Digital Inclusion Policy & Digital Tools to Drive Agricultural Development in SE Asia

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SEARCA - ADSS
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A Long (Family) History With UPLB & SEARCA
Professional Background
Topics Today

1) Internet Connectivity & Information and Communications Technologies (ICTs)

1) Application to Agricultural Development in Southeast Asia

Key Takeaways:

*How can digital tools support your work in agricultural development?*

*What can this community do to support digital ecosystem development in the region … to foster the utilization of digital tools in agriculture?*
Is internet connectivity an enabler or a prerequisite, when it comes to agricultural development?
Why Discuss the Digital Economy re: Agricultural Development?

"In today's world, when we talk about rural transformation, my best example is that the youngsters need to make sure WhatsApp is working. This is almost non-negotiable."

- Gilbert Houngbo, President of the International Fund for Agricultural Development (IFAD) and former PM of Togo

http://news.trust.org/item/20180713114206-galsr
Definitions

Information and Communications Technology (ICT):

Information Technology (IT), which covers digital computing technologies plus a focus on communications, such as the internet, telephony (fixed and wireless), and other communications mediums (including radio, etc.).

Digital Technologies:

“The internet, mobile phones, and all the other tools to collect, store, analyze, and share information digitally.” (World Bank WDR 2016)
“There is no good reason why by the early part of the next century, virtually the whole of mankind should not be within easy reach of a telephone and of all the benefits this can bring.”

- UN ITU ‘Maitland Report’, 1984
How did the global community do on telephony?

Fixed Telephone Subscribers* as a Percentage of Global Population

Source: UN ITU [https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx]/*denotes subscribers, does not reflect geographic access and double counting with regard to business adoption
On Mobile Telephony

Mobile Telephone Subscribers* as a Percentage of Global Population

Source: UN ITU [https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx] *denotes subscribers here does not refer to "unique mobile subscribers"
Internet Connectivity as a Global Goal

SDG 9c:
Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020
Digital Technologies as a Channel for Service Delivery

Macroeconomic Growth Impact of ICTs

Incremental Annual GDP Growth from Every Ten Percent Points Increase in ICT Penetration

Source: World Bank, 2009
How ICTs Contribute to Economic Growth

ICT leads to labor productivity gains through three channels:

1. Total Factor Productivity growth in sectors producing ICT
2. Capital Deepening
3. Total Factor Productivity growth through reorganization and ICT usage

*Qiang, Pitt “Contribution of ICT to Growth”, 2004*
Advancing Development Through Three Main Mechanisms

Digital Technologies

- Search and information
- Automation and coordination
- Scale economies and platforms

Inclusion  Efficiency  Innovation

Microeconomic Impacts of ICTs

- **Tanzania**: Poverty Alleviation
- **Peru**: Rising Income Levels Amongst the Very Poor
- **Ecuador**: Poverty Alleviation
- **Latin America**: Reduced Cost of Consumption
- **Kenya**: Increased Wellbeing Across All Sectors
- **India**: Market Expansion
- **East Africa**: Rising Income Levels Amongst the Very Poor
- **Niger**: Market Expansion
- **Healthcare**: Increased Wellbeing Across All Sectors
- **Energy**: Reduced Cost of Consumption
- **Agriculture**: Market Expansion
- **Education**: Increased Wellbeing Across All Sectors
Digital Technologies in Agriculture have the potential to:

- **Help achieve SDG2**: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Revolutionize **farmer organizations**
- Put African smallholder **farmers squarely as part of the solution** and not just as part of the problem
- **Empower rural women and youth** and activate participation in agriculture
- **Lower barriers and distance to markets** for isolated smallholders
- Revamp **traditional extension** models
- Foster better, **two-way and real time feedback loops**
- Improve **farmer decision-making** and competitive advantage.
One of the first RCTs in Telecommunications Provision

- Isolated coastal communities in coves
- Access is mainly by boat
- No concrete road network
- Off-grid power
- No cellular signal but some residents have cellphones
- 80% of land area are protected areas
- Mainly agricultural towns
- Access to social services limited to basic level services
Constraints to Digital Tool Adoption: Big Gaps in Mobile Adoption

Unique Mobile Subscribers as a Percent of the Population

- Malaysia 79%
- Indonesia 73%
- Philippines 63%
- Myanmar 49%

Source: GSMA, 2017 Data
Constraints to Digital Tool Adoption: Gaps between Urban vs Rural

Access to basic services (energy, water) versus basic connectivity (GSM)

Sources: GSMA, IEA, World Bank.
The Alliance for Affordable Internet *estimates* that target 9c will only be reached in 2042, 22 years after the target.
Constraints to Digital Tool Adoption: Limited Network Availability and Affordability

- 4.2bn non-internet subscribers
- 2.6bn covered by 3G but not subscribers
- 1.6bn not covered by 3G

Source: GSMA
Frameworks for Assessing National Digital Ecosystem

WEF’s Networked Readiness Index

Figure 1: Networked readiness framework:
Inclusive Internet Index (EIU / Facebook)

1. Availability
   - Usage
   - Quality
   - Infrastructure
   - Electricity

2. Affordability
   - Price
   - Competitive environment

3. Relevance
   - Local content
   - Relevant content

4. Readiness
   - Literacy
   - Trust and safety
   - Policy

https://theinclusiveinternet.eiu.com/
The Philippines: Strengths and Opportunities in the I3

The Philippines places 54th out of 86 overall, in the lower half of the standings for Asia, and 9th out of 23 lower-middle-income countries. The country’s overall ranking suffers from low Affordability: its competitive environment stands at 81st in the world. However, Readiness ranks 43rd globally.

*Rank out of 86 countries (1=best; 86th=worst)*

<table>
<thead>
<tr>
<th>Availability</th>
<th>46th</th>
<th>Affordability</th>
<th>71st</th>
<th>Relevance</th>
<th>54th</th>
<th>Readiness</th>
<th>43rd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage</td>
<td>48th</td>
<td>Price</td>
<td>51st</td>
<td>Local Content</td>
<td>62nd</td>
<td>Literacy</td>
<td>38th</td>
</tr>
<tr>
<td>Quality</td>
<td>56th</td>
<td>Competitive Environment</td>
<td>81st</td>
<td>Relevant Content</td>
<td>43rd</td>
<td>Trust &amp; Safety</td>
<td>16th</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>37th</td>
<td></td>
<td></td>
<td>Policy</td>
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<td></td>
<td>60th</td>
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<tr>
<td>Electricity</td>
<td>57th</td>
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</table>
Supply Side Challenges: Network Coverage Limitations

10k out of 42k barangays (villages) still do not have cellular coverage

- Most do not have stable grid power supply
- Geographically isolated, without safe and reliable transportation infrastructure
- Small potential subscriber populations

UP-Diliman team; OpenSignal Coverage Data (2017)
Supply Side Challenges: Competition and Affordability

*Rank out of 86 countries (1=best; 86th=worst)*

<table>
<thead>
<tr>
<th>Competitive Environment</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless operators’ market concentration</td>
<td>66th</td>
</tr>
<tr>
<td>Broadband operators’ market concentration</td>
<td>45th</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Price</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smartphone cost (handset)</td>
<td>54th</td>
</tr>
<tr>
<td>Mobile phone cost (prepaid tariff)</td>
<td>59th</td>
</tr>
<tr>
<td>Mobile phone cost (postpaid tariff)</td>
<td>55th</td>
</tr>
<tr>
<td>Fixed-line monthly broadband cost</td>
<td>62nd</td>
</tr>
</tbody>
</table>
Supply Side Challenges: Limited Subscriber Base

45% of 103 million individuals

61% of 23 million households

74% of 46,700+ public schools

Figure 1. Percentage of individuals and institutions in the Philippines with no Internet access (as of 2016)

Source: Broadband Commission 2017; Department of Education 2016.

Asia Foundation, “From Analog to Digital: Philippine Policy and Emerging Internet Technologies”
## Demand Side / “Readiness” Strengths

*Rank out of 86 countries (1=best; 86th=worst)*

<table>
<thead>
<tr>
<th>Readiness</th>
<th>Rank</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of literacy</td>
<td>48th</td>
<td>34th</td>
</tr>
<tr>
<td>Educational Attainment</td>
<td>41st</td>
<td></td>
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<tr>
<td>Support for digital literacy</td>
<td>1st</td>
<td></td>
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<tr>
<td>Level of web accessibility</td>
<td>44th</td>
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<tr>
<th></th>
<th>Readiness</th>
<th>Rank</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Trust and Safety</td>
<td>16th</td>
<td></td>
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<tr>
<td>Privacy regulations</td>
<td>1st</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trust in online privacy</td>
<td>43rd</td>
<td></td>
<td></td>
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<tr>
<td>Trust in government websites and apps</td>
<td>17th</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trust in non-government websites and apps</td>
<td>17th</td>
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<tr>
<td>Trust in information from social media</td>
<td>19th</td>
<td></td>
<td></td>
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<tr>
<td>e-Commerce safety</td>
<td>63rd</td>
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<tr>
<th></th>
<th>Policy</th>
<th>60th</th>
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</thead>
<tbody>
<tr>
<td>National female e-inclusion policies</td>
<td>33rd</td>
<td></td>
<td></td>
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<tr>
<td>Government e-inclusion strategy</td>
<td>1st</td>
<td></td>
<td></td>
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<tr>
<td>National broadband strategy</td>
<td>1st</td>
<td></td>
<td></td>
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<tr>
<td>Funding for broadband rollout</td>
<td>79th</td>
<td></td>
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<tr>
<td>Spectrum policy approach</td>
<td>1st</td>
<td></td>
<td></td>
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<tr>
<td>National digital identification system</td>
<td>76th</td>
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A Supply Side Approach: Components of the DICT National Broadband Plan

Five main components:

1) International bandwidth / capacity: FB’s Luzon Bypass

2) National backbone / NGCP dark fiber

1) Third telco license: New Major Telcom Player (NMP)

1) Connectivity to all barangays

1) Satellite overlay for backhaul
Transformative potential of ICTs in Agriculture

- Web pages
- Mobile Apps
- Video Clips
- Databases
- Text Messages
- Sensors and Drones
- Radio Broadcasts
- E-Learning Materials
Topics Under the e-Agriculture:

- **Knowledge Repositories**
  (Knowledge Banks, portals, Agropedia)

- **E-Learning**
  (Virtual academies)

- **Intelligent Agriculture**
  (Remote sensing, GIS, Drones)

- **Digital Agriculture**

- **Monitoring and evaluation**
  (Data collection, management, and monitoring)

- **Financial Services**

- **Market services**
  (Trade facilitation, Prices, Trading logistics)

- **Agro-advisory Services**
WHY - Digitize the Agricultural Value Chain

PLANNING
- Help farmers plan what, when to plant
- Tighten relationship with buyers, processors
- Provide data for farmers to make business decisions on cash flow and maximizing profit

INPUTS
- Reduce costs and risks for buyers
- Increase access to quality inputs
- Provide convenient and secure ways for farmers to purchase, save, and receive credit inputs

ON-FARM PRODUCTION
- Help extension services reach more farmers
- Use behavior change media to promote best practices among farmers

STORAGE
- Improve links between farmers, processors
- Use behavior change media to promote best practices among farmers

PROCESSING
- Increase farmer negotiating power by providing market prices
- Track governance for supply chain optimization and grading

TRANSPORT
- Reduce costs of transport
- Increase choice of different types of transport for farmers

ACCESS TO MARKETS
- Increase market information available to farmers so that they have more choices

Source: adapted from Chris Burns presentation Feed the Future, USAID
WHERE TO - Digitize the Agricultural Value Chain

<table>
<thead>
<tr>
<th>DATA COLLECTION</th>
<th>TRANSACTIONS</th>
<th>INFORMATION EXCHANGE</th>
<th>RISK MANAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLANNING</strong></td>
<td><strong>INPUTS</strong></td>
<td><strong>ON-FARM PRODUCTION</strong></td>
<td><strong>STORAGE</strong></td>
</tr>
<tr>
<td>Farm mapping</td>
<td>Seeds</td>
<td>Pesticides/fertilizers</td>
<td>Warehousing</td>
</tr>
<tr>
<td>Climate change predictive models</td>
<td>Pesticides/fertilizers</td>
<td>Weeding</td>
<td>Pests</td>
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<td></td>
<td>Payments</td>
<td>Soil/water</td>
<td>Preservation</td>
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<td></td>
<td>Soil/water testing</td>
<td>Weather information</td>
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<td></td>
<td>Weather</td>
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<td><strong>POST-HARVEST</strong></td>
<td><strong>PROCESSING</strong></td>
<td><strong>TRANSPORT</strong></td>
<td><strong>ACCESS TO MARKETS</strong></td>
</tr>
<tr>
<td>Crop varieties, quantities planted</td>
<td>Preservation</td>
<td>Climate control</td>
<td>Sales</td>
</tr>
<tr>
<td>Timing of planting, harvesting</td>
<td>Climate control</td>
<td>On-demand transport/ selling services</td>
<td>Payments</td>
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<td>Transport fees</td>
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<td>Coop fees</td>
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<td><strong>TRANSACTIONS</strong></td>
<td><strong>INFORMATION EXCHANGE</strong></td>
<td><strong>RISK MANAGEMENT</strong></td>
</tr>
<tr>
<td>Savings</td>
<td>Merchant payments</td>
<td>Extension delivery</td>
<td>Seeds</td>
</tr>
<tr>
<td>Basic credit</td>
<td>Subsidies</td>
<td>Farmer profiles to enable custom info to be delivered</td>
<td>Fertilizers</td>
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<tr>
<td>Insurance premiums</td>
<td>Savings and layaway plans</td>
<td>Market prices</td>
<td>Counterfeiting</td>
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<td>Basic credit</td>
<td>Feedback to/from farmers, other stakeholders</td>
<td>Weather insurance</td>
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<td>Better agriculture practices</td>
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<td>Market prices</td>
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<td>Traceability</td>
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Source: adapted from Chris Burns presentation Feed the Future, USAID
Example of Information Support Tools: Rice Knowledge Bank

knowledgebank.irri.org
Example of Decision Support Tools

**Crop Manager**
Rice Crop Manager is a computer- and mobile phone-based application that provides farmers with advice on crop management matching their particular farming conditions.

**Rice Doctor**
Diagnostics tool that will help you to identify problems in your crop and provide actionable advice on how to manage them.

**Weed Identification**
Weed Identification tool helps identify the major weeds of rice and also gives additional information such as management and geographical distribution.

**Important management factors by growth stage**
An interactive diagram that describes the critical factors associated with the growth stages of the rice plant.
Example of ICTs for Integrated Services: InfoLadies (Bangladesh)

- Young women reach the remotest villages to provide health, agricultural, and information technology services.
- Nominal fees for their services
- Are both entrepreneurs and public service providers
Example of ICTs for Integrated Services: Farmerlink (Grameen)

- Design financial services for smallholder farmers
- Train farmers in good agricultural practices
- Use data to develop individualized farm management plans
- Alert farmers to weather extremes and pest outbreaks
- Connect farmers to price information, buyers and markets
Example of ICTs for Integrated Services: Farmerlink (Grameen)
Considerations for Planning Integration of ICTs for Smallholder Agriculture

- Content
- Capacity
- Cost and Cost-recovery
- Connectivity
Principles for Digital Development

- Design with the User
- Understand the Existing Ecosystem
- Design For Scale
- Build For Sustainability
- Be Data Driven
- Use Open Standards, Open Data, Open Source and Open Innovation
- Reuse and Improve
- Address Privacy and Security
- Be Collaborative

Steward by dial Digital Impact Alliance | digitalprinciples.org | #DigitalPrinciples
For more on specific digital tools in agriculture:

Carolyn Florey  
Technology for Development Lead  
IRRI  
c.florey@irri.org
Other Considerations
The ICT & Income Inequality Paradox: Falling Global Inequality & Rising Within Country Inequality

**INTERNATIONAL**

Income inequality is on the decline

**INTRANATIONAL**

Income inequality is persistent

WEF 2015 - Pepper & Garrity, "ICTs, Income Inequality, and Ensuring Inclusive Growth," http://www3.weforum.org/docs/WEF_GITR_Chapter1.2_2015.pdf
Downside risks to digital technologies and unchecked digital technologies
Policy / “Analog complements” for a digital economy

1) Regulatory policy - “A business environment where firms can leverage the internet to compete and innovate for the benefit of consumers”

1) Skills development - “Workers, entrepreneurs, and public servants who have the right skills to take advantage of opportunities in the digital world”

1) Strong institutions - “An accountable government that effectively uses the internet to empower its citizens and deliver services.”

“Core elements of the development agenda—business regulations that ease market entry, education and training systems that deliver the skills that firms seek, and capable and accountable institutions—are becoming more important with the spread of the internet.”

World Bank WDR 2016, “Digital Dividends”
Is internet connectivity an enabler or a prerequisite, when it comes to agricultural development?
The Need to Engage Across Departments / Ministries

http://www.fao.org/3/a-i5564e.pdf
A Long (Family) History With UPLB & SEARCA (continued)
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