increase in overall production²</td>
<td>Direct impact from Uganda’s National Agricultural Advisory Services Program is estimated to be a 37-95% increase in per capita ag gross revenue from 2004-2007³</td>
<td>Extension participation increased farm productivity by 6% in Ethiopia, but could be as high as 20% if selection bias was not present⁴</td>
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Extension methodologies: Reach vs. Impact

Disconnect between research and extension

- The disconnect between agricultural research and ground-realities has led to both underutilisation of proven technologies and lack of development of farmer-friendly solutions.

- A key role in putting information, skills and tools into farmers’ hands is played by national extension systems (public and private).

- However, these extension systems often suffer from chronic understaffing, lack of institutional capacity, limited operational funds, and weak linkages to other players such as research.

- Weak extension systems leads to limited reach and scalability for full inclusion, adoption and impact and as well as inability to respond quickly to new agricultural threats (e.g. invasive pests, climate change).
**Farmer access to extension**

Vast majority of smallholders have little access to public extension agents…

<table>
<thead>
<tr>
<th>Country</th>
<th>Public extension agent to farmer ratio (per 10,000 farmers)</th>
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<tbody>
<tr>
<td>Ethiopia</td>
<td>21</td>
</tr>
<tr>
<td>China</td>
<td>16</td>
</tr>
<tr>
<td>Indonesia</td>
<td>6</td>
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<tr>
<td>Tanzania</td>
<td>4</td>
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<tr>
<td>Nigeria</td>
<td>3</td>
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<tr>
<td>India</td>
<td>2</td>
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</tbody>
</table>

…or any source of information overall

Only **38%** of smallholders have access to any information²

And women have even less access…

Smallholder access to extension in 1 year (Ethiopia, 2014)³

- **31%** for men
- **21%** for women

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Source: Transforming Rural Advisory Services in a Digital World, Agriculture Development Programme, Bill & Melinda Gates Foundation, 2017
Digital-enabled extension system

Digital development helps to overcome constraints in extension delivery:
- Limited availability of national funds for inclusive extension delivery
- Limited interaction and knowledge sharing between players
- Limited capability to provide and develop farmer-friendly, research based solutions
- Limited two-way flow of knowledge and information
- Limited capacity for quality assurance
- Limited interest of youth to undertake a career in extension

Source: Plantwise webpage: www.plantwise.org
Digital tools to improve extension

- Web portals and applications
- Mobile services
- Communication apps

...to enable extension organisations to store, share and access country-specific information and tools

...to provide targeted SMS services across the whole agricultural supply chain

...to exchange knowledge, raise awareness and improve linkages between stakeholders
Digital tools to improve extension

Image recognition and crop advisory apps

Educational apps (serious games)

Data collection tools

...to improve diagnostic services and management advice

...to make learning fun, even in a professional environment

...to increase data volume and speed of data delivery
Pilot digital services for extension

**Pest Risk Information Service (PRISE)**

- **Static sources**
  - Topographic maps, administrative maps, etc.

- **Dynamic sources**
  - Weather data
  - Satellite data

**Brings together:**
- Earth observation technology
- Plant health modelling
- Real-time field observations

- **Widely communicates pest forecasts and appropriate action to take**

Source: [http://www.spaceforsmartergovernment.uk/ips/](http://www.spaceforsmartergovernment.uk/ips/)
An India-based start-up (Bhoomee) is facilitating a one-stop platform for farmers with the aim of empowering them to make agriculture a sustainable business.

Plan to scale-up by 2020 to a total of 6 states in India, targeting about 6 million farmers.

**Stakeholders** | **Activity**
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University of Agricultural Sciences (Knowledge Partner) | Training DESEE force advisors; Content Development
DESEE force (Implementation Partner) | Unemployed youth trained to be private extension officers
M5 (Implementation Partner) | Identifying, recruiting and managing DESEE force in action
Tene Agro (Technology Partner) | Developing software for the tablets for DESEE force

Source: DESEE Force, [http://bhoomee.co.in/Aboutbhoomee/AboutBhoomee.aspx](http://bhoomee.co.in/Aboutbhoomee/AboutBhoomee.aspx)
Other digital opportunities for farmers

**Digitised financial services**

... to enable farmers to invest in improvements in farm productivity, mitigate risk and improve resilience

**ICT-enabled market linkages**

... to translate productivity gains into increased farmer incomes

**Self-service farm management solutions**

... to boost farm profitability and empower farmers to transition from smallholders to small businesses

Source: Transforming Rural Advisory Services in a Digital World, Agriculture Development Programme, Bill & Melinda Gates Foundation, 2017
Conclusions

- CABI believes that digital development and open/big data\(^1\) will have a transformative power because it can enable:
  - **Transformation of scientific information into practical, actionable knowledge** that addresses real needs
  - **Two-way flow** of information and agricultural data, while respecting the ‘FAIR principles’\(^2\)
  - Recognition of **farmer heterogeneity/diversity**
  - Use of **inclusive and complementary communication channels** to facilitate stronger linkages
  - **Cost-effective opportunities** to systematically assess performance and ensure effective services

\(^1\) [www.godan.info](http://www.godan.info) ; \(^2\) [www.force11.org/group/fairgroup/fairprinciples](http://www.force11.org/group/fairgroup/fairprinciples)
Recommendations

- Considerable public and private investment in digital development will facilitate impact at scale:
  - Greater adoption rates
  - Increased farmer income & yields
  - Cost savings for public systems

- CABI’s recommendations, in line with G20 Agricultural Ministers’ Action Plan (Jan 2017):
  - Improve digital infrastructure to enable greater access to ICT-solutions
  - Improve capacities of extension workers and farmers to adopt and benefit from ICT-solutions
  - Implement appropriate measures to address data privacy and data security, within the open-data initiatives
  - Ensure effective delivery of targeted and needs-based information to relevant end users
thank you