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Reciprocal Technologies: Enabling the Reciprocal Exchange of Voice in Small-Scale Farming Communities through the Transformation of Information and Communications Technologies

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Appendix B: Notable e-agriculture initiatives.

1. E-agriculture initiatives in Africa and Asia.

1.1. Radio and SMS.

1.1.1. The Organic Farmer Radio.

The Organic Farmer is both a printed magazine and a radio program that aims to provide farmers in Kenya and neighboring countries with practical advice about locally relevant, basic agricultural information and training. This initiative, funded by the Swiss NGO Biovision Foundation, specifically focuses on the dissemination of organic farming techniques. The Organic Farmer radio program uses FrontlineSMS¹, a freely available software platform that allows farmers to send their questions so that broadcasters may respond to them while on air. According to the testimony of one broadcaster, replying to the farmers' questions through SMS was not enough, whereas radio provided the opportunity to elaborate and explore topics in depth (Banks, 2011).

1.1.2. Trac-FM.

Trac-FM is described as "an innovative software platform used by media and non-profit organizations to amplify voices of citizens, track reports and collect opinions. It enables citizens to participate in a meaningful public debate through interactive radio shows and SMS." Although this Dutch-Ugandan initiative is not specifically focused on agriculture, it has launched several radio polls in which Ugandan farmers could respond via a free SMS subscription to questions about the challenges they were facing². Trac-FM also launched a participatory radio show encouraging small-scale farmers to grow orange-fleshed sweet potatoes in order to compensate the severe lack of vitamin A found in infant population³. The farmers' answers to the radio polls are instantly visualized by the TRAC-FM software used by the broadcaster, turning it thus into a platform that may inform and guide the

1 FrontlineSMS, a software platform first released in 2005, is an open-source professional SMS management tool that allows users to manage, send and receive large volumes of text messages: <http://www.frontlinesms.com/> (retrieved 05.05.2014)

2 <https://www.tracfm.org/s/campaign/33/agriculture/> (retrieved 05.05.2014)

3 <https://www.tracfm.org/s/campaign/62/orange-sweet-potato-campaign/> (retrieved 05.05.2014)

contents of radio scripts. This initiative is part of Farm Radio International, an NGO funded by the Melinda and Bill Gates Foundation that seeks to create participatory models of radio broadcasting for small-scale farmers.

1.2. SMS.

1.2.1. Esoko.

Esoko is an e-agriculture platform that provides a broad range of mobile applications that address different aspects of farming. Through SMS-based applications, Esoko helps farmers connect with markets by allowing them to view and compare current market prices for different crops and advertise their services and products. Esoko's applications are also aimed at supporting agricultural extension services through SMS alert services that may be automated and sent differentially to individuals or groups. The SMSPolls application helps extension workers to monitor and aggregate farmers' opinions about a particular matter. Esoko has also developed two additional applications for smartphones: Surveys, which lets users create custom forms for collecting and storing data, and Knowledge+, designed to manage technical data and advice, and serve as a handheld library for extension workers. Esoko follows a startup enterprise model and, in addition to mobile applications, the company also provides deployment support, strategic planning and field training. According to the company's website, the SMS-based platforms have been used in the context of several development initiatives throughout Africa.

1.2.2. FarmerConnect.

FarmerConnect directly addresses the insufficiency and inadequacy of channels for delivering expert information and advice to small-scale farmers. Through an SMS-based service, FarmerConnect allows farmers to receive personalized agricultural information and advice in their own language. The platform is specifically aimed at agricultural institutions, and seeks to equip them with the ability to communicate effectively and efficiently with farmers. Agricultural institutions may be registered as users of the web-based FarmerConnect platform and use it to manage the dissemination of information. The platform connects these institutions to a network of experts who may provide detailed information on a

specific subject, and to various information portals with dynamic information such as weather reports and forecasts, market prices or government announcements. The information obtained by agricultural institutions through the FarmerConnect web-based platform may be disseminated to farmers via SMS. According to the FarmerConnect website, 93% of the more than one million farmers who benefited from their services had reported higher incomes. However, evidence to support this claim was not publicly available. FarmerConnect was developed by eSeal, a US company that describes itself as "the world's first integrated brand protection, sales promotion and supply chain visibility solution to enable consumer business growth in emerging markets."

1.2.3. Farmerline.

Farmerline, a startup company based in Ghana, provides "improved information access and communication channels for smallholder farmers and agricultural workers." Farmerline has developed a mobile messaging platform that allows agricultural institutions to provide farmers with crop management information and advice. By also receiving incoming messages and replies to surveys via SMS, institutions may ensure that the information they have provided has been received on time and applied properly. A 2013 report about Farmerline published by the ICT for Education for Rural Development program of the International Center for Rural Education (INRULED) stated that the company was undergoing a pilot phase. During this phase, Farmerline worked with small groups of farmers and organized weekly meetings to monitor their information demand and consumption, and to train technical coordinators (INRULED, 2013).

1.2.4. iCow.

iCow is an SMS-based mobile information service that aims to help small-scale farmers to increase milk production by addressing different issues throughout the life cycle of their cows, such as optimizing their health and nutrition, managing their estrus cycle or calculating the costs of milk production. Farmers can register individual cows with the service by texting registration information to an SMS short code⁴. iCow will then track each cow and give farmers access to a gestation calendar,

⁴ An SMS short code is a special telephone number with less digits than regular numbers. SMS short codes are normally

a calf calendar so that calves are reared following best practices, an immunization calendar, and health and diet information services. An impact study of iCow carried out in 2012 showed that 82% of farmers who had joined the platform six months earlier were still using it. According to the study, 42% of those farmers reported increased incomes, and 56% of them attributed those profits to an increase in milk yield. Reduced spending on commercial feed due to knowledge on homemade production and reduced animal illness and mortality were among other benefits of iCow revealed by the impact study⁵. An article on iCow from 2013 claimed that, since the platform was launched in 2010, its user base had grown from 300 to 45,000⁶. iCow was developed in Kenya, and counts USAID (United States Agency for International Development) and the Kenyan mobile network operator Safaricom among its sponsors.

1.2.5. M-Farm.

M-Farm is an SMS-based application created by a Kenyan company that goes under the same name. The M-Farm application allows farmers to inquire about the current market prices of different crops in different regions and/or specific markets, aggregate their needs and orders, contact farm input suppliers, sell collectively and connect with ready markets. Kenyan Safaricom clients may access the services offered by M-Farm by sending an SMS to a special number. For example, if a farmer wants to know the current local price of cabbage at the Embu market in Kenya, he has to write the words 'price', 'cabbage' and 'embu', and send them as an SMS. He will then receive an SMS stating the current market price⁷. M-Farm was developed and is maintained by an all-women team, and is supported by the World Bank's infoDev program⁸, Samsung and two of Kenya's major technological hubs: iHub⁹ and m:lab East Africa¹⁰.

available countrywide, are associated to specific telecommunications service providers, and can be used to send SMS messages.

5 iCow impact study: <http://icow.co.ke/blog/item/15-icow-impact-study-results.html> (retrieved 07.05.2014)

6 Article "Kenyan dairy farmers to benefit from Safaricom's partnership with iCow", by Dennis Mbuvi. Published in CIO / East Africa on June 26, 2013. Available at: <http://www.cio.co.ke/news/main-stories/kenyan-dairy-farmers-to-benefit-from-safaricom-s-partnership-with-icow> (retrieved 07.05.2014)

7 The M-Farm usage example was retrieved from the article "Kenyan farmers use SMS to beat climate-driven price uncertainty", by Isaiah Esipisu, published by the Thomas Reuters Foundation on April 18, 2011. Available at: <http://www.trust.org/item/?map=kenyan-farmers-use-sms-to-beat-climate-driven-price-uncertainty/> (retrieved 07.05.2014)

8 infoDev: <http://www.infodev.org/> (retrieved 07.05.2014)

9 iHub: <http://www.ihub.co.ke/> (retrieved 07.05.2014)

10 m:lab East Africa: <http://mlab.co.ke/> (retrieved 07.05.2014)

1.2.6. M-Shamba.

M-Shamba is a mobile platform that provides information to farmers about different stages in agricultural processes, including land preparation, harvesting, post-harvest handling and marketing. The information is customized based on the farmers' location and crop preferences. The platform uses various mobile phone features, such as cross-platform applications usable in both smartphones and basic phones, or SMS messaging. M-Shamba also provides information about the current market prices of crops in a similar way as M-Farm. However, M-Shamba also allows registered farmers to advertise their crops and services. In the platform's website, Calvince Okello, founder of M-Shamba, claims that M-Shamba has helped over 4,000 farmers to adopt the System of Rice Intensification¹¹ in different parts of Kenya. M-Shamba is supported by a consortium of partners including the Jomo Kenyatta University of Agriculture and Technology¹² and other Kenyan and African agricultural and development organizations.

1.3. Web-based services.

1.3.1. Infonet-Biovision.

Infonet-Biovision is a web-based resource of scientifically and practically sound information for strengthening the sustainable development of farmers and rural communities in Africa. The website, developed and maintained by the Biovision Foundation, allows users to access and share information available in four categories: plants, humans, animals and environment. Infonet-Biovision is specifically aimed at trainers, extension workers and farmers, and offers them quick access to locally relevant information. The platform offers a simple user interface whose functionality is centered on a search field. After a keyword is entered into this field, a list with multiple results is displayed. Each result consists of an article with a detailed explanation related to the search topic, and generally includes photographs, maps, diagrams and other related information.

11 The System of Rice Intensification (SRI) is a low water, labor intensive, organic farming practice developed in Madagascar in 1983. Because of its success, SRI has spread throughout the rice-growing regions of the world (De Laulanié, 2011).

12 The Jomo Kenyatta University of Agriculture and Technology: <http://www.jkuat.ac.ke/> (retrieved 07.05.2014)

1.3.2. Rural eMarket.

Rural eMarket is a multilingual web-based market information system that provides subscribers with information about market actors (producers, buyers, service providers or intermediaries), categorized products, locations, prices and transactions (what has been sold, what is still available). The platform performs different functions, such as advertising and searching for product offers and demands, comparing market prices in different locations and consulting the availability of specific products in specific markets. Rural eMarket is targeted at producers, including small-scale farmers, consumers ranging from small market resellers to supermarkets, hotels and restaurants, and other service providers and intermediaries. Those who wish to subscribe to Rural eMarket must pay an annual fee in order to access the services offered by the platform. Rural eMarket was developed and is promoted in all Africa by Farming and Technology for Africa, an organization based in Madagascar.

1.3.3. Totoagriculture.

Totoagriculture is a web-based collection of localized, multilingual agricultural information such as weather forecasts, soil health, planting tips and pest management. Totoagriculture, developed by a team at INSEAD, was designed with rural radio and agricultural call centers in mind. Therefore, it may be used as an interface to help prepare radio programs or to provide timely information to call center operators. The information offered by Totoagriculture covers various formats, including text, audio, video, calendars and maps. Country-specific versions of the platform are also available. Totoagriculture is supported by the Bill and Melinda Gates Foundation, and has been used in agricultural and development initiatives such as the Africa Soil Information Service¹³, the Grameen Foundation¹⁴ or Farm Radio International.

1.4. Multimedia.

13 Africa Soils Information Service: <http://www.africasoils.net/> (retrieved 07.05.2014)

14 The Grameen Foundation: <http://www.grameenfoundation.org/> (retrieved 07.05.2014)

Although Infonet-Biovision and Totoagriculture offer agricultural contents in multimedia formats, these platforms mainly focus on text-based information. The following e-agriculture initiatives are aimed at delivering educational videos and animations to farmers. These multimedia formats are commonly produced using video cameras and viewed on TV sets or monitors equipped with DVD players. Even though computers and smartphones may also be used to produce and view these formats, they are rarely used in the context of e-agriculture. Therefore, the initiatives in this category rely on information and communications technologies only in an indirect way. However, these initiatives were included because some of them regard farmers not only as clients of expert information, but also as producers of content, and therefore may reinforce reciprocal practices. It is outside the scope of this dissertation to fully analyze the role of video in agricultural development projects. However, a comprehensive toolkit for video practitioners produced by USAID and the NGO FHI360¹⁵ is available online¹⁶. Additionally, InsightShare, an organization based in the UK has produced a practical guide for designing and implementing participatory video projects.¹⁷

1.4.1. Access Agriculture / AgTube.

Access Agriculture is an international NGO that facilitates the production, translation, dissemination and usage of agricultural training videos in developing countries. The videos are designed by experts to support training in sustainable agriculture, and are available in different languages. The videos produced by Access Agriculture may be freely watched online, and may also be downloaded or obtained in DVD format. The platform targets agricultural researchers, service providers and extension officers as its primary audience. While Access Agriculture does not allow users to upload their own videos, the platform has an associated website called AgTube, described as a social media platform for farmers in developing countries where subscribers may share their own contents. The guidelines for uploading videos to AgTube require videos to have a training focus relevant to developing countries, to be shorter than 20 minutes and to avoid advertising. The videos uploaded to AgTube

15 FHI 360: <http://www.fhi360.org/> (retrieved 08.05.2014)

16 Integrating Low-Cost Video Into Agricultural Development Projects: A Toolkit For Practitioners. <http://www.ictforag.org/video/> (retrieved 08.05.2014)

17 InsightShare defined participatory video as a "tool for positive social change" consisting of "a set of techniques to involve a group or community in shaping and creating their own film" (Lunch, Lunch, 2006).

may be classified under the same categories as those available through Access Agriculture. Videos in AgTube are also made freely available for download, and therefore contents licensed under copyright are excluded from the platform. Access Agriculture and AgTube were both developed with Agro-Insight, an enterprise based in Belgium that creates high-quality videos using a team of professional or locally trained video makers, and sponsored by the Swiss Agency for Development and Cooperation.

1.4.2. Digital Green.

Digital Green is an Indian NGO that uses a mediated model to disseminate targeted agricultural videos to small-scale farmers. The Digital Green model has four main elements:

- A participatory process for local video production.
- A human-mediated learning model for video dissemination and training.
- A hardware and software technology platform for data management customized to limited or intermittent Internet and electrical grid connectivity.
- An iterative model to progressively address the needs and interests of the community with analytical tools.

As of March 2014, Digital Green had extended its reach to Ghana, Ethiopia and Tanzania, and had produced 2,914 videos, reached 3,598 villages and staged 216,238 video screenings¹⁸. The videos are approximately 8-10 minutes long and feature a variety of topics including testimonials and demonstrations of production techniques, market linkages, and government schemes. Although Digital Green stresses its human-mediated model of dissemination, its videos are also available through a search engine on the organization's website. Digital Green operates as a public good, and therefore relies on public and private funding. Public sponsors include the Ministry of Rural Development of India and the Ministry of Agriculture of Ethiopia, while AGRA, the Bill and Melinda Gates Foundation, Google and the Vodafone Foundation are some of Digital Green's private investors. Additionally,

18 Data obtained from the "Digital Green Key Facts" digital brochure, available at <http://www.digitalgreen.org/media/docs/Digital-Green-Key-Facts.pdf> (retrieved 08.05.2014)

Digital Green has fostered a network of research and technology partners, including local agricultural institutions and international organizations.

1.4.3. Farming Instructor.

Farming Instructor is a mobile application for Android smartphones that provides farmers with online and offline agricultural information in the form of text, voice recordings and animations. According to the application's mission statement, Farming Instructor specifically targets young farmers and seeks to awaken in them a passion for agriculture as a means of self-employment. Besides providing information about different agricultural processes, Farming Instructor also offers users the possibility of sharing their own farming advice. However, it is not clear whether only registered members of Farming Instructor, who must pay a subscription fee, may contribute with additional content, or whether the platform allows open publishing. Moreover, the developers of Farming Instructor do not disclose the sources from which the agricultural information included in the application is taken. Farming Instructor is developed by an independent Tanzanian programmer, Ernest James Mwalusanya.

2. E-agriculture initiatives in Latin America.

As discussed in chapter 4, notable e-agriculture initiatives in Latin America, with the exception of Agronet in Colombia, are offered exclusively as web-based services. In the following table, those initiatives are briefly described.

Country	E-Agriculture initiatives
Argentina	- Agrositio: ¹⁹ online information about market prices of crops and farming inputs. - FruTic: ²⁰ practical information for farmers who grow citruses.
Brazil	ALICE ²¹ and Infoteca-e: ²² online repositories maintained by the Brazilian Enterprise for Agricultural Research (EMBRAPA ²³) provide full access to scientific and technological research articles and other materials.
Chile	- Yo Agricultor: ²⁴ connects farmers who produce berries, maize, wine, and honey. - Other known e-agriculture initiatives either provided outdated market prices for crops (Agroportal ²⁵) or were no longer active at the time of writing (DatAgro ²⁶).

19 Agrositio: <http://www.agrositio.com/> (retrieved 09.05.2014)

20 FruTic: <http://www.frutic.org.ar/> (retrieved 09.05.2014)

21 ALICE: <http://www.alice.cnptia.embrapa.br/> (retrieved 09.05.2014)

Colombia	Agronet: ²⁷ integrated and decentralized information and communications network that offers different types of agricultural information through the web, and market price information via a free SMS service.
Peru	Agricultural Information System of Huaral, ²⁸ started in the year 2000 by the Peruvian Center of Social Studies (CEPES ²⁹), offered farmers in the valley of Huaral connected computers to help them manage and improve their practices by accessing timely information (Bossio, 2007). A full web-based platform was developed by CEPES in 2004. Unfortunately, it was no longer accessible nor active as of this dissertation.
Mexico	National Network of Sustainable Rural Development (RENRUS), developed by researchers of the Postgraduate College of Agronomy (COLPOS ³⁰). The RENRUS project aims at building knowledge-sharing networks between farmers and other agricultural actors that may enhance rural development at regional and national levels (Nuñez et al., 2013). To achieve its objective, researchers who maintain the RENRUS initiative have developed a web service ³¹ where the different actors may share their success stories, which can be evaluated and reproduced by peers. ³²

29 CEPES: <http://www.cepes.org.pe/> (retrieved 09.05.2014)

28 In 2005, the Agricultural Information System of Huaral received an honorary mention in the Prix Ars Electronica, under the category of Digital Communities. Of all projects reviewed in this chapter, it is the only one that has been explicitly recognized within an artistic context. http://90.146.8.18/en/archives/prix_archive/prix_projekt.asp?iProjectID=13416 (retrieved 18.07.2014)

27 Agronet: <http://www.agronet.gov.co/> (retrieved 09.05.2014)

26 The DatAgro project in Chile was based on the Mobile Information Platform, an SMS information system developed by the Kenyan company DataDyne (USAID, 2011b).

25 Agroportal: <http://www.agroportal.cl/> (retrieved 09.05.2014)

24 Yo Agricultor: <http://www.yoagricultor.cl/> (retrieved 09.05.2014)

22 Infoteca-e: <http://www.infoteca.cnptia.embrapa.br/> (retrieved 09.05.2014)

23 EMBRAPA: <https://www.embrapa.br/> (retrieved 09.05.2014)

30 COLPOS: <http://www.colpos.mx/> (retrieved 09.05.2014)

31 RENRUS web service: <http://www.renrus.org/> (retrieved 09.05.2014)

32 The developers of RENRUS have organized discussion forums where the participating farmers can meet face-to-face and present their own projects. Between 1996 and 2012, a total of 4,872 projects had been presented in the RENRUS platform, and about 50% were still active in 2013 (Nuñez et al., 2013). However, most of these projects were classified under the category of industrial agriculture, suggesting that farmers with greater production capacity (and therefore greater income and access to information and communications technologies) may have participated more actively and benefited more than small-scale subsistence farmers.

Reference.

Banks, K., 2011. "'Farming Out' Agricultural Advice Through Radio and SMS National Geographic NewsWatch, April 26, 2011. URL = < <http://newswatch.nationalgeographic.com/2011/04/26/%E2%80%9Cfarming-out%E2%80%9D-agricultural-advice-through-radio-and-sms/> > (retrieved 05.05.2014)

Bossio, J., 2007. "Sostenibilidad de proyectos de desarrollo con nuevas tecnologías: el caso de la organización de regantes y su sistema de información en Huaral", *Journal of Community Informatics*, vol. 3, n. 7. URL = < <http://www.ci-journal.net/index.php/ciej/article/view/394/335> > (retrieved 09.05.2014)

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USAID (United States Agency for International Development), 2011b. "Presentation by Joel Selanikio, DataDyne.org at USAID on 1/5/2011", USAID,

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Washington DC, USA. URL = <

<https://communities.usaidallnet.gov/ictforag/node/44> > (retrieved 09.05.2014)