ICT Update

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Impacts of digitalisation for agriculture

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ICT Update

The impacts of digitalisation

Michael Hailu

Over the last 20 years, *ICT Update* has followed and reported on the rapidly changing landscape in ICTs for agriculture and digitalisation of the sector. The definition of digitalisation for agriculture, according to *The Digitalisation of African Agriculture Report, 2018–2019*, "is the use of digital technologies, innovations, and data to transform business models and practices across the agriculture value chain, including production, post-harvest handling, market access, finance and supply chain management." In this edition, which unfortunately will be the last, recent work of CTA in promoting digitalisation for agriculture is featured, as well as the associated impacts.

At CTA, we are applying ICTs to agriculture to address the Sustainable Development Goals (SDGs), whilst ensuring there is a solid business case to support the costs of using the technology. We have taken existing problems expressed by our partners and sought solutions (see Figure 1).

Through partnership, we identify the areas of agricultural transformation that can help achieve the SDGs, and support actions where digitalisation can assist. For example, our work with the Pan African Farmers Organisation identified farmer profiling as a common issue in aggregating farmers to deliver benefits in production and value chain management, and access to markets and finance. To address this, we have worked with farmers associations across Africa to facilitate the digital registration of their members.

By building capacities in digital literacy and bringing in expertise, CTA has used new technology, such as drones, to put more information in the hands of the farmer organisations to improve yields and has worked with local technology operators to develop sustainable businesses. Insurance applications have been bundled to address climate risks and new software has been developed to provide farmers with forecasting and agronomic advice. In order to maximise the use of new technologies and develop applications, the efficient exchange of data is required. We have worked with partners to look at how data sharing and exchange can be equitable so that smallholder farmers can also participate in the benefits of open farm data.
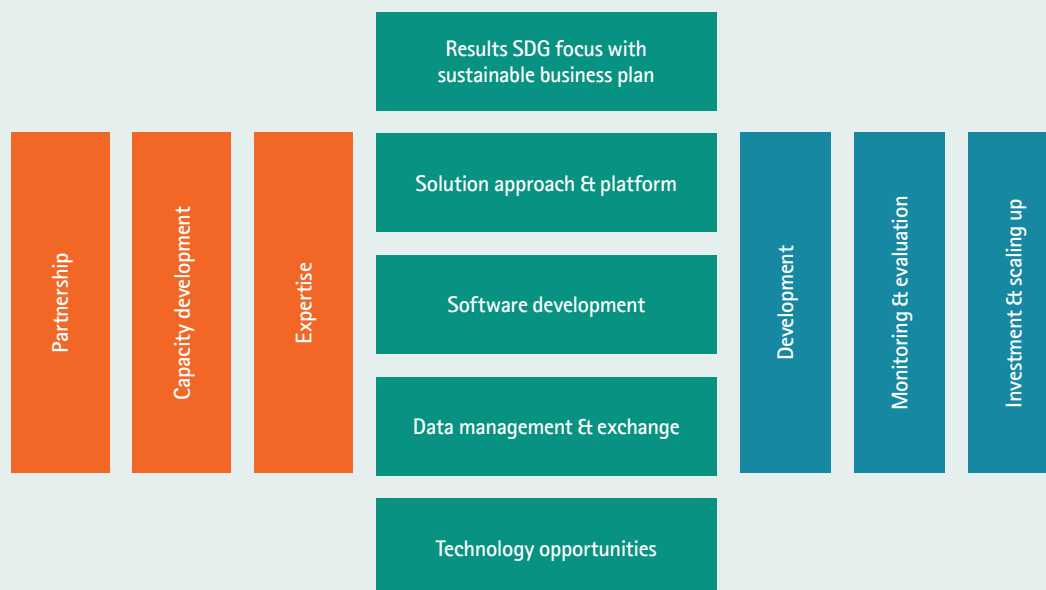
> *At CTA, we are applying ICTs to agriculture to address the SDGs, whilst ensuring there is a solid business case to support the costs of using the technology*

Figure 1: The ICT projects that CTA has worked on show a need to combine the areas below, where orange indicates areas of support, blue indicates areas for action and green, areas for change.

Partnership	Capacity development	Expertise	Results SDG focus with sustainable business plan	Development	Monitoring & evaluation	Investment & scaling up
			Solution approach & platform			
			Software development			
			Data management & exchange			
			Technology opportunities			

This issue of *ICT Update* describes new technologies and approaches to using ICTs in agriculture. We are often asked about project results, so here we present a series of cases from our own experiences.

Based on his experiences working with young digital 'agripreneurs' and agribusinesses, Ken Lohento presents key strategies to help start-ups achieve business success. Ben Addom describes one of the key findings from the *Digitalisation of African Agriculture Report* – the development of ICT super-platforms – and his experience of the Market-led User-owned ICT4Ag-enabled Information Service project. Giacomo Rambaldi shows how new technologies have been applied to support agricultural transformation, and how this has resulted in new businesses and services. Chris Addison and Chipo Msengezi discuss the importance of data management in support of digitalisation, as illustrated through their projects studying data use in the field, capacity building in data use, and improving policy to ensure data is more effectively shared. And the role of applying applications to address one of the biggest threats to smallholders – climate change – is illustrated by Olu Ajayi and Mariam Kadzamira.

We have not only applied digitalisation to our partner projects, but to our own practices as well. The management of our agricultural projects is now supported by a series of dashboards and our IT systems have been ramped up to handle and visualise the data. Ibrahim Khadar explains how this has been achieved. To capture and analyse this data, we have worked with external partners, as explained by Martine Koopman and Claudia Ayim, who detail some of the evaluation work of our digitalisation projects. ●

About the author
Michael Hailu, an Ethiopian national, is the Director of CTA.

Right: Farmers in Zimbabwe are being offered bundled weather-based index insurance

Photo credit: CTA

http://ictupdate.cta.int

Ten key success drivers of young digital start-ups servicing the agri-food sector

Ken Lohento

Ken Lohento, Senior Programme Coordinator ICT4Ag Youth Entrepreneurship at CTA, discusses ten key strategies to help young digital ag-tech start-ups achieve 'business success'.

CTA has been operating the AgriHack Talent[1] initiative since September 2013 when its first 'hackathon' for agriculture was organised. Ensibuuko, a youth-led company from Uganda (they now offer digitally-supported financial management services to around 200,000 farmers), won the first prize. Since then, AgriHack has developed into a renowned programme which has supported more than 1,500 young entrepreneurs offering advisory, market linkage, financial and supply chain management services to more than 1 million stakeholders. During the implementation of AgriHack, and in a framework of an MBA research[2] (undertaken with a friend), we have identified ten key success drivers for youth-led digital ag-tech operations.

Success in digital agribusiness

We can define business success as an economic activity which provides satisfaction to its owners and stakeholders (particularly customers), and generates a level of revenue that permits sustainability. Success is therefore defined by financial indicators (sales, profit margin, market share, etc.) and non-financial indicators (customer satisfaction, personal achievement, social impact, business longevity, etc.). This conceptual understanding is also valid for digital agribusinesses of which success depends on customer satisfaction. While digital agribusiness start-ups struggle to achieve sustained profits for a variety of reasons[3,4], some are generating social impacts or business longevity (leveraging grants and public funding if needed). As achieving 'business success' represents climbing the 'Everest' for seasoned and younger digital ag-tech start-ups, strategies to ensure this happens need to be continuously devised.

Photo credit: CTA

Figure 1: The 10 success drivers for youth-led digital ag-tech start-ups
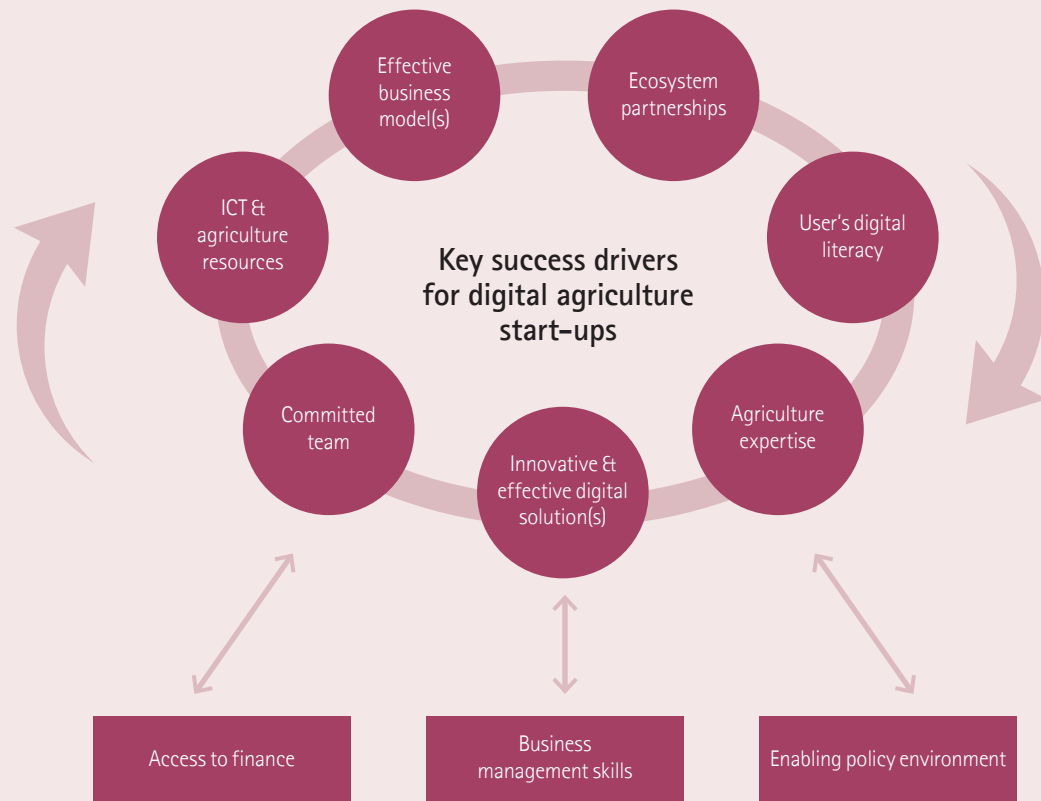
1) Access to finance

In a survey of 582 entrepreneurs in six sub-Saharan countries, 71% of participants indicated that there was insufficient equity capital for start-ups[5]. Similarly, about 90% of finalists from three of CTA's Pitch AgriHack competitions revealed that they fund their ventures mainly with their savings; grants and family donations or loans come next as funding sources. However, experts, including financiers, claim that many young ventures are not fundable and that most of them lack financial management skills[6]. To address these concerns, CTA has been, among others, training all Pitch AgriHack finalists on investment readiness, in collaboration with venture capitals, since 2017. ACP countries' venture capital and angel networks are becoming better organised but must provide more readily available capital to youth ventures.

2) Enabling policy environment

A concern many start-ups raise is taxation; in most African countries, newly-created businesses have to pay the same corporate taxes as mature businesses. Young entrepreneurs would benefit from policies that, in their early years, exempt them from paying taxes. A tax holiday[7] adopted by the Ghanaian Government for start-ups may be seen as model. In addition, policies facilitating affordable access to digital technologies, in rural areas in particular, as well as increased digitalisation in the agricultural sector, are strong business enablers.

3) Business management skills

A lack of business acumen is perceived as a 'gravedigger' for youth-led start-ups. Stakeholders offering business development services, such as incubators, are attempting to address this; however, those specialised in digital technologies are largely new and still fragile. Above all, very few incubators or accelerators have the double capacity in agribusiness and digital technologies, which is needed to be successful in this sector. Finally, to attract serious investors or banks, young companies need to illustrate rigorous business processes, sound corporate governance, human resource and financial management principles. Institutions supporting start-ups therefore need to better facilitate access to these capacities.

As achieving 'business success' represents climbing the 'Everest' for seasoned and younger digital ag-tech start-ups, strategies to ensure this happens need to be continuously devised

Opposite: The Ghanaian start-up Cowtribe, which delivers animal vaccines to farmers, was the 2018 Pitch AgriHack winner

4) Committed teams

Committed human resources are usually lacking in youth businesses but are vital for their growth. They also need to retain the know-how acquired internally. Unfortunately, most lack capital and strategies to ensure this. Apart from the founders, few people are ready to work for free or with insufficient remunerations. Very often, employees that young businesses have trained for months then leave for more established businesses promising higher pay. Good practices to successfully address this challenge include nurturing a sense of belonging and collective company ownership. Ghanaian start-up Farmerline, for example, regularly recognises employees on social media and provides opportunities to non-founders, including attending conferences.

5) Effective business model(s)

Targeting institutions (cooperatives, restaurants, NGOs, etc.) guarantees more sustainable revenue than targeting individual farmers who are usually unwilling or unable to pay for digital services. Institutions can act as proxies, offering services procured from start-ups to individual farmers. Collaborating with institutions that have a large user-base (though not easy to achieve) can also be a winning strategy. Bradstorne Enterprises from Botswana (Pitch AgriHack 2016 winner which operates mAgri) has successfully adopted this strategy by working with mobile provider Orange.

Bundling digital and non-digital services is a very effective business model for targeting individual farmers. Entrepreneurs should learn to develop services that leverage data, but must protect farmers' data rights. Some services may also facilitate revenue generation. For example, some drone services easily generate revenue, but offering advisory services (as a single service) via mobile phone is harder to translate into sales. A revenue model that has proven to be effective is the subscription model (customers subscribe to a weekly, monthly or annual service); however, services offered have to deliver strong value.

6) Ecosystem partnerships

The mobilisation of a variety of digital and agriculture business stakeholders help young entrepreneurs build their capacities and access profitable markets. Youths depend on these partnerships as they have limited assets and business networks. Implementing viable ag-tech business models strongly depends on the ecosystem's institutional collaboration. The start-ups need to know how to build these partnerships.

7) Digital literacy of users

Lack of digital literacy, particularly amongst farmers, impedes the adoption of services offered and increases customer acquisition costs. Strategic collaboration with agricultural support organisations (CTA, FAO, etc.) can help to address these challenges, as they may pay start-ups for capacity building and some marketing services.

Some young start-ups are already achieving great impacts. We need to better nurture all the others, which will ultimately lead to more jobs and growth for our economies

Photo credit: CTA

Photo credit: CTA

Above: Young entrepreneurs preparing for pitching sessions at the 2019 Pitch AgriHack finals

Left: 2018 Pitch AgriHack finalists at the end of investment readiness training

8) Availability of key agricultural, digital and business resources

To achieve success, start-ups need internal resources such as relevant ICT and agricultural equipment, and adequate systems. External factors include the existence of adequate digital infrastructure and connectivity, especially in rural areas, to enable better uptake of the companies' services.

9) Effective and innovative digital solution(s)

Designing excellent digital platforms, that also respond to the target user's socio-technical profile, especially farmers, and that are easy to use, is essential. Many young entrepreneurs do not have strong digital expertise. Prototypes developed during many hackathons struggle to be finalised because of a lack of advanced software capacity. Many e-commerce platforms that are available have no internally-developed algorithms or distinctive features, so are unable to provide a comparative advantage and become a successful service.

10) Agricultural expertise

Last but not least, it is critical for the young start-ups to have good agricultural expertise in the team, including good knowledge of the agricultural ecosystem in regions they target.

Some young start-ups are already achieving great impacts. We need to better nurture all the others, which will ultimately lead to more jobs and growth for our economies. ●

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Super platforms – going beyond bundling digital solutions

Ben Addom

Below: CTA's MUIIS is moving to integrate payments, credit, and market linkage elements as it explores a move to a super platform model

Solutions that bundle multiple digital agricultural services have the capacity to unlock the potential of smallholder farmers. However, emerging 'super platforms' are complex and their impacts need to be carefully assessed before being widely promoted in Africa.

A super platform is a type of digital agricultural solution which bundles together, in one platform, multiple different services for farmers or other smallholder value chain intermediaries and, typically, integrates digital advisory services, market linkage services, and financial services, among others. It's not about a bucket list of services on one platform by a given service provider; super platforms bring services that complement each other together, enabling them to strengthen one another and create added value.

Super platforms take a comprehensive approach to service provision by linking farmers to market (input and output) and to the broader ecosystem of finance, advice, and other services, thereby reducing layers of intermediaries and creating immediate economic value. Minimising the number of service providers a farmer deals with is a key benefit of super platforms. Rather than having separate service providers that offer digital market linkage services, financial services, index-based insurance and climate-smart advisory services to a farmer, super platforms that can build all of these services to complement each other will have the advantage in the future to reach more farmers, create operational efficiencies, improve farmer trust and loyalty, establish quality control over value chain inputs and outputs, and provide valuable data and insights.

Business models for sustainability

The Market-led User-owned ICT4Ag-enabled Information Service (MUIIS) in Uganda – a digital agricultural service funded by the Dutch government and implemented by CTA – started as a bundled service with precision advisory and agri-insurance services. The service is now moving to integrate payments, credit, and market linkage elements as it explores a move to a super platform model.

The biggest challenge while building this model with MUIIS has been securing relevant stakeholders, particularly with a lack of private sector/business partners. In hindsight, I'd have gone for a model of super platform in which governments take the lead. Government builds the basic data infrastructure – the middleware. Private sector partners – including banks and input dealers, which need to provide services to smallholder farmers – would then be able to join and build the super platforms in partnership with the government and use this strong foundation to continue the process. Providers of financial services, advisory services, market linkages, and supply chains, etc. could all be part of the system.

In order for banks to give loans to farmers, for example, they need to know the farmers, and it is governments that are most likely to be the reliable source for such data, the data infrastructure, and the middleware, including farmer's digital IDs; so banks need to partner with governments to be able to provide financial services to farmers in a more trusted way. A mobile network operator (MNO) that wants to deliver mobile services to farmers needs to work with the government to access farmer data. With data infrastructure, aggregators can easily locate farmers, know what crop they are growing for the season and the yield forecast, among others. This data can also be used to secure loans from banks to purchase the produce from farmers.

While governments can provide basic infrastructure for super platforms, they cannot do everything; the private sector has an important role. Governments are not business-oriented so may not be able to build strong business models for sustainability, for example, so if business models are not built into the platform, they will not work. A key factor that must be built into a super platform is 'who will pay for the services' to be delivered to the end users. Super platforms will only have a future if they can define how that payment is made; whether it is farmers, or businesses.

Super platforms vs young start-ups

Super platforms are interesting models which have advantages and challenges, but I'm not a fan. I am not sure if we have yet reached a stage in Africa where the advantages of super platforms outweigh the challenges. The young digital entrepreneurs that we work with and support do not have the

Photo credit: CTA

capacity to build such platforms in Africa. So, if I promote super platforms as the way to go, then I'm killing their businesses. For example, if the 'powerful' such as a government or MNO invest in such a model without considering young start-ups/entrepreneurs, these young people will be out of business the next day. Unless we define the role of each actor in the partnership, identify ways and put in place measures and strategies for the start-ups to work with the 'powerful', the 'powerful' are likely to take over, and this may not be in the interest of smallholder farmers. The 'powerful' can invest in the development of super platforms, but sustaining this within the development context is another issue as the interest of the 'powerful' is – most of the time – for profit, not development.

Developing, operating and sustaining a super platform is extremely complex and difficult. Hence simple and focused platforms could potentially be more successful than those that promise to do everything. At the same time, we have seen the very low survival rate of these single service platforms. Therefore, it will be good to see how the complex super platforms that aim to combine a number of services actually operate and are sustained. Hence, if I look into the future, I see few of the super platforms surviving across the continent.

So, we have to wait and see how they survive, and then assess their impact before we promote them more widely. The concept needs to be proven under the various geographic contexts and then we need to see how to scale and sustain them. ●

About the author

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Figure 1: Examples of super platform solutions supporting agriculture

Government

Smart Nkunganire System

RAB Ethiopian ATA

Payments

Mastercard Farmers Network

cAgrikore

MNO

DigiFarm

ECONET

BANK

KCB

Start–up market linkage specialists

iProcure Twiga TULAA MUIIS SERVICE BUNDLE e-GRANARY

Agribusiness

Digital Olam

Donor–led / PPP

FARM TO MARKET ALLIANCE

An example for African super platforms to emulate?

Enable rural residents greater access to a broader variety of goods and services

Rural Taobao

Help farmers earn more by selling agricultural products directly to urban consumers

Alibaba Group 淘宝网 Taobao.com

In 2019, Rural Taobao service centres are in 1000 counties and 30,000 villages, with 60,000 last mile Taobao assistants. €400-500 annual investment by AliBaba

3-year plan announced in 2018 to establish service centres in 150,000 rural villages in 1000 counties, supported by 300,000 Taobao assistants. This would cover 33% and 25% of the villages in the country

Rural life digitalisation and big data infrastructure
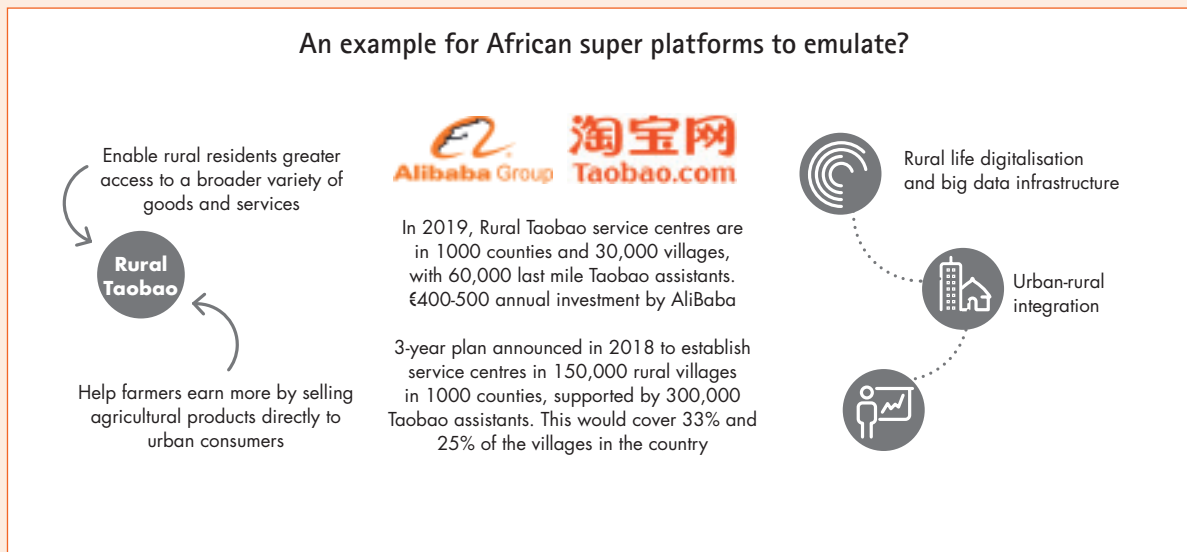
Urban-rural integration

Photo credit: CTA

Drone-based services taking off to transform Africa's agriculture

Giacomo Rambaldi

Africa's agriculture sector is being progressively transformed into a high-tech industry through digital services. Decisions are being based on real-time gathering and processing of data, feeding into increasingly effective decision support systems. Unmanned aerial systems (UAS) are an integral part of this digital revolution.

Across 21 African countries, 38 youth-led enterprises, three government agencies and two universities are now offering drone-based services to farmers' organisations, agribusinesses, governments, international development agencies and other parties as a result of support provided by CTA's 'Eyes in the Sky, Smart Techs on the Ground' project, which was launched in 2017. This is a significant development for the continent.

Through a combination of scientific research, proof-of-concept initiatives, capacity building, investment support, enterprise development, networking, experience capitalisation and communication, this innovative initiative has played a key role in establishing an enabling environment for drone technology. The project also supported the African Union's (AU) High Level African Panel on Emerging Technologies in selecting 'drones for precision agriculture' as one of the most promising technologies to foster Africa's development. As a result, in January 2018, the AU Executive Council recommended that all Member States harness the opportunities offered by drones for agriculture.

In addition, CTA project implementers co-authored the report, *Drones on the Horizon: Transforming Africa's Agriculture*, which was launched at the Africa Innovation Summit in Kigali in June 2018. Project beneficiaries have also played a critical role in advising national civil aviation authorities in developing regulations for the responsible use of drones.

Understanding perceptions and addressing challenges

Despite the Africa-wide interest in UAS, a number of challenges have been experienced during project implementation and development of drone-based services linked to: 1) disabling regulatory frameworks (e.g. Uganda, where no framework is in place); 2) lack of access to capital for upscaling (in the initial phases of business development); 3) initial lack of understanding of the potentials and pitfalls of the technology; 4) difficulties in cloud data processing due to poor internet connectivity in most countries; 5) steep learning curve in using data processing software; 6) need to develop a price structure for UAS services; and 7) a lack of agronomic skills within most of the drone enterprises which have more of a focus on GIS, remote sensing and ICTs.

Nevertheless, over time, the challenges have been addressed either via the project or by the 38 youth-led enterprises themselves. Assisting the AU in realising the potential of the technology resulted in the issuance of the AU's Executive Council decision, encouraged many national civil aviation authorities to develop and promulgate their own regulations. Training offered by the project and regular mentoring facilitated the enterprises in being more responsive to challenges and more competent in delivering their services. On-site instead of online data processing addressed the challenge posed by poor connectivity. Constant information sharing among members facilitated the establishment of ad-hoc partnerships and mutual learning.

A Community of Practice (CoP) was established with members sharing common interests and goals which has also led to the establishment of a 'first of its kind' industry association – Africa Goes Digital Inc (AfGD), which is supporting further growth and outreach of the member enterprises. Learning and information exchange in order to maximise on opportunities and help to address challenges has been facilitated through the project via a WhatsApp group, which has become the pulsating heart of the CoP. The group has continued to expand – consisting now of approximately 80 members from across 21 different African countries (see *ICT Update* 92: http://bit.ly/2L2hTMT).

Evolution of UAS

Whilst the terms drone technology and UAS are used here interchangeably, UAS is not just the drone or unmanned aerial vehicle (UAV) but also includes the sensor(s); the controller used to command it; the pilot; the apps used for flying; the analytical software used to analyse the (multispectral) imagery captured by the sensors; the data scientist, who performs data analysis; and, finally, the computer which hosts the analytical software.

UAS are evolving at breath-taking speed and are increasingly relying on artificial intelligence to feed decision support systems. Currently, high-end UAS solutions are providing real-time actionable information visualised as, for example, geo-referenced index maps or infrared imagery, which allow on the spot data interpretation and

action. CTA is funding a sub-project in Ethiopia where UAS are being used to calibrate an existing algorithm aimed at estimating wheat yields according to local agro-ecological conditions. Once upscaled and matched with satellite-generated data, this kind of information will be of strategic importance to the Ethiopian government for mitigating food shortages in years of adverse climatic conditions.

UAS are evolving at breath-taking speed and are increasingly relying on artificial intelligence to feed decision support systems

Innovation and impact
In June 2019, a survey was conducted to assess project outcomes and impact. Results revealed that most enterprises had recruited additional staff (72% aged between 18 and 35 years) contributing to youth employment. Of the 32 respondents, 97% stated that offering drone services had improved their companies' visibility and reputation. Results also show that during the first 6 months of 2019, 19% of the companies had signed service contracts in excess of €50,000, each one including a drone component. Enterprises had also signed more service contracts with private companies (54%) than donor agencies (14%), and the value of individual contracts increased compared to previous assessments, indicating the enterprises' viability and sustainability.

The survey also revealed that agriculture (60%) and surveying and mapping (31%) were the service domains yielding the highest volume of business, although the most successful enterprises were those that had diversified the most and were also serving other sectors such as engineering and construction, real estate and mining. Overall, the 32 enterprises served 209 farmers' organisations, 65 government agencies and a total of almost 16,000 farmers.

In terms of policymaking, 38% of surveyed enterprises reported having contributed to the passing of national regulations governing the use of drones, with 75% stating that their staff reviewed or commented on draft regulations.

Sustainability and growth
While the CTA project comes to an end, the long-term sustainability of drone-based services for agriculture will be ensured through AfGD, which is a legally incorporated industry association representing African enterprises providing digital services across a number of sectors beyond agriculture. AfGD provides a range of services to members and sources funding to support its activities as well as members' growth in terms of enterprise management, business development and acquisition and service delivery. Members have to meet a number of eligibility criteria to be part of AfGD and pay membership fees to access the services. All AfGD members are currently CTA project beneficiaries but, going forward, AfGD membership will be opened up to non-project beneficiaries who meet the eligibility criteria. ●

▶ www.afgoesdigital.com
🐦 www.twitter.com/afgoesdigital
f www.facebook.com/afgoesdigital

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Below: Members of Africa Goes Digital Inc at the Experience Capitalisation Workshop held in Cotonou, Benin, October 2019

Photo credit: CTA

GODAN Action: digital capacity building

Chipo Msengezi

Increased availability of agricultural data could help overcome key challenges for the sector, however many stakeholders still struggle to access and interpret agri-data. GODAN's Action project aims to tackle this issue.

Rapid internet and mobile phone penetration, reduction in hardware costs and digitalisation are stimulating innovation for sustainable agri-food systems, and allowing the production of better and safer food. Inclusive, digital and data-driven agricultural practices can increase and improve livelihoods for smallholder farmers while driving greater participation of women and youth, meanwhile creating employment along the value chain.

From the coffee farmer in Uganda who could be using a mobile to market her crops online, to the young entrepreneur in Zambia aiming for self-employment in agriculture – digital literacy provides an essential set of skills needed to find and communicate information in the modern world. The development of robust digital tools for the agriculture sector relies heavily on the availability of reliable, quality data regarding weather, land administration, land use, markets, soil health, pests and diseases, among other variables. Such data falls into a spectrum from 'closed' to 'open', with open data being data that anyone can access, use or share[1]. The more open – or FAIR[2] i.e., findable, accessible, interoperable, reusable – the better for agricultural development.

A United Nations report[3] on mobilising the data revolution for sustainable development, stressed the need for improved governments' and citizens' data literacy to remove barriers between people and data. In this context, one of the focal areas of GODAN Action* – a 3-year project led by CTA – was to develop and strengthen the capacity of potential open data users (e.g. researchers, ICT professionals, journalists and policymakers) to understand the value of open data and practically engage with it, in order to tackle key agriculture and nutrition challenges.

Capacity development

The envisioned impacts of the intervention – outlined in the project's Theory of Change[4] – were: 1) improved service delivery by businesses using open data in agriculture and nutrition; 2) smallholders, communities of practice, business and other stakeholders empowered by being able to access and use open data; 3) data-driven business creation; 4) increased transparency of decision-making by policymakers, since it will be clearer to the public how these decisions came to be and whether or not they are justified; and 5) better evidence-based policy and decision-making. The inception phase of GODAN Action, which was funded by the UK's Department for International Development benchmarked existing skills for open data use and developed a capacity development action plan[5] with thematic modules aligned with weather, land and nutrition data.

During the implementation phase, several approaches were adopted to deliver training and build capacity. One approach was face-to-face workshops which had a positive response and led to requests for more and continuous learning. Workshops have been held in Botswana, Ecuador, Ghana, Kenya, Rwanda, South Africa, Tanzania, Uganda, USA and Zimbabwe. Over 200 infomediaries, researchers and policymakers have attended the eight courses held in Africa so far. Advantages of this approach include its adaptability to the specific audience; increased trainer-to-participant interaction and engagement; and promotion of peer-to-peer learning from rich sectoral experience and knowledge exchange.

After taking part in a face-to-face workshop, many participants went on to complete a free 4-week e-learning course[6], which has reached the widest range of open data users and data managers. So far, 4,448 people from 148 countries have completed the open online course which covers different aspects of making data open and usable – from first principles, to use, exposure, sharing and licensing of data.

A trainers' network (consisting of 94 trainers from 24 countries) was established to support the replication of the face-to-face open data workshops and support uptake of learning materials[7]. Since 2017, trainers held local workshops in five African countries and trained over 200 data and information intermediaries.

*GODAN Action is a 3-year project to enable data users, producers and intermediaries to engage effectively with open data in the agriculture and nutrition sectors. In particular the aim is to strengthen capacity, promote common standards and best practice, and improve how impact is measured. http://bit.ly/2YIMKDL

Monthly webinars[8], provided with the support of the GODAN Secretariat, have proved to be a successful way to reach wide audiences and engage other communities and networks working with open data. Webinars cover a variety of agriculture-data topics (such as land data management and nutrition) and societal issues (such as the link between gender and open data). They have also provided a way to encourage practitioners and professionals to join the GODAN Capacity Development Working Group to share their findings.

Measuring impact

The project is now assessing the impact of its approaches on the capability and effectiveness of individuals to use open data. Boniface Akuku, ICT director at the Kenya Agriculture and Livestock Organisation (KALRO) is an active member of the trainers' network and has facilitated the training of over 90 Kenyans in use of open data for agriculture and nutrition. "Research scientists as well as technical staff capacity has been built in understanding and applying open data principles, subsequently contributing to improved openness of research data, and this has increased access to agricultural research technologies. Similarly, researchers have been empowered to effectively undertake research, access data, information and knowledge both locally and internationally," he explains. "In view of the transformative change through scalability, replication, and sustainable access to research knowledge using ICT platforms – and the successful impact this has had on many farmers in Kenya – KALRO has developed an open data policy, and is in the process of establishing a cloud-based Big Data platform and use of disruptive technologies to harness all datasets in agriculture and nutrition in Kenya."

Alfred Mwaura, an extensionist by profession, has been using skills gained through the e-learning course to collect, manage and analyse data from coffee farmers, millers and buyers. "I've developed an open market for small scale coffee farmers," Mwaura reveals. "Open data can be used to improve coffee prices for small-scale coffee farmers in Kenya and help fight poverty." Natasha Mhango – a senior agricultural information and publications officer at Zambia's Ministry of Agriculture and Livestock – is also

using skills she honed to write and publish data driven articles about the biggest issues in agriculture and nutrition in a weekly print newsletter for farmers and a blog. "My stories now have more credibility. I backup statements I make with relevant and credible stats and findings from verified data sources."

Looking ahead

Increasingly we see that there is a high level of commitment from development partners, the private sector, research and academic networks to have open data on the agenda across the agriculture sector. The demand for training in open data is high, and so investment in this area must continue. However more can be done to support citizens and stakeholders to innovate and address the challenges in agriculture and nutrition. Governments have a key role in creating the policy framework for openness and supporting the infrastructure developments needed to sustain open data for agricultural research and practice. ●
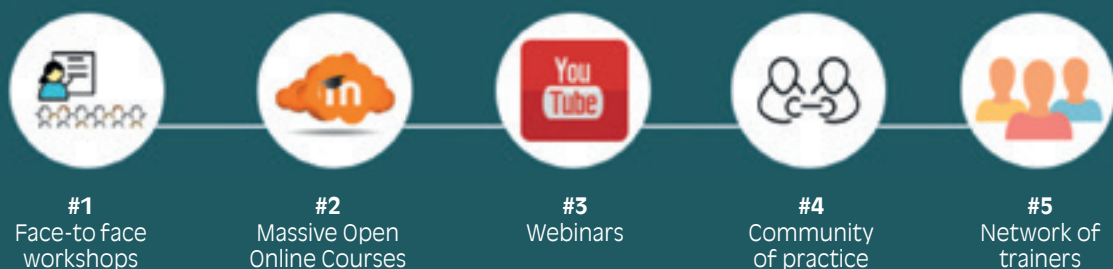
About the author

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Figure 1: GODAN Action approaches to capacity development

#1 Face-to face workshops

#2 Massive Open Online Courses

#3 Webinars

#4 Community of practice

#5 Network of trainers

Data4Ag impacts for farmers and for policy

Chris Addison

CTA's Data4Ag project has introduced digital solutions in Africa to assist farmers organisations in registering their members to offer targeted agricultural services. Whilst impacts from the field have been impressive, questions have been raised around the collection and use of farmer data, and the need for policy development.

CTA's Data4Ag project focuses on one of the key enablers of change and collective operation in agricultural production; the farmer organisation. There are 700 million smallholders around the world with as many as 300 million coming from Africa, the Caribbean and the Pacific. In some African countries, smallholders contribute up to 70% of agricultural production[1].

Over 4 years, the Data4Ag project has worked with the Pan African Farmers Organisation to ask farmer organisation members from across the continent about the core development needs for their associations. All respondents mentioned digital farmer registration services as key to enhancing operations as this would enable the provision of targeted services.

Since 2016, the Data4Ag project has supported seven initiatives across Africa (outlined in *ICT Update* Issue 89: http://bit.ly/37EcK6D) to register more than 120,000 farmers. The process validated approaches to digitalising farmer registration and produced lessons on capacity building for farmer organisation development – as well as raised policy issues around data privacy. The results from these projects have been used as inputs for a massive open online course on farm data management[2], developed by the GODAN Action network (see p12, *GODAN Action: digital capacity building*).

Examples from the field

The confederation of agricultural producers for development in Burundi (CAPAD) has supported 39 smallholder cooperatives to register over 14,000 farmers (55% women), and has issued all members with an ID card. The data collected has enabled farmer organisations to better plan for the 2019 and 2020 seasons through bulk ordering of, for example, mineral fertilisers (1,059 t), rice seed (27 t) and corn seed (18 t). Collection of the farmer information has also facilitated rapid processing of applications for agricultural credit and as a result, 2,896 farmer organisations members have received FBu 214,275,049 (>€100,000). Digital membership has also allowed cooperatives to better organise their post-harvest management and marketing of agricultural products; so far in 2019, 4,052 t of rice, 132 t of maize and 131 t of beans have been sold collectively.

CTA-supported digital solutions, including farmer registration and drone trials, have increased the resilience and sustainability of livelihoods for Ugandan coffee farmers of the National Union of Coffee Agribusinesses and Farm Enterprises (NUCAFE). The innovations have doubled production and productivity for farmers, increased their access to finance and premium markets, and raised incomes by over 30%. With the use of digital tools, coffee can be traceably and transparently handled, and for this information, buyers are willing to pay a premium price. NUCAFE can now prove its coffee supplies are grown above a certain altitude – an indication of higher quality beans – and buyers from South Korea, for example, are now interested in the product.

The number of profiled NUCAFE farmers has reached 14,000 farmers and as a result, the Union is now a Fairtrade certified 'conveyor' – passing on the Fairtrade minimum price and/or premium to producers. With this recognition, Fairtrade-certified coffee sales are expected to increase from 38.4 t worth around €160,000 in 2018 to 210 t worth €875,000 in 2019/2020 – despite a 13-year low in world coffee markets.

The Igara Growers Tea Factory (IGTF) also benefits from CTA's support in developing data-driven services for farmer members. The instalment of 40 digital weighing scales, for instance, is helping the agribusiness to pay for farmers' raw material on receipt, and delivery records for over 4,000 farmers are stored by the new systems. Digital profiling of farmers has captured their locations and farm size information, which means field extension services are better targeted and produce quality has improved. This is reflected in the price received at the tea auction market where IGTF is earning more than its competitors. Local youths are now also involved in the initiative, with over 40 using mobile apps to collect tea from the farmer members, and 70 are using GPS-enabled tablets to validate farmer data for the profiling platform.

Research consultations

An e-discussion on FAO's e-agriculture website, held in 2018 with the Data4Ag team and researchers from Wageningen University and Research (WUR), resulted in a mix of insights regarding data driven services for agriculture from the perspectives of research and practical application. The services discussed ranged from farmer registration and extension, to access to credit and markets.

There were a number of issues raised by the researchers from WUR, the project partners and external companies involved in the data services regarding the collection of data from the farmer registration process.

The concerns have been published in various studies, and include the following:
- "The primary farmer may not be head of the household."[3]
- "Development policies in Malawi still largely consider men as 'the farmers' and therefore neglect female farmers and the complexity of gender relations."[4]
- "Farmers who share a SIM are unable to use the mobile phone number as a unique identifier."[5]

- "Coops need to be pragmatic in applying the traditional principle of open membership, in order to avoid the inclusion of free-riders and the risk to end up with a production that exceeds market demand."[6]

One of the main emerging issues of data driven approaches in agriculture, as highlighted by the discussion, was the need for farmers to have their say in the use of their data. For this reason, the Data4Ag project dedicated part of the project to support farmer organisations in controlling the use of farmer data.

Research into policy

Together with the Global Forum on Agricultural Research and Innovation and GODAN, CTA investigated how farmers could have a say in the exchange of their data to access agricultural services. It was noted that whilst legislation on data privacy is starting to emerge, the situation regarding data services is far from clear. Instead, countries and regions are developing codes of conduct regarding how data is exchanged[7].

Following a series of CTA workshops, convened together with the Association for Technology and Structures in Agriculture, it became apparent that there was a need to break down information regarding data control into modules to provide farmers organisations with a set of data privacy codes of conduct.

The following points were also discussed at the workshops:

1. The need for trust centres (units that handle data management and control) social responsibility mechanisms (i.e. certifications such as Fairtrade) and business models that enable an equitable share of proceeds from data usage.
2. The key role of farmer associations and the creation of data cooperatives for data exchange and collective negotiation of data rights.
3. The need for national and international policies, international agreements and treaties that enable fair data flows and counter power imbalances around data ownership.

4. A need to evaluate the application of existing relevant data laws (privacy, business data, database copyright), avoid the development of new specific laws which cannot be enforced, and replace them with voluntary codes of conduct for data exchange.

A number of policy issues arose from the Data4Ag project, which have been raised by the farmers organisations and were subsequently included in major strategy plans for digitalisation, such as the Africa EU rural taskforce and the FAO digital council. Through a series of three ministerial meetings, pledges are being sought to open up more agricultural data for use by farmers. Already, 12 African countries have committed to open their data as a result[8]. ●

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One of the emerging issues of data driven approaches in agriculture is the need for farmers to have their say in the use of their data

Below: CTA-supported digital solutions – including geo-farmer registration and drone trials – have increased the resilience and sustainability of livelihoods for NUCAFE members

Photo credit: NUCAFE

Weather-based index insurance: a climate-smart agricultural solution for smallholder farmers

Oluyede Ajay & Mariam Kadzamira

Dr Oluyede Ajayi and Mariam Kadzamira explain how CTA has been bundling weather-based index insurance with other services to increase the resilience of 140,000 smallholder households in Southern Africa to climatic changes.

Weather-based index insurance (WBI) has been one of the key components of CTA's flagship project 'Scaling-up Climate-smart Agricultural Solutions for Cereal and Livestock Farmers', which began in August 2017. The project aimed to increase food security, nutrition and income for 140,000 rural smallholder households affected by changing climatic conditions within maize-livestock based farming systems, by upscaling proven climate-smart agriculture solutions – such as insurance – in Malawi, Zambia and Zimbabwe. The project adopted a bundle of solutions in which, alongside insurance, farmers are offered access to drought tolerant maize, weather information services and diversified livelihood options.

Traditionally, these farmers have not been targeted by insurance companies, partly because of the high costs of dealing with individual farmers in rural areas. Yet, farmers often lack adaptive capacity, which makes them vulnerable to climatic uncertainties. Index-based insurance shifts the risk from farmers to the insurers, as compensation is provided in the event of climatic or weather-related crop-loss. In this project, total annual rainfall is used as an 'index' to trigger insurance pay-outs. Hence, farmers get paid when drought or prolonged dry spells significantly impact crop production, and the pay-out allows farmers to purchase agricultural inputs (specifically seeds) to replant lost crops, thereby supporting farmers' adaptive capacity and enhancing their resilience to climate change.

Mobile phones have been the key enabling technology in this project; farmers subscribe in order to benefit from the insurance product and associated services via their mobile phone. In April 2018, the project adopted USSD*, which does not require internet connectivity, thus ensuring easier access for farmers in remote locations. Furthermore, local agricultural extension and insurance agents or partner staff carry out digital registration and farmer profiling via mobiles. Mobile phones are also used to provide e-extension services on weather and agricultural advisory messages.

Tailored partnerships and services

From the outset, key stakeholders were consulted to avoid reliance on donor-funding and ensure long-term sustainability of the project. As a result, implementation was steered by partnerships between farmers organisations, private sector stakeholders, development organisations, knowledge institutes and public partners.

To promote the scaling up of WBI, the project has used a three-pronged approach:

1. To facilitate the engagement of key industry players (insurance companies, seed companies and mobile telephone companies), farmers' readiness to adopt and pay for insurance was determined, as well as private sector/industry readiness to develop agricultural insurance products suitable for smallholder crop farmers.
2. Technical assistance and capacity-building support for scaling up the project to more beneficiaries was provided and implemented through local partners and government schemes.
3. Industry and farmers organisations were supported by CTA in scaling up successful insurance products for smallholder farmers in bundled packages with, among others, funeral insurance, farmer organisation membership, weather information forecasts and extension advisory services.

Left & right: ZFU's EcoFarmer 'combo' offers farmers a combined service for weather alerts, farming tips and index-based insurance

Photo credit: CTA

Photo credit: CTA

154,578 farmer profiles have been digitised; 54% men (83,796) and 46% women (70,782).

59,046 smallholder farmers (45% women) have been made aware of and trained in WBI.

21,293 of those trained have subscribed to a bundled WBI product for which they are paying a monthly fee (52% of these insured farmers are women).

In Zambia, the project has contributed to public policy dialogue and the development of nation-wide WBI for smallholder farmers. In addition, the project provided technical support in the government's efforts to reach 1.5 million smallholder farmers with WBI in the 2018/2019 season through the provision of training manuals.

A proposal has been developed and approved for the establishment of a regional regulatory framework to support the development of WBI in Southern Africa.

In the three target countries different financial and business models have been developed to support WBI service development and delivery.

Zambia

In Zambia, the implementing consortium consists of a knowledge institution (the Zambia Open University), an insurance company (the Professional Insurance Company of Zambia) and a rural development organisation (Musika Development Initiative). Data is sourced from the National Agricultural Information Services – a specialised wing of the Ministry of Agriculture and Livestock that supports extension services through the dissemination of agricultural information.

In Zambia, WBI is subsidised for all smallholder farmers who are eligible for the Farmer Input Subsidy Programme; subscription to the insurance product and payment of a relatively small insurance fee are now conditional for access to the subsidy. This programme is coupled with training to ensure that farmers understand the concept of the insurance and its benefits.

Malawi

The National Smallholder Farmers Association of Malawi works in collaboration with the Malawi Meteorological Services and the Department of Agricultural Extension Services for weather information and for extension messaging, respectively. Based on a baseline study to determine smallholders' willingness to pay for insurance, a WBI product that meets farmers' needs, while ensuring a return on investment for the private insurance partners, is currently under development.

Zimbabwe

The Zimbabwe Farmers Union (ZFU) sources data from international climate information service company aWhere. As such, it has access to local satellite-based weather data. Econet Wireless – a private sector entity that is a key project partner in Zimbabwe – offers the EcoFarmer 'combo'; a combined service for weather alerts, farming tips and index-based insurance, which allows farmers to insure their crops against the risk of excessive rainfall or drought for US$1 per month.

Field surveys commissioned at the start of the project showed that farmers' awareness on WBI does not automatically translate into uptake; although 60% of sampled farmers were aware of WBI, only 16% had signed up for it. Packaging WBI with other accepted services, such as life/funeral insurance and farming advice helped ZFU to overcome adoption barriers.

Enabling insurance adoption through bundled services

The project found that data and information alone is not enough to help farmers. Many farmers did not have the ability to interpret information and data received via mobile phones pertaining to weather forecasts, so needed additional support to use it to make informed decisions regarding their farm activities. This was addressed by ensuring that extension officers working in project target areas also subscribed to the service and had access to information from the digital portal for farmers. This way, they received the same information and data that farmers received and they could better support farmers' queries in their area. The data delivered via SMS, or accessible via the mobile portal, could therefore be used as a 'toolkit' for field-based extension staff. "Extension workers play a pivotal role in interpreting weather information for farmers. Once registered, even farmers who are not on the ICT platform benefit through the extension workers daily advisories," says Prince Kuipa, an economist with ZFU.

Securing sustainability

The project is anchored within well-established innovative partnerships that include farmer organisations, the private sector and governments, and the project goals are well aligned to the overall objectives of the partnerships, hence ensuring continuity after the project finishes. Strengthening these partnerships to ensure sustainability has been achieved by facilitating the development of memorandums of understanding between partners and fostering the inclusion of climate-smart solutions into the partners' long-term strategies; insurance solutions have hence become a key component of partners' investment and project implementation strategy. ●

*Unstructured Supplementary Service Data is a mobile phone technology that is used to send texts between a mobile phone and an application.

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The impact of data collection for farmer organisations

Martine Koopman & Claudia Ayim

Photo credit: Martine Koopman

In Uganda, CTA has been working with the Igara Tea Growers Factory (IGTF) to digitally profile their farmer members and enhance their data management practices. In this piece, the impact of these activities for the individual farmers, and the cooperative as a whole, is assessed.

CTA has been working with farmer organisations in six countries in sub-Saharan Africa to implement its Data4Ag project. The aim is to investigate how the collection and effective analysis of farmer data can be used by farmer organisations to improve the livelihoods of their members. This article focuses on the impact of collecting data, and how this information could be systematically incorporated within the monitoring and evaluation systems of farmer organisations.

Impact assessment was based on the example of the IGTF in Uganda; one of the partners of the Data4Ag project. Before 2018, IGTF used to store farmer member information in an old database, and process member data manually into a spreadsheet. Collecting farmers' raw tea leaves and weighing them accurately using analogue scales was challenging; farmers were often cheated at collection centres and then received delayed payments. In partnership with CTA, IGTF launched a digital profiling project in December 2018 to help solve these challenges. The project involved compiling geo-referenced information about the tea farmers and their land using GPS-enabled tablets. Extension officers then uploaded the data onto a dedicated online platform (the ONA Platform/Open Data Kit), and subsequently onto the IGTF's new QGIS database. The profile database is now linked to a financial and accounting system, allowing IGTF to track records of transactions with member farmers. They also connected Internet of Things digital weighing scales of at each collection point to this system to reduce fraud. "Now, my green leaf cannot be cheated by leaf collection clerks, I can have my payment when I need it and I can have system reports about my supply and credit statements for months," says tea farmer Mwenderehi Eliphaz.

Qualitative and quantitative approaches
To measure the impacts of farmer profiling for the IGTF members, CTA's research team used two approaches; the first was a qualitative assessment approach using an innovation framework inclusion tool. The second was a quantitative approach involving the use of machine learning to create a model to determine the best algorithm to predict the yield of tea leaves, and the use of Statistical Package for the Social Sciences (SPSS) to analyse statistical data.

The qualitative framework inclusion tool was used to describe the processes involved in value creation for the beneficiaries, and outlines five main criteria essential for digital projects: the extent of collaboration, the value to be created, the involvement of users or local community in the design, the digital readiness of the ecosystem, and the availability of human and financial resources. In this case, the value created by the project is increased yields for profiled farmers, which is supported by the findings of the SPSS.

From the analysis of the machine learning data, it was clear that more extensive data were needed to improve the model to optimise yield predictions. There were some missing values in data variables, such as farm size, for example. There was however enough data to conclude that the profiled farmers experienced an increase in yield, both in the first quarter of 2018 and 2019 (data for the other seasons was also not available). The machine learning analysis was also able to investigate the relationship between the variables of credit access and the yield of tea leaves.

From the SPSS analysis, yield differences were compared between profiled farmers and non-profiled farmers, and between farmers with and without access to credit. The results showed that the mean yield for farmers who were digitally profiled and who had access to credit was significantly higher (10%) than farmers who were not profiled and had no financial access. The findings, supported by the results from the machine learning analysis, showed that access to credit was dependent on profiling, with the majority of the profiled farmers gaining access to credit. This can be explained by the fact that profiling made it easier for credit cooperatives to access farmer data and indicate their creditworthiness. Available farmer data also enabled farmers to be targeted with the right agronomic advice and input for production. From the predictive model, farmers with access to credit had higher yields than farmers without access to credit. It was also evident from the analysis that the Data4Ag project employed a gender inclusive approach, as male and female farmers had equal chances of been profiled.

Building up local expertise to improve systematic analyses of all data collected can support organisations like IGTF to prove their impact

An internal assessment

An internal impact review tool was also employed by the project to provide a practical set of questions that allowed IGTF to methodically assess the current effectiveness of its operations, in regards to impact, cost effectiveness and significant reach. Based on the results of this tool, the profiling can be considered to be cost-effective, but has a low reach (33%) – reach is seen as the ability to scale up to at least 50,000 farmers, while IGTF only has 7,468 members. IGTF is now implementing the farmer profiling model at other farmer-owned cooperatives in the tea sector which will increase the reach.

Building up local expertise to improve systematic analyses of all data collected can support organisations like IGTF to prove their impact and embed systematic analysis
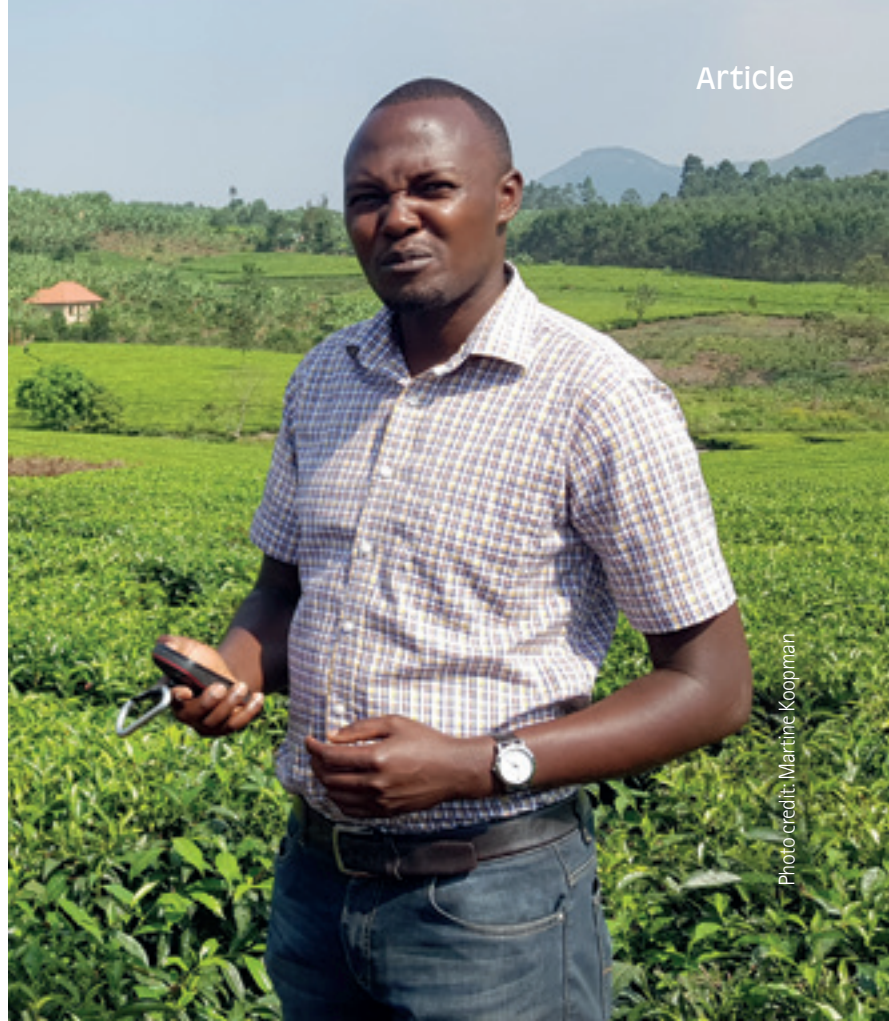
within their monitoring and evaluation (M&E) practices. Another important capacity that needs critical attention is data management. This is the first step towards better M&E. Data management involves optimising data collection and organisation processes to ensure the quality, reliability, and timeliness of data. This is vital to derive the correct insights from data to drive better decision-making.

IGTF embraced data analysis and will improve the yield prediction model by continuing to add farmer data, as well as build an algorithm to predict how much nitrogen tea farmers need to apply to their soil. The introduction of farmer profiling connected with digital scales and the financial system has enabled IGTF farmers to increase its competitiveness with multinationals through well-managed farmer data, improved quality control, access to finance and a faster payment process for raw material delivered. ●

Photo credit: Martine Koopman

Above & left: IGTF's digital profiling project involved compiling geo-referenced information about the tea farmers and their land using GPS-enabled tablets

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Seeing is believing! Visualisation of CTA's results

Ibrahim Khadar

To demonstrate how CTA projects are matching the Centre's corporate targets and to enhance project data integrity, consistency and accuracy, a results data management initiative has been launched.

From a strategic perspective, the goals for investing in a strong monitoring and evaluation (M&E) system for CTA, or any development agency, whether operating at local, national, regional or international level, are four-fold; to promote accountability, learning, decision-making and visibility. While, in principle, there is overwhelming support for M&E in the development community, most, if not all organisations still find it challenging to build and maintain a fully functioning M&E system that fulfils these ambitious goals.

Until recently, one of CTA's main M&E challenges has revolved around the need to demonstrate precisely how a sizeable number of projects contribute to its corporate logframe targets; the solution has been data visualisation. The adoption of Microsoft's Business Intelligence (Power BI') package for data visualisation has been one element of CTA's recently-developed Results Data Management System (RDMS), which focuses primarily on M&E. The RDMS initiative, which was launched in January 2019, has also refined and coded project-specific logframe indicators, and adapted the project monitoring functionalities in CTA's main project management database (known as DELTA).

Figure 1: Four intricately connected components of CTA's RDMS
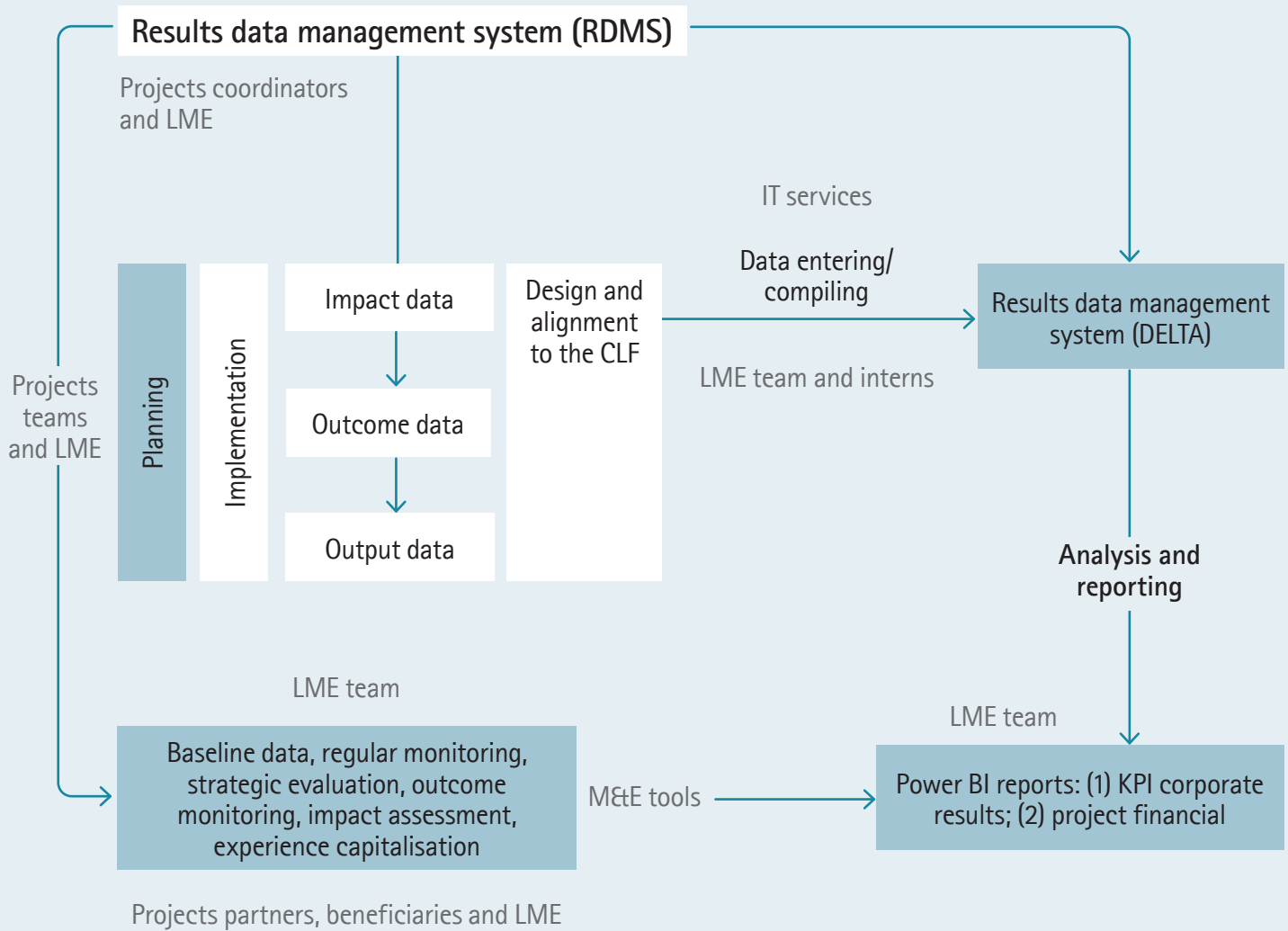
CTA's logframes (top left segment); CTA's use of DELTA for M&E purposes (top right segment);
CTA's use of Power BI (bottom right segment); and M&E feedback and reports (bottom left segment).

Refining and coding of project-specific logframe indicators

CTA's Learning, Monitoring and Evaluation (LME) Unit embarked on a centre-wide exercise in February 2019, with the aim of updating 35 project-specific logframes and promoting stronger alignment between project-level indicators and the indicators in the corporate logframe – which had been updated in 2018 with approval from the European Commission.

This involved several measures (depicted by the components in top left segment of Figure 1), including:

- Making sure that project-specific indicators comply fully with SMART (specific, measurable, achievable, relevant and time-bound) criteria, and are allowed a degree of flexibility in designing logframes to make sure that the indicators reflected each project's theory of change;
- Assigning a unique code to each project-specific indicator to facilitate the aggregation of values at corporate level; and
- Specifying whether each project-level indicator had a direct or indirect relationship with a corresponding indicator in the corporate logframe.

Adapting project monitoring functionalities in DELTA

While logframe indicators were being aligned and coded, CTA's internal IT service facilitated several changes to the monitoring functionality within DELTA to allow the systematic inputting of results data via standardised data collection forms (top right segment of Figure 1).

Figure 2: Graphical overview of the levels of achievements for the Data4Ag logframe targets

DELTA's updated data entry form now contains 20 fields that are applied separately for impact, outcome and output data. The main fields that support data visualisation include the project code, indicator statement, the code that links the indicator to the corresponding corporate indicator, the target, and the actual value of the indicator. Where appropriate, data are differentiated by gender, age and geographical location (country and region). Additional fields are included (e.g. source of verification and confirmation of input validation) to enhance data integrity, consistency and accuracy.

Intensifying data visualisation

One of the strengths of RDMS's data visualisation component, Power BI (bottom right of Figure 1), is the functionality to pull data in from multiple databases, rather than relying only on DELTA. As a result, datasets can be imported into Power BI from data available in Excel files and other sources on topics not sufficiently catered for in DELTA (e.g. financial information and data on participants and events).

Power BI reports, which have been available since August 2019, have enabled CTA to track impact, outcome and output targets for all of the logframes in DELTA. Figure 2 provides a graphical overview of the levels of achievement for each logframe targets at impact, outcome and output levels for CTA's Data4Ag project. Figure 3, on the other hand, shows how numerical data is presented as a 'traffic light' to indicate the relative degrees of progress towards achieving

The emergence of a common reference point for results data on the performance of individual projects is enabling CTA to precisely demonstrate how specific projects are contributing to its corporate logframe targets

Figure 3: Graphical overview of the relative degrees of progress for a project's outcome targets

the outcome target for CTA's Eyes in the Sky, Smart Techs on the Ground project.

Both illustrations show that it is possible to observe a project's performance from data visualised on a single slide. They also demonstrate how data can be projected in different formats and with different levels of detail. Visualising M&E data through Power BI reports and dashboards has many additional advantages, including being able to refresh data and publish reports automatically to provide users with accurate and up-to-date information. The emergence of a common reference point for results data on the performance of individual projects is enabling CTA to precisely demonstrate how specific projects are contributing to its corporate logframe targets. Improvements in the quantity and quality of data, used for project management oversight and decision-making, means that CTA is now much better placed to use M&E for accountability, learning, decision-making and visibility. The tool is also relatively easy to master, both as a developer and a user.

The human factor

If we were to compare CTA's RDMS to a machine, adding the visualisation component has helped to elevate the machine's performance. The machine runs on data as its main fuel, which enters the RDMS via M&E feedback and reports (bottom left segment of Figure 1). Like most machines, be it a car or a computer, humans do not only create the finished product, but they are also responsible for its use and maintenance. This explains why, in addition to the four main components, Figure 1 is littered with references to CTA units and project teams, as well as project implementing partners. These various groups of people continue to play a significant role in building the RDMS, and without their ongoing contributions it would be impossible to maintain such a system. ●

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Resources

Digitalisation for agriculture: the case of MUIIS Uganda
The MUIIS project set out to deliver ICT-enabled extension services to smallholder farmers in Uganda. Based on in-depth assessments of the concept of digitalisation of smallholder agriculture, e-extension and credit, this report highlights some of the lessons learned throughout the MUIIS project. It also discusses the business model designed by the project to support long-term sustainability of the services provided.
https://bit.ly/2DMudwP

Open data in developing economies report
How can the 'data revolution' truly support positive social and economic transformation in developing countries? This report poses critical questions regarding the need for and impact of open data for developing economies, and proposes a theory of change to leverage open data for development.
https://bit.ly/2PbiPkK

Dashboards in support of SDGs
One of the most impactful ways to disseminate data is through visualisation, which also supports a better understanding of data and subsequent decision-making. Data visualisation through interactive dashboards is an important tool for the implementation of the Sustainable Development Goals (SDGs). Through five case studies, this report illustrates how dashboards function as a system to navigate large and complex databases for data analysis and visualisation, monitoring and reporting. By making data more widely available, dashboards can push the development agenda.
https://bit.ly/2Ph9yGE

Join us! Blockchain 4 agrifood community of practice
This community of practice is created by CTA and Fair Food with the objective to share knowledge and exchange ideas to work towards a sustainable, healthy and resilient food system by unlocking the potential of blockchain technology for agriculture. Join the discussions, connect with other professionals and participate in webinars by joining this open community. https://bit.ly/2RmJYCL

Join us! GODAN community of practice on data codes of conduct
Agricultural data is shared among many diverse actors in the data value chain – yet legislation on data rights and privacy is lacking for most industries. Voluntary codes of conduct, guidelines and principles of transparency in the governance of agricultural data are starting to fill this gap. The objective of this community of practice is to empower farmers and minimise their risks by discussing what these codes of conduct for farm data sharing should look like.
https://bit.ly/33VjhaO
To join the discussions mailing list, send a request to: wg-Datarights@godan.info

GODAN impact stories
GODAN, a global network of over 900 change makers, aims to support SDG 2 – ending global hunger – through the promotion of open data. GODAN believes that accessible and re-useable data will unlock tools and strategies to improve farming practices and that advocacy and capacity building on open data will help unlock agriculture's growth potential. On its website, GODAN shares impact stories of data sharing on agriculture, value chains, nutrition and food security.
https://bit.ly/2Yj86aI

Institutionalising experience capitalisation
The Capitalisation of Experiences for Greater Impact in Rural Development project uses proven approaches to improve analysis and sharing of field experiences to stimulate learning. This publication captures how beneficiaries of the project institutionalised experience capitalisation practices within their own organisations, thereby upscaling the approach and continuing the ongoing process of practice-based learning.
https://bit.ly/2RocBiM

Digitalisation of African agriculture
"In agriculture, digitalisation could be a game changer in boosting productivity, profitability and resilience to climate change". This executive summary from the Dalberg and CTA's report on the current state of digitalisation in African agriculture highlights the key findings of their extensive research. The report consolidates evidence and provides proof of impacts to guide evidence-based policymaking and investments to further develop D4Ag in Africa.
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Business success for youth entrepreneurship in agriculture
What business models and business model innovations lead to business success for youth entrepreneurs in Africa? This is the core question addressed in this study. Based on analysis of the strategies and experiences of 12 start-ups, recommendations are put forward to support business success of youth entrepreneurship in the agri-tech sector.
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