Using ICT to enable Agricultural Innovation Systems for Smallholders

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ICT IN AGRICULTURE

Connecting Smallholders to
Knowledge, Networks and Institutions

The World Bank, in collaboration with the e-Agriculture community and the Food and Agriculture Organization of the United Nations (FAO), is holding a series of two week online forums. These e-forums stem from the launch of the World Bank's *ICT in Agriculture e-Sourcebook* (2011) and the growing demand for knowledge on how to use ICT to improve agricultural productivity and raise smallholder incomes. The following summary captures the discussion during the most recent *e-forum*. The text is derived strictly from the participants' posts during the forum and does not reflect the views of the World Bank or FAO.

ICT innovations

The potential of ICT to support the access to and exchange of information for smallholder farmers is clear. A rich discussion centred on examples of current pilots and processes expected to bring beneficial results. It must be noted, however, that there continues to be a challenge in finding examples that have moved beyond the pilot stage, reaching scale in a sustainable manner.

Through improved communication, ICT are known to enhance or expand human networks. Mobile technology is seen as having a particularly positive impact in this area, fostering networks of farmers and agribusiness, so that they can support each other. Specialized applications are being developed to further extend this impact, including Sustaination ("a LinkedIn for local food and farmers") in the United Kingdom.

From a technology perspective, the discussion focused largely, but not exclusively, on innovation using mobile phones. Many of these examples use SMS. Reference was made to the report "Connected Agriculture", which states that the greatest increase to farmers' incomes will come from mobile: mobile payment systems that provide farmers with the ability to exchange capital, mobile information services that give access to critical, targeted information on commodity prices, weather, disease outbreaks, etc., and helpline services providing key tips and real-time advice.

ICT has allowed for innovations that bring financial services, including mobile money, to smallholder farmers. Agrinet Uganda, M-PESA in Kenya, and others have brought financial services to the previously unbanked, a critical component of improving smallholders' participation in the value chain.

A service that allows for the authentication of agricultural inputs is being piloted by CropLife in Uganda. Using scratch labels and SMS, farmers can confirm that an input is genuine at the point of purchase. The scratch label system works like an airtime refill, following a process that is already widely known in agriculture communities. The system also provides a link to the Ministry of Agriculture, which has a mandate to stop counterfeit products, and can follow up on any problem.

There were several other examples of innovation using SMS, including systems such as FrontlineSMS and applications like Twitter, to reach many individuals with advisory information in an efficient and timely manner. The

attraction of SMS is based on its low cost and ability to work on all types of mobile phones. While SMS-based systems seem to predominate at this time, there is hope that technology and infrastructure will progress beyond short texts to allow use of more complex information, including images.

Community radio remains one of the most widespread and well studied ICT, allowing farmers to access information and for service providers to provide information. Innovation has occurred where new ICT are paired with radio. Combinations such as radio and mobile phones can become an important tool in information exchange and community networking. Reports by Farm Radio International were referenced in the discussion, giving more details on these "new" communication services. Radio's positive role in reaching female farmers was re-affirmed, along with a need for greater awareness of the gender inequity of different ICT.

Another audio-focused ICT innovation is the Talking Book, a "low cost audio computer". It is being used by Literacy Bridge in agricultural projects to address both literacy and gender gaps by providing women and illiterate farmers, as well as others, with access to information on agricultural technologies on demand.

Lifeline Energy

Call centres, while around for some time, are also experiencing a new round of innovation. Different models for call centre operation and partnerships are being tested by groups like Esoko and the Grameen Foundation, which in time may provide more guidance on this issue. Lifeline India has implemented an interactive voice response (IVR) system with a localized "Question and Answer" service that now has about 10% of the calls automatically answered. While the value of systems such as Lifeline's IVR still has to be substantiated, such developments could point the way to sustainable models.

Video, especially when combined with participatory processes, has shown positive impact on agricultural training and productivity amongst smallholders. Some processes using video are focused on dissemination, while others also enhance peer-to-peer learning. The example of Digital Green's innovation in the processes used for video production came up repeatedly in the discussion. Its innovative processes build on social dynamics that support the development, screening, and learning from the videos. A study has shown that this process is at least ten times more effective on a cost per adoption basis and seven times more likely to encourage farmers to adopt new practices compared to conventional agricultural extension systems. Digital Green is also reaching scale, having produced over 2,000 videos in local languages, reaching 110,000 famers in over 1,100 villages in India, with plans to expand into Ethiopia and Ghana.

Innovation using ICT can also be found in more formal learning systems. The Institute of Agro Technology and Rural Science in Sri Lanka is offering diplomas in agro-technology to the farming community "without barriers of age, distance, time and academic background" in local languages. This is facilitated through the use of the Internet.

In developed countries, ICT are being tested to reduce animal theft. Technologies such as retinal scanning show promise, but so far are cost prohibitive.

It was noted that innovations in associated technologies (e.g. solar chargers for power supply) are also critical elements in successful ICT innovations.

ICT facilitates knowledge generation, documentation, and sharing in support of farmers and of farmer innovations

Farmers are the traditional innovators in agriculture, and actively engage in communication about innovation. ICT provides a new channel for this communication. The key for development actors is to understand the traditional process of farmer innovation in order to succeed in bringing ICT in line to support this. Communities themselves will also drive this through their own choices around technology and its application.

Some participants felt that technology must be easy to use, and selected from the start to ensuring that farmers can use it themselves with minimal external support. This was supported by experience showing that farmers learn better from fellow farmers.

The mobile phone and new processes using video are mentioned as the most popular modern ICT for farmer-to-farmer communication and innovation sharing, noting that video normally requires the involvement of an intermediary. While communication at this level has always existed, and ICT can simply supplement these channels, with increased communication there is a much greater need for individuals (e.g. extension agents, intermediaries) to validate and further disseminate the information, and support its adoption.

Farmer-led documentation is at a point in the innovation process where ICT can be effectively used to document innovation processes and generate knowledge, especially local agricultural content. In this practice, as outlined by Prolinnova, the farmers lead the process, including the choice of ICT. A major challenge remains in applying the process at scale to farmer-generated content, in the validation of content, and in liability for the content. The m4agriNEI initiative, a multi-stakeholder programme in north-eastern India, is attempting to address this issue by developing capacity among selected village youth.

In Uganda, the Grameen Foundation has 800 Community Knowledge Workers (CKWs) who use mobile phones to provide poor farmers with real-time information on agricultural topics, including market prices, and are supported by a call centre staffed with highly skilled agricultural experts, who speak the major languages of Uganda. The CKWs also document traditional farmer practices and share these through TECA ("technologies and practices for agricultural producers"), an online platform that facilitates access to information that can benefit smallholder producers around the world.

Challenges to ICT innovations

Challenges that prevent the maximum benefit of ICT innovations being realized can be roughly grouped into three categories: technology, human capacity, and content. Note that the challenges discussed in this forum were not strictly technology-related, but considered who innovates, who uses these innovations, and why. Observation was also made that general challenges found when working in remote rural areas do apply here, with coverage, electricity, literacy, etc., all cited as posing additional challenges to ICT-based services. The discussion focused on the challenges particular to this field.

Grameen Foundation - Uganda

Technology

In some perspectives, technology is not considered an actual challenge, but a tool that evolves over time based on market forces and public policies. Technology is only a frustration when our demands exceed its ability to deliver services. With much of the discussion focused on mobile technology, there were constant reminders that even in developed countries, Internet and/or cellular coverage is not present in many rural areas. In other instances, where there is coverage, the cost these services remains a barrier regardless of the innovations available.

Despite the widely reported rapid growth of mobile network coverage in developing countries, concern remains that mobile network operators (MNOs) will not expand coverage into the most remote, low population areas. In such a case, without a policy intervention, alternate technologies are essential to prevent the rural digital divide from growing. One such innovation discussed is mini-VSAT. Where this will be cost effective and for how long depends on the growth of rural cellular coverage and the costs of mobile handsets and alternative technology.

Several participants believe that sustainable information services will need to combine multiple communication channels using technologies including SMS, IVR, etc. However, there is not yet significant experience in this area.

Capacity

ICT may make tools and information available, but farmers must know they exist and be able to use them. The capacity of individuals to use what ICT are available is often over-looked, or taken for granted, leaving older people and women in some communities at a particular disadvantage. Anecdotal accounts of this continue to occur in the development setting. One solution suggested to address limited individual capacity is the use of intermediaries, which is discussed further in the next section of this report. Another solution is to include capacity development in all ICT services from the beginning.

Tambero.com, Argentina

Content

Content, in many instances does not exist in forms usable with modern ICT. This was mentioned in different contexts throughout the discussion. Ultimately, if ICT are to provide real decision tools, it will be necessary for an "ecosystem" of relevant information and data to exist. This sort of information is under development in some examples, but in many cases there is lack of clarity regarding who should be responsible for the creation or mo-bilization, quality assurance and dissemination.

Information should be developed according to need of the end users (e.g. farmers), and provided in local languages, in simple, interactive form. It must be up-to-date, relevant and supplied in a timely manner.

Some felt it would be essential to offer a continuum of information required for successful farming, not simply to focus on one piece of relevant data.

Models for sustainability

Sustainability and reaching scale are real challenges. Information shared in the discussion (from various sources) indicates that less than 10% of all projects have become sustainable, and even fewer are reaching scale. There was also discussion about the definition of "sustainable", which turned to a focus on models for establishing these ICT-based advisory services. The discussion could be broadly grouped in to three cases:

- A successful business model, where the service costs are covered by revenue: user payment, 3rd party fees for advertisements, data, etc. (private sector).
- A successful service model, where the service is taken on as part of the mandate of a government office (public sector).
- An innovation/technology being taken on by the target and continuing after the project.

In the discussion, participants spoke about ICT-based services from the public sector, the private sector and part-nerships. Benefits and challenges of the different models were discussed with little conclusion on what was most appropriate. Recognizing and building on existing structures, such as public extension systems, was agreed to be part of designing a sustainable model. However, some felt that ultimately only a private sector business model would prove sustainable.

There is controversy (and examples on both sides) about whether donor or public sector support to pilots nega-tively affects the sustainability of ICT-based advisory services. Specific concern was raised over donor funding being tied to "uptake", which is measured on delivery, not demand for or application of information.

It was also noted that overall commercial investment in innovation is lacking. While support continues to be present from donors and international organizations, private sector investment at the venture, incubation and growth stages could lead to more robust, sustainable innovation in this sector.

There was agreement that an enabling environment is critical. This raises the need for advocacy within the public and private sector, for investment in infrastructure and services, providing better coverage, including broadband in rural areas, as a base for any successful model.

It was suggested that an information service should be directly tied to markets or the value chain, in order to associate its value with improved production or sales. The important role of value was embodied in a statement by one participant:

> *"When our SMS content was free, no one wanted it. When we charged, more than 1,200 users registered. We need to stop underestimating smallholder farmers (AKA rural communities) and their potential as commercial consumers."*

Several examples of business models were brought into the discussion. In the case of the new video processes, organized communities are able to pay small fees to screen the videos, helping to sustain the model themselves. Still Digital Green's work is in large supported by donors and government.

At Esoko, the greatest costs to provide valuable service to end users are: (a) data collection, which requires a huge amount of management to ensure it is accurate and comes at a regular frequency, and (b) marketing and continual support to build awareness about the service. In order to cover these costs, Esoko earns revenues by selling subscriptions to its platform (to individuals, NGOs, agribusinesses, and government), by charging a fee on SMS services, and, by providing consulting and training services for deployment of the technology.

Agrinet in Uganda provides market intelligence and brokerage services. It uses SMS linked to physical information boards, strategically located in markets, to collect and disseminate market intelligence. The intelligence collected and disseminated by Agrinet's agent network is then used to broker deals, where a commission is earned for each brokered deal.

Partnerships

While roles are not always agreed upon, the importance of public-private partnerships was stressed. Partnerships between advisory service providers and MNOs, for example, could potentially offer subscriptions to extremely affordable voice and data services at scale to farmers. IKSL, a joint collaboration between the Indian Farmers Fertiliser Cooperative Ltd (IFFCO), the largest farmer cooperative in India, and Airtel, a mobile network operator was highlighted. The mFarmer programme has written a detailed case study on IKSL.

Partnership is central to Digital Green's strategy to reach scale and continue to grow. Partnering with both government and NGOs allows Digital Green to access established extension systems and community networks, domain expertise, and to scale operations.

Intermediaries

The role of intermediaries in a model of ICT-based advisory services continues to be controversial. While intermediaries, from radio announcers to private sector extension agents, are playing a role in extending reach and addressing human capacity issues, there is disagreement about what role they play in a sustainable business model. Thus, while there are current examples of intermediary-based information services, the future role(s) of intermediaries in transmitting information within the innovation system remains unclear. (The role of intermediaries in mobile information systems was discussed at length in the "mFarmer" e-Agriculture discussion *forum held in November 2011*).

In conclusion to this discussion, a forthcoming report from FAO was referenced. A workshop with public and private sector stakeholders in ICT-based advisory services in Asia identified four critical areas for ICT-based service sustainability. The main findings were:

- **Clear policies** need to be formulated by governments and the public sector which define the principles for their involvement in the development of MAIS, that also take account national communication policy or ICT policy. This will require collaboration between the agricultural and telecommunications sectors of government.

- **Partnership with the private sector** has been shown to be an essential mechanism for the public sector to develop enhanced MAIS in a sustainable way. The roles and responsibilities for public and private sectors have to be clearly defined in each particular case, noting that the most frequent split of roles is that the former provides the content and the latter provides the delivery mechanism.

- **Trustworthiness/Reliability** of the public sector information/advice delivered through MAIS is of paramount importance to the people whose livelihoods depend on actions influenced by the information received. In this context, clear policy guidelines should be formulated to ensure validity and accuracy of the technical information/ advice provided.

- **Accountability** for the quality (correctness and accuracy) of technical information/ advice delivered through MAIS should be formally recognized by the respective public and private sector actors involved. This accountability should be defined in any partnership agreement between the actors in MAIS.

- Ideally, agricultural information services should be **platform-independent**, given that technology-specific services impose requirements on potential audiences and can greatly limit accessibility.

Evidence of smallholders using and/or benefiting from ICT-based advisory services

The final part of this discussion focused on the critical issue of evidence and impact. Experts in the discussion agreed that linking cause and effect (e.g. showing that access to market information increases revenue) is complicated and expensive. However, the need for more impact studies, carried out by neutral third parties, was unquestioned.

There was discussion, but not agreement, on potential indicators of smallholders using and/or benefiting from ICT-based advisory services. These included: payment for services; increase in scale/usage; user retention rates; user satisfaction; growth in features/services; savings related to inputs; and improved socio-economic indicators.

The value/appropriateness of the indicators was not universally agreed upon, but it was noted that the choice of indicators would depend at least on the type of service, in particular if it is a fully commercial model or financially supported/subsidized.

The results of two impact studies with controls were presented in the discussion. One from Ghana showed that access to market information resulted in a 10% increase in farmers' income, while another study in India showed no significant impact on farmers' income. Thus, even with methodologically sound work, no conclusive evidence was presented in this discussion that ICT based advisory services have a positive benefit to smallholder farmers. Other studies were mentioned in much less detail in the discussion, and can be found in the "References" section of this report.

Through the discussion there were doubts raised about the appropriate methodology for researching the impact of ICT on agricultural development.

Grameen Foundation - Uganda

Applications

There are many applications and ICT-enabled tools for data collection purposes. The following information provides a synopsis of the applications discussed and presented during the discussion.

Applications	Where	Description
AgriNet Uganda Ltd	Uganda	The company works with real-time markets and links value chain players to marketing information, niche markets, market development and agribusiness development services including agricultural finance real time, customized agricultural market information on mobile phone, information boards and e-mails. *http://www.agrinetug.net*
CafeDirect Producer Foundation (CPF)	International	Farmer-to-Farmer knowledge sharing (mobile platform) The Cafédirect Producers' Foundation (CPF) has been established to represent and support smallholder tea, coffee and cocoa farmers and their organizations located across East Africa, Latin America and Asia. *http://www.producersfoundation.org*
CropLife	Africa and Middle East	CropLife is testing a system in Uganda to validate that agro-inputs are genuine (not fakes). *http://www.croplifeafrica.org/*
Digital Green	India	An organization that works to increase agricultural productivity by training small and marginal farmers via short instructional videos. The Digital Green system combines technology and social organization to improve the cost-effectiveness and broaden the community participation of existing agricultural extension systems. *http://www.digitalgreen.org*
e-Arik	India	ICTs for Agriculture Extension. A research project to experiment the application of ICTs in agricultural extension services provision and also to measure its impact on the tribal farmers has been implemented in "Yagrung" village of East Siang District of Arunachal Pradesh State. *http://www.earik.in*
e-Choupal	India	The e-Choupal model has been specifically designed to tackle the challenges posed by the unique features of Indian agriculture, characterised by fragmented farms, weak infrastructure and the involvement of numerous intermediaries, among others. 'e-Choupal' makes use of the physical transmission capabilities of current intermediaries – aggregation, logistics, counter-party risk and bridge financing – while disintermediating them from the chain of information flow and market signals. *http://www.echoupal.com*
ESOKO	Africa	Smallholder farmers can sign up to Esoko to receive a package of weekly advisory services. This typically consists of current market prices, matching bids and offers, weather forecasts, news and tips. In some countries, advisories may also be sent by voice messages, and a live call centre of agricultural experts can be available to complement data alerts with voice support. *http://www.esoko.com*
Farmers on Film	UK	An initiative to raise national awareness of farmers and their important role in society. *(Staffordshire University)*
Freedom Fone	International	A platform for two-way information sharing with farmers. Freedom Fone is free software that creates interactive, voice-based communication services for organisations or bodies seeking to engage with communities across mobile networks. Freedom Fone uses voice menus to share information with any target audience, SMS polls to organize opinion surveys and callers can also leave voice and text messages on the service where call data records can be safely stored, organized and evaluated. *http://www.freedomfone.org*
Frontline SMS	International	Frontline SMS has as a mission the empowerment of people to use their own ingenuity to craft solutions and create positive change in their own communities using mobile technology. Frontline SMS is a tool for SMS communication management and is freely available for download to service providers. FrontlineSMS helps organizations across the world to overcome communication barriers they face. *http://www.frontlinesms.com*

Applications	Where	Description
Honey Bee Network	India	The Honey Bee Network for dissemination and documentation of local and farmer innovation processes. *http://www.worldchanging.com/archives/006333.html*
ICAAP	India	Documentation of best practices at farmer level (e-portal). The portal aims to provide comprehensive and interactive agricultural information to stakeholders for better decision making on various agricultural enterprises across the world. *www.advanceagriculturalpractice.in*
iCow	Kenya	The iCow approach was developed in Kenya for small-holder dairy farmers and helps them manage their cows to have a greater profit. *http://www.icow.co.ke*
ICTforAg.org/video	International	A toolkit for practitioners: Integrating Low-Cost video into agricultural development projects. This toolkit was prepared for the U.S. Agency for International Development by FHI 360 as part of Associate Award. *http://ictforag.org/video*
IKSL	India	The IKSL initiative has been documented by mFarmer in a case study as an example of a successful partnership. IKSL is a joint collaboration between the Indian Farmers Fertilizer Cooperative Ltd (IFFCO) -the largest farmer cooperative in India- and Airtel, a mobile network operator. *http://www.iksl.in*
Intelligent Advisory System for Farmers (IASF)	India	An advisory system, a hybrid system by integrating Expert System (ES) and Case-base Reasoning (CBR) for answering queries related to farming activities carried out in Northeast states of India. *http://iasf.cdacmumbai.in/ias/jsp/about.jsp*
KUZA Doctor	Kenya	Using the most basic mobile phones, farmers receive critical knowledge to increase their rates of production and subsequent incomes while learning the value of local biodiversity and conservation farming. From BackPack Farms. *www.backpackfarm.com/site/1075kris/KuzaDoctorFAQ_FINAL.pdf*
LifeLines India	India	LifeLines India-Agriculture brings agri-advisory right to the field of a farmer. LifeLines India-Education provides pedagogic support in rural and remote areas. *http://lifelines-india.net*
mKisan	India	m-Kisan: Using mobile technologies to strengthen farmer-extension-expert-linkages in India. Launched in June, 2012, the m-Kisan project will run in six Indian states for the next two years, using additional information provided by CABI and Digital Green. mKisan is part of the *mAgri initiative* and it looks at issues of dissemination of information without intermediaries to focus on scale and content quality management. The medium is voice with restricted use of SMS linked to Voice messages. *http://ilriclippings.wordpress.com/2012/06/26/m-kisan-launch*
Pasture Promise TV	UK	Farmers post educational videos around pasture management.
Prolinnova	International	Prolinnova is an NGO-initiated multistakeholder programme to promote local innovation in ecologically oriented agriculture and natural resource management (NRM). The focus is on recognizing the dynamics of indigenous knowledge (IK) and enhancing capacities of farmers (including forest dwellers, pastoralists and fisherfolk) to adjust to change – to develop their own site-appropriate systems and institutions of resource management so as to gain food security, sustain their livelihoods and safeguard the environment. *http://www.prolinnova.net*
Satadsl	Africa	Providers of low cost mini-VSAT Internet access. *http://www.satadsl.net*
Sustaination	UK	A 'LinkedIn' for Local Food and Farmers: a professional food trade network with an emphasis on SME, sustainability, and relocalization. *http://www.sustaination.co*
Talking Books		A simple audio computer that speaks in local language. *http://www.literacybridge.org*

Applications	Where	Description
Tambero	International	Tambero is a free system that uses innovative ideas and trends such as QR codes to track information about land parcels and cattle in the cell phone. It is used in 89 countries, most of them in South America, Asia and Africa. *http://www.tambero.com*
TECA	International	Technologies and Practices for Small Agricultural Producers (TECA): a platform that combines a knowledge repository with a tool for discussions. *http://www.teca.fao.org*
Ukulima.net	Kenya	Pamoja Media's mobile web platform that allows farmers to connect and interact on topics of similar agriculture interests. *http://ukulima.net*
VERCON	International	The Virtual Extension and Research Communication Network (VERCON) model aims to enhance interaction among agricultural research, extension, farmers and the other stakeholders of agriculture and rural development. To ensure this process, collaborative techniques and innovative methods of communication are used as well as Information and Communication Technologies (ICTs). *http://km.fao.org/vercon*
VERCON Egypt and RADCON	Egypt	An institution based communication network first established in Egypt in 2002, VERCON Egypt was later expanded into the Rural and Agricultural Development Communication Network (RADCON). *http://www.radcon.sci.eg*
WeFarmit: Farm Cloud, HERDit	UK	WeFarmit provides social networking platforms and cloud computing for the farming and food community. HERDit is an application for herd tracking. *http://wefarmit.com*

Resources

This case study, "IT for Change", is part of a research project that sought to analyze how different telecentre models approach development on the ground, proceeding to elaborate a typology based on the cornerstones of participation and equity:

http://www.scribd.com/doc/45310241/Village-knowledge-centres-An-initiative-of-MSSRF

TECA has recently launched the Farmer Innovation Exchange Group:

http://teca.fao.org/group/farmer-innovation-exchange-group

Backpack Farm Agriculture Program (BPF) located in Kenya and East Africa, is committed to transforming Africa's smallholder farmers into agri-preneurs— empowered to feed themselves and the world. BPF distributes packages of 'green' farming inputs and training through a network of franchise training and distribution centers expanding across rural Kenya. This grassroots program is now enhanced by the first crop-specific, mobile phone-delivered agriculture training content designed specifically to support smallholder farmer's primary production in Kenya and the East Africa region delivered in both English and Swahili. The content is delivered via both SMS and basic smart phone application.

http://www.backpackfarm.com

This study by the University of Oxford Department of Economics estimates the benefits that Indian farmers derive from market and weather information delivered over SMS to their mobile phone by Reuters Market Light (RML), a commercial service.

http://www.economics.ox.ac.uk/members/marcel.fafchamps/homepage/rml.pdf

Benjamin Kwasi Addom has written a short blog based on "How local farmers innovate".

http://benjaminkaddom.wordpress.com/2012/01/22/how-local-farmers-innovate
This framework was developed based on an empirical research carried out with farmers.

Article: Anil Gupta and the Honey Bee Network.

http://www.worldchanging.com/archives/006333.html

Families that had intermittent access to Talking Books, grew 48% more food in a pilot study, published in the journal "Information Technologies & International Development", and summarized here.
http://www.literacybridge.org/our-mission/pilot-results
Farm Radio's report on MIS and radio.
http://bit.ly/farmradiomis

From India: Rob Jensen has looked at the adoption of mobile phone by fishermen in south Indian state of Kerala.
http://qje.oxfordjournals.org/content/122/3/879.abstract.

Aparajita Goyal has looked at the impact of market information systems on prices received by soybean farmers in Madhya Pradesh.
http://www.aeaweb.org/articles.php?doi=10.1257/app.2.3.22

From Sub Saharan Africa: Muto and Yamano have looked at the impact of mobile phone usage by Ugandan farmers of maize and banana.
http://ideas.repec.org/a/eee/wdevel/v37y2009i12p1887-1896.html

From Niger: Fafchamps and Aker have looked at mobile phone usage.
http://www.economics.ox.ac.uk/members/marcel.fafchamps/homepage/mobiles

There is evidence emerging from Colombia and Peru as well.
http://works.bepress.com/aparajita_goyal/23

An initiative by the International Institute for Communication and Development (IICD) in West Africa trains farmers in innovative production and techniques for sustainable management of natural resources, using video, photos and digital presentations.
http://www.new-ag.info/en/focus/focusItem.php?a=2748

An article in the Guardian UK provides examples of how ICT is helping African farmers to adapt.
http://www.guardian.co.uk/world/2012/aug/26/new-technology-farming-films-africa

"Integrating Low-Cost Video into Agricultural Development Projects: A Toolkit for Practitioners" is a toolkit to help organizations interested in using video to do so in a more deliberate way. It is available online at: *http://ictforag.org/video*

Farm Radio International reports on how best to integrate new or modern ICTs with radio to provide farmers with effective communication services at: *http://bit.ly/farmradioict*
and how radio is helping farmers make informed decisions relevant to food security at: *http://bit.ly/farmradioprc*

A working paper from CIMMYT gives insight on the status of ICT's in India
http://repository.cimmyt.org/xmlui/bitstream/handle/10883/1322/96533.pdf?sequence=4

A report from IICD on an SMS platform that helps farmers in Zambia access extension services
http://iconnect-online.org/blogs/national-agricultural-information-services-use-smsize-internet-based-platform-improve-farmer-p

The Webfoundation has reported on a strategy in India to implement IVR with lifeline India.
http://lifelines-india.net
A localized FAQ system has saved close to 10% of calls that are instead automatically answered.
The report is at: *http://www.webfoundation.org/2012/02/vbat-lessons-and-future-steps*

The Institute of Agro Technology and Rural Science, University of Colombo, offers the first ever online diploma program for farmers in Sri Lanka. Learn more at: *http://uciars.cmb.ac.lk/index.php/education/ediploma-in-agro--technology*

"Connected Agriculture" report released by Vodafone and Accenture in 2011
http://www.vodafone.com/content/index/media/news/connected_agriculture.html

Strengthening Rural Livelihoods - The impact of information and communication technologies in Asia. Produced by IDRC, ENRAP and IFAD, the book is available here:
http://idl-bnc.idrc.ca/dspace/bitstream/10625/45947/1/132419.pdf

The OneFarm Service experience of customizing information for farmers reported in the Hindu Business Line
http://www.thehindubusinessline.com/todays-paper/tp-agri-biz-and-commodity/article2636978.ece

Some initiatives of e-Extension center of TNAU: Tamil Nadu Agricultural University
http://www.tnau.ac.in

TNAU AGRI TECH PORTAL - *http://agritech.tnau.ac.in*
TNAU Weather Information Network - *http://tawn.tnau.ac.in*
TNAU Multi Video Conference facility - *http://vcon.tnau.ac.in (Meeting protected)*
TNAU-IFPRI Knowledge support for Indian Agriculture - *http://www.advanceagriculturalpractice.in*
TNAU-IIT-C Mobile Agro Advisory Services - *http://e-vivasaya.rtbi.in/aas/index.php (Password protected)*
TNAU on-line course contents - *http://mms.tnau.ac.in*
TNAU-CDAC-Daily price information through Mobile - *http://services.indg.in/market_info/market_information2.php*