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Adopting and Practising ICT-led Agriculture by Young Farmers: A Success Story in Luwero District, Uganda

Herbert Lwanga

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Herbert Lwanga

Coordinator, LOG`EL Project
Kampala, Uganda

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The Technical Centre for Agricultural and Rural Cooperation (CTA) is a joint international institution of the African, Caribbean and Pacific (ACP) Group of States and the European Union (EU). Its mission is to advance food and nutritional security, increase prosperity and encourage sound natural resource management in ACP countries. It provides access to information and knowledge, facilitates policy dialogue and strengthens the capacity of agricultural and rural development institutions and communities.

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About the author

Herbert Lwanga is a designer/promoter of innovations in electronic engineering and ICT systems. He applies his ICT expertise to agricultural activities, with a strong focus on promoting the involvement of youth in rural and under-served urban settings in Uganda. He holds a higher diploma in electrical and electronic engineering, a diploma in computer science and a certificate in project planning and management. Since 2001 he has coordinated the LOG`EL Project, participated in several exhibitions, made presentations and offered technical support to upcoming cottage industrialists and entrepreneurs in the fields of both indigenous and modern technologies.

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Please address comments on this Working Paper to Benjamin K. Addom (addom@cta.int), Programme Coordinator, ICT, at CTA.

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Executive summary

This paper highlights the successful adoption of information communication technologies (ICTs) in transforming agriculture among young farmers in Luwero district in Uganda. The first part treats agriculture as a critical sector for developing countries (Uganda and Africa inclusive). Second, the diverse experiences among young farmers in Luwero district are highlighted.

The enabling elements (measures, lessons, successes and challenges) of ICTs to agriculture in Luwero district form the third part of the paper; fourth, we present a detailed description of ICTs and their respective application to farming. Finally, we outline five recommendations for further review and action to enrich and sustain the young farmers' initiatives in Luweero district.

A general impression of ICT-led agriculture

A significant portion of the world's population – 86% of rural inhabitants – still depend on agriculture for employment and sustenance (World Bank, 2007). In Uganda today, about 70% of the population practice agriculture, mainly as subsistence farmers who rarely use sophisticated planning and co-ordination of their activities. Alongside these nature-dependant peasants are a few strong pockets of organised farmers in Luwero district that are driven in part by information communication technologies (ICTs). They involve innovative women and youth groups, and are largely supported by non-governmental organisations such as Women of Uganda Network (WOUGNET) and Community Initiatives for Development (CIDev), among others.

The ICT-led agriculture subsector holds promise for what contemporary communities need to survive and thrive. Bearing in mind that demand for food is increasing, the Food and Agricultural Policy Research Institute estimated that an additional 6 million hectares (ha) of maize and 4 million ha of wheat plus a 12% increase in global maize and wheat yields will be needed to meet demand for cereals alone in the next decade (Edgerton, 2009). Demand for meat is also expanding as incomes rise, creating competition for land and other resources. Increasingly unstable weather and temperatures require adaptive agronomic techniques to meet the demand; we need to adopt and use ICT-led agriculture to enable the entire farming process to become gainful and meaningful to humanity.

How conventional agricultural practices affected young farmers in Luwero

In 2011, the LOG`EL team contacted Luwero district local government and two young farmer groups to determine the plight of young farmers in the area. Consequently, it was discovered that the young farmers were conducting their farming activities under a lot of constraints including inadequate market information for their agricultural produce and lack of information on better farming practices. These young farmers largely depended on conventional farming practices characterised by poor planning, co-ordination and general organisation. Farming was a negative experience for them and they began to view farming as "an activity of doom and stagnation".

The lack of good quality planting/stocking materials to ensure sufficient, quality yields meant that young farming households always remained food insecure. In the end, cases of malnutrition, low school attendance among school-going children, failure to pay medical bills and associated household expenses meant that most of these households were reduced to deprivation, poverty, ill-health, social exclusion and psychological agony/stress.

The dominance of the hand hoe in their farming system meant that these young farmers were physically unable to till fairly large pieces of land; they were destined to remain marginal smallholder farmers with small gardens that only generated bare minimum yields.

Third, adverse attacks of crops by pests and diseases were widespread, resulting in low yields, low prices and ultimately poor health among household members. Furthermore, there was limited knowledge among the young farmers about the effective use of pesticides.

Fourth, the farmers' soils were of poor quality as a result of diminishing levels of nutrients in the soil and contamination of the soil by pollutants. To compound the situation, they knew little about how to determine the levels of soil fertility and how to address these challenges.

The role of ICTs as transformative enablers to young farmers in Luwero

During the consultative meetings between the young farmers and the LOG`EL project team, it was observed that most of the participants either had or regularly accessed several ICTs such as radios, mobile phones and commercial internet services. Surprisingly, most of the young farmers reported that they usually used these tools for entertainment activities.

Consequently, the LOG`EL team sensitised and trained the young farmers on how to obtain and use agro-based information from radios, mobile phones and online to boost their farming activities. An information communication technology (ICT) centre was launched in March 2013 at Luwero community centre and feedback from farmers indicates that these young farmers have began to have improved yields, better incomes and enriched livelihoods.

Establishment of groups and training

LOG`EL project identified two groups of young farmers comprising of 85 members (25 males and 15 females) – Eden group was near Luwero town council while Makurubita group was in a rural area and comprised of 45 members (25 males and 20 females). The two groups were introduced to information searching skills, blogging skills and social media skills with an emphasis on Facebook and Twitter. They were also given a list of useful agro-based websites.

They were introduced to the use of SMS messages via their mobile phones, radios and accessing various agro-based information through laptops. Currently, the first three applications are in use because these young farmers are unable to afford laptops.

Status of ICT adoption and use by young farmers in Luwero district

To date, about 30 of the 40 near-urban young farmers have access to the internet; they visit agro-based websites on their mobile phones and at internet cafes in Luwero town. In addition, they also use their mobile phones to access and use agro-based information through SMS messages, to enable them procure quality planting/stocking materials, pesticides, markets and prices for their agro-produce as well as accessing information on weather patterns.

Members of the larger rural area group do not have ready access to the internet because there are no internet cafes in their locality. About 10 to 15 members of this group regularly visit Luwero town to use internet cafes. The LOG`EL project encourages the few rural, young farmers to gain skills in agro-based ICTs use; they are also saving funds for purchase of a computer in addition to one donated by LOG`EL project. They are considering using the two computers to start a mini-internet café for use by their members and perhaps the wider community in the area. Overall, about 90% of the urban group accesses ICTs through the available internet cafes, while about 10–12% of the rural group access ICTs by travelling to Luwero town.

Group dynamics among the youth

Since the initiative was started, the young farmers groups have used it as a source of their empowerment in the diverse spheres of livelihoods. Usually, members discuss and arrive at solutions on the issues of: HIV/AIDS sensitisation and prevention; reproductive health management and control (i.e., sex by choice and not by chance); entrepreneurship skills development and use (e.g., provision of planning and management services, crafts making and selling, video recording and coverage services, hairdressing and beauty care services, etc.).

These groups serve as platforms for the various support activities in the cultural, social, economic and governance spheres; they have ensured that their members have taken on diverse responsibilities in their households and communities. Membership of the group has enabled these young farmers to reduce socially unhelpful behaviour such as drug and alcohol abuse, violence against women and children and petty theft, among others.

Strategies for up-scaling of the project without LOG`EL support: Existing measures and lessons

Successes and challenges encountered

To ensure that the project is young farmer-led and sustainable, LOG`EL project and the young farmers have worked together to link to a number of existing development initiatives within the district such as the National Agricultural Advisory Services (NAADS), Community-driven Development Fund (CDD) and other development programmes, for additional support. These farmers groups have also been recognised by the Youth Co-ordination Office in the district for ongoing guidance, linkages and other support.

The young farmers in Luwero have learned a number of valuable lessons.

- Mobile phones are powerful tools that improve livelihoods especially with regard to farming – in fact the LOG`EL project has provided them with computers and helped them to access ICTs to empower them to get high prices for their produce. ICTs has also enabled the young farmers to produce better quality crops and animals, for food security and increased incomes.
- ICTs enable young farmers to cut off marauding middlemen who usually pay low farm-gate prices while they reap big profits from urban traders and consumers.
- ICTs enable young farmers to access and use diverse agro-based information sources from single sourcing points thereby saving them time, energy and stress, while lowering their risk of accidents and transport costs. All these benefits are strengthened by enabling them to access dependable sources for markets, suppliers, reliable weather information, quality pesticides and any other resources that they need.
- The district local government continues to support and sustain the activities of the two young farmers' groups in Luwero, which would have otherwise collapsed.
- The two young farmers' groups continue to work closely with the LOG`EL Technology Centre; the Centre's volunteer software application developers are using the Incubation programme to come up with more agro-based, mobile applications for wider use.

Project successes

Several successes are progressively being registered in support of the project:

- Three computers have been donated to the two groups one to the urban group and two to the rural group – they are used for printing, internet services and to generate extra revenue for sustainability.
- Luweeo district local government has acknowledged the work of the project and is now encouraging the two young farmers' groups to apply for development funding from the NAADS CDD and similar poverty reduction grants in the district.
- Luwero district authorities are willing to link the two young farmers groups to other development partners, for support, to expand and sustain the project after LOG`EL project finishes. The district also plans to bring similar groups on board, in its efforts to reduce poverty while checking rural-urban migration especially by the youth.

These strategies are largely responsible for ensuring that the two young farmers groups keep growing from strength to strength instead of collapsing, as is the case with most rural agricultural initiatives.

Challenges encountered

While implementing the project, several challenges were noted i.e.,

- Previously, district support to the young farmers was minimal
- Some of the ICT equipment e.g. laptops, are quite costly
- Costs for value-addition equipment and materials are still high; this hinders the young farmers in Luwero from processing and marketing their farm produce at the desired improved qualities that would otherwise attract higher prices
- The unstable supply of hydropower affects the smooth running of internet cafes where the young farmer could source the information they require

In response to these challenges, a combination of approaches is proposed.

The potential of ICTs for the young farmers in Luwero

ICTs can lead to more optimal use of inputs. Increasing producers' knowledge of how to use and manage water, equipment, improved seed, fertiliser and pesticides. In the long term and after collecting and analysing multi-site, multi-year data, ICTs can be used to match cultivars to appropriate environments, increase the understanding of genotype-by-environment interactions, and adapt cropping strategies to the changing climate. Each of these applications increases the profitability of agriculture, reduces transaction costs, facilitates climate change adaptation and improves livelihoods for the rural poor.

Today, smallholder productivity is one of the greatest tasks in this century. Consequently, the growing number and sophistication of ICTs offers some hope of raising agricultural productivity, even in smallholders' fields. Variable rate technology, GIS, GPS, satellite imagery and other data collection technologies have increased the information available about soil health, weather conditions and disease outbreaks, making very site-specific farming possible. The key to using these technologies to boost productivity is to remember that complementary technologies are needed; data analysis technologies (such as data mining or mediation software) and information dissemination technologies (such as mobile

phones and radio) are essential to reaching smallholders effectively. Dissemination also includes the crucial human component: the extension agents and the farmers themselves must transmit and share knowledge.

As noted, productivity can be increased by expanding the land available for agriculture or by making the land already in use more productive. The second option is more likely to close the productivity gap and meet demand. Hence, the use of ICTs such as those discussed may do just that. Mainstreaming the use of ICTs in agriculture will also enable them to be used more effectively. Integrating ICT into national programmes, creating a policy environment conducive to ICT investment and designing digital systems that are compatible and common can help improve access for users. Conducting impact studies and sharing pilot project information is also critical to success with ICTs (IICD, 2006).

In a nutshell, the benefits of ICT can be realised on multiple levels. As ICT capacities expand, local farmers and communities at all levels need to understand their potential uses to increase agricultural productivity. These stakeholders must learn how to tailor ICT solutions to their macro-economic needs as well as local agricultural bottlenecks, while exploring how current infrastructure can harness relevant and appropriate technologies (IICD, 2006).

Apparently, the young farmers in Luwero district are on the right track of embracing ICTs to harness their farming activities. They however, need to continuously network with the diverse, key officials and stakeholders in the district.

Future plans

Specifically, the future plans are to:

- link the young farmers in Luwero to more online platforms that give support to ICT-led agriculture
- work with young farmers in Luwero to implement/test the agricultural mobile applications currently undergoing development by the LOG`EL project team of volunteer software developers
- encourage them to use mobile phones, short message services (SMS), GIS applications as well as listen to agricultural programmes on the radio
- strengthen existing collaborations with Luwero district local government, development partners and key stakeholders to ensure continued support to ICT-led agriculture by young farmers
- replicate the project to more young farmer groups in the district and elsewhere.

Bibliography

[AfSIS] Africa Soil Information Service. 2009. Digital Soil Mapping. Accessed October 2015. http://africasoils.net/services/data/digital-soil-mapping/

Baggio, A. 2004. ‘Wireless sensor networks in precision agriculture’. Accessed October 2015. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.120.46&rep=rep1&type=pdf

Che’Ya, N.N., Shariff, A.R., Soom, M.A., Bejo, S.K., Mahmud, A.R. and Aziz, F.A. 2009. ‘Generating Online GIS Decision Support System for Paddy Precision Farming’. Global

Spatial Data Infrastructure Association. Accessed April 2011. http://www.gsdi.org/gsdiconf/gsdi11/papers/pdf/225.pdf

Dargie, W. and Zimmerling, M. 2007. 'Wireless Sensor Networks in the Context of Developing Countries'. Paper presented at the 3rd IFIP World Information Technology Forum, Addis Ababa, August.

Edgerton, M. D. 2009. 'Increasing crop productivity to meet global needs for feed, food, and fuel.' *Plant Physiology* 149: 7–13.

Fukatsu, T., Hirafuji, M, Kiura, T., Imada, A. and Ninomiya, S. 2004. 'Long-Term Monitoring System Using Field Monitoring Servers'. Proceedings of the 2004 AFITA/WCCA Joint Congress on IT in Agriculture. 685–91.

Global Mobile Connections to Surpass 6 Billion by Year-end. 2011. Wireless Intelligence. Accessed 15 September 2011. *How to Feed the World 2050*. 2009. UNFAO. Accessed 6 September 2011. https://www.wirelessintelligence.com/analysis/pdf/2011-09-08-global-mobile-connections-to-surpass-6-billion-by-year-end.pdf

Govereh, J., Nyoro, J. and Jayne, T. 1999. 'Smallholder Commercialisation, Interlinked Markets, and Food Crop Productivity: Cross-country Evidence from Eastern and Southern Africa'. Paper presented at the 4th Agricultural Transformation Conference, NairobiGPS.gov. (n.d.). 'Global Positioning System: Serving the World'. Accessed December 2010. gps.gov

[ICRISAT] International Crops Research Institute for the Semi-Arid Tropics. 2010. 'Satellite Imagery for Smallholder Farmers in Mali'. ICRISAT Happenings.

[IICD] International Institute for Communication and Development. 2006. *ICTs for Agriculture Livelihoods: Impact and Lessons Learned from IICD Supported Activities.* The Hague: IICD. Accessed April 2011. http://www.iicd.org/files/IICD-agri-impact-2006.pdf

Lester, D. 2010. 'Sensors, Software Send Ag Alerts to Farmer Phones'. *Tri-City Herald,* 5 March 2010. Accessed October 2015. http://www.tri-cityherald.com/news/business/article31766124.html,

Mathur, S. 2003. 'Carambola Fruit Fly Campaign: Latin America'. ICT for Development, Accessed November 2010. http://www.comminit.com/en/node/121310/307

Mehra, A. 2010. 'Small Technologies Fuel Big Results in the Developing World'. *The Huffington Post,* 13 September 2010. http://www.huffingtonpost.com/amit-mehra/small-technologies-fuel-b_b_715274.html

Munyua, H. 2007. *ICTs and Small-Scale Agriculture in Africa: A Scoping Study.* Ottawa: International Development Research Centre (IDRC).

Ogodo, O. 2009. 'Cassava Disease Monitoring Goes Mobile'. SciDev Net. Accessed October 2015. http://www.scidev.net/global/farming/news/cassava-disease-monitoring-goes-mobile.html

Rossiter, D. 2004. Digital Soil Mapping. *Global Workshop on Digital Soil Mapping.* Montpellier: International Union of Soil Sciences.

Traoré, P.S. 2010. 'The View from Above: VHRI Gives West African Farmers Data on Soil Fertility and Land Size'. *ICT Update*, 23 February. Accessed July 2011. http://ictupdate.cta.int/en/Feature-Articles/The-view-from-above

Woodhouse, P. 2009. 'Technology, Environment and the Productivity Problem in African Agriculture: Comment on the World Development Report 2008'. *Journal of Agrarian Change* 9(2): 263–76.

World Bank 2008. *World Development Report 2008: Agriculture in Development.* World Bank. Accessed 10 September 2011. http://bit.ly/JOp89w.

World Bank, 2007. *World Development Report 2008: Agriculture for Development.* Washington, DC.

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Contact us
CTA
PO Box 380
6700AJ Wageningen
The Netherlands

Tel: +31 317 467100
Fax: +31 317 460067
Email: cta@cta.int

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