

**AGRICULTURAL
DIGITALISATION IN AFRICA**

*The transformative potential of
digital solutions for agriculture*

INTERVIEW

*Professor Frederike Praasterink
emphasises the urgent need to
transform food systems*

TRADING OPPORTUNITIES

*How will new initiatives help
women take advantage of the
Africa Continental Free Trade Area?*

N°194 | September - November 2019

SPORE

spore.cta.int

Digitalising extension

SMART ADVISORY SERVICES FOR FARMERS



A global perspective on agribusiness and sustainable agriculture





RURAL DEVELOPMENT FOR A BETTER WORLD



Brussels Development Briefings

Sensitising the development community
on current and emerging ACP-EU policy
relating to rural development issues

www.brusselsbriefings.net

SPORE N°194

TRENDS

4 | Decoding the potential of agricultural digitalisation

ENTREPRENEURSHIP

8 | Vegetable gardens crop up in Trinidad and Tobago
9 | Farmers' eyes in the sky in Côte d'Ivoire

SMART-TECH & INNOVATION

10 | SMS greenhouse farming
11 | Building Jamaica's creditworthiness with blockchain

CLIMATE-SMART AGRICULTURE

12 | Reducing water to raise rice yields
13 | Stepping up climate-smart efforts in Malawi

INTERVIEWS

14 | Murielle Diaco: the circular economy has always been present in Africa
16 | Frederike Praasterink: we need a strategy that focuses on the transformation of food systems

17 | Dossier

Agricultural extension: innovating advisory services with ICTs

29 | Agribusiness

MARKET OPPORTUNITIES

30 | Cotton transforms Mali's textile sector
31 | Tanzania's smallholders access the potato snack market

AGRI-FOOD SYSTEMS

32 | Nigeria increases tomato production with good practices
33 | Groundnut production boosts profits for Zambian farmers

34 | FINANCE & INSURANCE

Making index-based insurance profitable

36 | TRADE & MARKETING

Fairtrade: a sweet deal for women farmers?

38 | BUSINESS LEADERS

Opportunities for women in Africa's free trade area

40 | PUBLICATIONS

44 | OPINION

EDITORIAL

Ensuring digitalisation is a force for good for African farming

Michael Hailu, director – CTA



On 21 June, 2019, CTA was proud to launch *The Digitalisation of African Agriculture Report*, produced in collaboration with Dalberg Advisors, at the AU–EU Agriculture Ministerial conference in Rome. We have been pleased to see much positive feedback, including on the report's timeliness, the usefulness of the information

to fill knowledge gaps and the opportunities for further interaction among various stakeholders in the sector.

The report paints a clear picture of the recent emergence of more than 390 digital solutions in African agriculture, as well as presenting a geographical mapping of these applications and service providers, including NGOs, governments, mobile network operators and other commercial actors. Critically, the report provides a forecast for the period 2025–2030 – a first for the sector.

In all, 17 institutions have worked together as part of an advisory council to review different drafts of the report and provide feedback. And the launch of the report at the 2019 African Green Revolution Forum in Accra, Ghana, held in September, has provided an opportunity for interested partners to share experiences, and created a space for future collaboration so that, together, we can move to the next level in progressing the digitalisation for agriculture (D4Ag) agenda.

There is enormous potential for digitalisation to help achieve food and nutrition security and resilience to climate change, as well as promote engagement of youth and women in agribusiness in Africa. But this potential will not be fulfilled by chance. At such a defining moment for this burgeoning market, we will only realise the true benefit of D4Ag in Africa with strong, coordinated leadership.

One of the report's key messages is that, up until now, D4Ag development has been mostly donor driven and rather piecemeal. However, if these initiatives are to be scaled up and really have an impact then collaboration is necessary to avoid duplication, and investment must move from the public to private sector.

D4Ag in Africa now needs an alliance of governments, donors, farmers, agribusinesses and international bodies partnering with big tech companies to support organisations on the ground that are well positioned to design products that directly serve farmers' needs. From trust and privacy to accessibility, a collaborative approach from all interested parties would not only protect users and ensure fairness and transparency, but ensure that technology is a force for good in Africa.

D4AG REPORT

Decoding agricultural digitalisation in Africa

For the first time, a landmark report on digitalisation for agriculture (D4Ag) in Africa compiles and highlights data on digital solutions that are enabling the transformation of African agriculture.

Yanne Boloh and Susanna Cartmell-Thorp

Across a continent where 80% of food is still produced by smallholder farmers, digital technologies and innovations are putting Africa on the cusp of an exciting new agricultural revolution. As highlighted in a study by CTA and Dalberg Advisors, which is providing the first analysis of its kind, digitalisation is a game-changer. According to the study, there are nearly 400 digital solutions with 33 million smallholder farmers registered across sub-Saharan Africa, with an annual growth of around 45% since 2012. Nevertheless, more than 90% of the market for digital services that support African smallholders remains untapped, with a turnover of an estimated €127 million out of a total potential market of €2.3 billion.

These figures are just a taste of what is revealed in the *Digitalisation of African Agriculture Report*, prepared by CTA and Dalberg Advisors, which was launched in Rome, Italy, on 21 June, 2019 at the AU-EU Agriculture Ministerial conference and, in Africa, at the 2019 Africa Green Revolution Forum in Accra, Ghana.

The impressive report of more than 200 pages paints a clear picture of the

recent emergence of digital solutions in African agriculture. It also presents a baseline geographical mapping of these applications and service providers including NGOs, governments, mobile network providers and other commercial actors, etc. Critically, as well as surveying the D4Ag landscape, and providing a valuable insight into the actual utilisation of digital solutions in agriculture across the continent (mainly sub-Saharan Africa), the report also provides a forecast for the period 2025-2030 – a first for the agricultural sector. The report thus shows what digital solutions have achieved to date, sets out prospects for growth in the short and medium-term and, above all, analyses what could be achieved by reaching the sector's full potential.

As data quality improves, the report notes that entrepreneurs developing new digital solutions for agriculture are growing exponentially. "In 2013, when CTA organised a major international conference on ICTs for agriculture in Rwanda, there wasn't much happening in this sector. But the past 5 or 6 years have seen a very significant increase in the number of new digital solutions appearing on the market," says CTA

director Michael Hailu in a recent interview with *Spore*.

A barometer of digital agriculture

The CTA/Dalberg report establishes a benchmark against which it will measure progress every year or every 2 years, acting as a kind of barometer: what does the digital ecosystem in African agriculture look like, who are its main actors, what impacts do different solutions have, what are their growth prospects, who are their real users?

In all, 17 institutions have worked together as part of an advisory council to draw up a methodology, guide the data collection and provide feedback on the content. The report classifies digital solutions for agriculture into five primary use categories (advisory services, market linkage, financial access, supply chain management, and macro agri-intelligence), subdivided into secondary categories. In addition, the experts have proposed new terms, such as *middleware* to describe the data infrastructure necessary for the deployment of concrete digital solutions (drones, weather stations, soil, pest and crop diagnostics equipment, and field sensors).



© CTA

A new report highlights that Africa has an untapped market for digital services to transform agriculture

Christian Merz, senior advisor at the German development agency, Deutsche Gesellschaft für Internationale Zusammenarbeit, and member of the Report Advisory Council states that, “This landmark report provides desperately needed intelligence on the market of digital agriculture solutions in sub-Saharan Africa. Stakeholders across the sector including donors, governments, investors but also implementers and solution providers need to understand size, character and coverage of the market to optimise interventions, select the best solution, define roll out and go to market strategies etc.”

Leonard Mizzi, head of unit at the European Commission, Directorate-General for International Cooperation and Development agrees: “We are living in an era of unprecedented transformation and technological change. Digitalisation can help stimulate innovation for sustainable agri-food systems and produce better and safer food while preserving natural resources and biodiversity. But we need to be conscious and support solutions that are sustainable and that are tailored to countries’ needs, and embedded into conducive and broader innovation systems. This is in

line with the EU’s Digital4Development and SDGs [Sustainable Development Goals] agendas that we are proudly promoting.”

“Digitalisation is a game changer in the transformation of small-scale agriculture but it must be given the importance it deserves in policies and investments”

Digital disparities

Despite some impressive achievements in digital transformation, one of the key messages of the study’s analysis confirms the digital divide regularly denounced by experts: women are under-represented, accounting for only a quarter of registered users of digital solutions, while representing about half of the agricultural workforce in sub-Saharan Africa. Given that, in Africa, 1 MB of mobile data costs on average 10% of the average monthly income, women

– who often earn less than men – are left out. Yet digital solutions could increase their capacity to increase production of higher quality produce and boost sales.

Young people, on the other hand, are over-represented among registered users (70%), and digital technology can be a driver to attract or retain them in agriculture. At the same time, this figure likely also indicates an important age divide that must be overcome in order to engage the significant proportion of farmers from older groups.

Another striking trend highlighted by the analysis is that there are far more registered users in Eastern Africa, with Kenya leading the way, while paradoxically, there are more solutions in the West. Central and Southern Africa remain less represented overall. Nevertheless, despite the large number of players that make up this young market, only 15 companies have reached 1 million users or more, accounting for 70% of the 33 million registered farmers.

Scaling up

The report authors have focused on the number of registered users, which is of interest to donors. But they do not overlook the reality of the situation, which

is that the number of active users is far lower. More than a third of users surveyed in the study said they used at least one form of advanced technology (drones, field sensors, big data or machine learning) but only 40% admitted to using it often, and very active users represent no more than 10 to 20% of all those registered. Yet, almost 60% of respondents stated that they expected to integrate these types of technologies into their operations in the next 3 years. “We estimate that 100 million small farmers will register with a digital or other service by 2020, and probably 200 million by 2030,” state the report authors. Within 5 years, 87% of mobile phone users in sub-Saharan Africa should be connected to mobile internet, the report claims.

“This report indicates that despite challenges, the economics of D4Ag is rapidly improving, with a handful of players beginning to develop viable, large-scale businesses. To reach their

full potential, companies will now need to focus on converting customer reach to actual use in order for this type of model to yield returns,” says Hailu.

This report demonstrates the real potential of the digital sector for African agriculture, and thus should convince other potential partners who are reluctant to get involved. There has been real progress in terms of performance and income, even if the data is still scarce. In order to provide a first set of data at a national level, CTA has therefore carried out more detailed analysis in Ethiopia, Ghana, Nigeria, Rwanda and Senegal, and some additional analysis in Kenya and the Sahel.

The collection and analysis of all this data, and the successful projects highlighted in the report, provide a solid foundation for any individual or organisation in the agricultural and/or technological sectors interested in investing. This research raises awareness of the challenges and opportunities of digital technology, not only in Africa, but across the entire ACP region.

The digitalisation of agriculture provides agro-industry and governments with a better vision of their targets, enabling them to better adapt their products, services, policies and actions in general. Goldman Sachs estimates that blockchain, for example, can lead to global savings of US\$6 billion (€5.4 billion) per year in economic transactions. According to a 2018 study published in the *Journal of the British Blockchain Association*, the improved data traceability provided by an International Business Machines Corporation blockchain platform used by Walmart reduced the time required to trace a mango’s journey from the tree to the supermarket from 7 days to 2.2 seconds (see <https://tinyurl.com/y246sh2u>).

Nevertheless, the CTA/Dalberg report highlights that investment in digitalisation for agriculture to date has been isolated, scattered, and piecemeal, with efforts to scale-up being unnecessarily duplicated, causing inefficiencies and hampering large-scale, long-term growth. “While the opportunity is

Digital technology can be a driver to attract or retain young people in agriculture



immense, the report is not naïve about the challenges that remain and the significant work required by agribusiness, governments, donors, and investors to maximise the transformative impacts of digital agriculture in years to come,” states Michael Tsan, partner at Dalberg Advisors and co-leader of the firm’s global Digital and Data Practice.

The need for all operators to be involved

All of the achievements highlighted by this report show how important it is for all stakeholders to invest in digital technology for agriculture, from donors to major technology companies and the agri-industry as a whole; investments in the sector started out with mainly donor-driven financing, but the private sector is now catching up.

The study’s recommendations will be critical for the development of appropriate policies at national and regional, but also continental levels, as well as for the

development of human resources, public infrastructure and regulations. “The recommendations for concrete actions to be implemented have the potential to transform the agricultural sector,” says Ben Addom, one of the report authors, and head of CTA’s ICTs for Agriculture team, pointing in particular at the need to build an alliance of all stakeholders and to avoid duplication in effort.

According to Enock Chikava, deputy director of the Bill & Melinda Gates Foundation’s Agricultural Development department, countries must start by having a clear vision of their agriculture and its potential for digitalisation. “Once you have the vision, there is the need for infrastructure. You cannot get into digital agriculture if the infrastructure will not allow connectivity, so we need regulations and policies to attract private sector investment,” he said in an interview with *Spore*.

However, Chikava does not shy away from reality, urging caution to respect

the underlying motivation for digitalisation: “If the data already collected, standardised and analysed remains in the hands and control of the few, it defeats the whole purpose of digitalisation. It is only when the data is widely shared that newcomers do not have to spend the same amount of time and effort collecting the same kind of data.”

“Digitalisation is a game changer in the transformation of small-scale agriculture but it must be given the importance it deserves in policies and investments,” confirms Hailu. “Governments should consider digitalisation as a priority area, as it can have a strong impact on the transformation of agriculture, improving productivity, building resilience to climate change and creating opportunities for young people and women. Governments should seriously consider the benefits they could derive from digitalisation as part of their strategies for transforming agriculture.” ■

The way forward for D4Ag

As D4Ag develops, there is an opportunity to improve use and drive greater inclusivity and impact in Africa. But this must be done while actively managing the risks of digital tools, which will require sector actors to make several major investments in the improvement of business models and, especially, the D4Ag ecosystem. As efforts are made to mainstream D4Ag, the following recommendations from the CTA/Dalberg report are provided to donors, governments and investors:

1. Develop human capital at every level of the D4Ag ecosystem

The necessary growth in human capital includes increased awareness of D4Ag, improved digital literacy and greater digital skill-building among smallholder farmers and other actors across the agricultural value chain as well as the capacity of government staff – particularly in relevant ministries – to understand how to use and deploy D4Ag solutions in various public initiatives.

2. Drive greater business model sustainability.

Key to driving greater business model sustainability will be improving value for farmers, identifying and promoting successful business models and mobilising funding to support a more diverse set of companies.

3. Create greater impact by making D4Ag solutions more inclusive of women, other marginalised groups, and smallholders in regions with relatively less D4Ag investment.

To achieve equitable growth, D4Ag needs to be more inclusive. Donors, in particular, can play a key role in catalysing greater targeting of marginalised communities.

4. Invest in the missing middleware infrastructure. Successful D4Ag solutions require access to a wide range of data (from remote sensing data to farmer-specific data) in order to deliver high-quality services to farmers.

Coordination between governments, donors, investors, farmers and other interested parties will likely reduce duplication of efforts and result in higher-quality, efficient infrastructure that enterprises can rely on across regions.

5. Invest in good data stewardship and design for the risks and limitations of digital systems.

Governments must design and implement approaches that appropriately balance the need for good data stewardship with the desire not to overregulate and stifle D4Ag innovation.

6. Invest in the D4Ag knowledge agenda.

We recommend knowledge investments in three major areas: how to design user-centric offerings that meet the needs of farmers, in particular women and other under-served communities; research to gather better market and business model intelligence to drive success in D4Ag; and research to gather more robust evidence on the impact created by different use cases and business models.

7. Create an alliance of key D4Ag stakeholders to promote greater investment, knowledge sharing and partnership building.

This alliance should be built as a partnership between governments, donors, international bodies, farmer organisations and the private sector dedicated to advancing inclusive, sustainable D4Ag across Africa and beyond.

URBAN FARMING

Vegetable gardens crop up in Trinidad and Tobago

Student entrepreneur, Jameel Phillip, is creating adaptable food production systems in the Caribbean by setting up small urban gardens that maximise production using space-saving designs.

Keron Bascombe

Jameel Phillip, 24, set up his urban agriculture business Green Thumb Gardens with his fiancé, Ciele Williams, in September 2015. The company combines sustainable agricultural practices together with landscaping principles to provide an aesthetic appeal to home-based food production, whilst helping to remove the stigma attached to traditional farming.

As a geography and agriculture student at the University of the West Indies (UWI), Phillip undertook courses with the Ministry of Agriculture in basic aquaponics and grow box production (a method that uses partially or entirely closed, soil-based or hydroponic systems maintained within a wooden box with equipment to deliver optimal plant growth conditions). Whilst completing his studies, Phillip installed a 1 m² kitchen garden on the patio of his father-in-law's townhouse. Within a brick frame, the small garden incorporated a mixture of sheep manure, compost, soil and sand for growing herbs and vegetables such as basil, celery, chive, dill, fennel, jalapenos and tomatoes. With requests coming in from neighbours, Phillip began to build up his business. "We started with about three clients in the first year and have grown to over 30 clients, including schools," Phillip states.

To access financing, Phillip engaged with Youth Business Trinidad and Tobago (YBTT) in 2016, which offers mentorship to young entrepreneurs. "I heard about the opportunity to pitch my business to YBTT in order to qualify for a loan of \$20,000 [€17,550], which was used to build a small office space, store stock,



© JAMEEL PHILLIP

In Trinidad and Tobago, entrepreneur Jameel Phillip is promoting food security through the establishment of urban vegetable gardens



30 clients

including schools, have established vegetable gardens

and purchase a larger tiller to maximise time and productivity in the business," says Phillip. YBTT partnered Phillip with mentor Rachel Renie of D'Market Movers – an online delivery service of fresh produce. "Rachel helped me to understand what it means to do business," Phillip reveals. "She showed me how to set up and keep financial records, as well as how to manage clients."

As well as other space-saving alternatives, such as aquaponic systems that run along walls, Green Thumb provides vertical pots, which are used to grow various leafy vegetables and herbs. "We also do lawn maintenance so we collect

the clippings to use in our own garden as natural mulch to keep down weeds, and also prevent too much evaporation from the soil so less water is needed daily," Phillip explains.

The company also works with other local agribusinesses to support home-grown innovations. "I was introduced to Mark Mica of Boissierre Greens Earthworm Farm during an elective Vermicompost course at UWI in 2017," Phillip says. "Their soil is the best. We also use their vermicompost and compost tea for our client's gardens. Another regional product we use is Algas Organics which is an organic fertiliser made from sargassum seaweed." For the future, Phillip and Williams are looking to start a programme to encourage their clients to engage in composting utilising their own food waste in their gardens, and improve agricultural education beyond classrooms and backyards. ■

REMOTE MANAGEMENT

Farmers' eyes in the sky in Côte d'Ivoire

Joseph-Olivier Biley founded drone start up WeFly Agri in January 2017 to help farm and plantation owners regain control of their land.

Emmanuel Maduka

In Abidjan, Côte d'Ivoire, entrepreneur Joseph-Olivier Biley is providing user-friendly, drone-enabled technologies to allow land and plantation owners to stay digitally connected to their farms. His company, WeFly Agri, delivers services such as interactive farm mapping, virtual reality (VR) farm tours, and a remote employee monitoring tool to interact with employees on the ground. Since the launch of WeFly in 2017, drones have been used to survey and monitor over 40,000 ha of farmland.

Prior to the establishment of his company, Biley's father experienced issues of transparency and control on his rubber farm which he managed from afar. The employees, who had been provided with fertilisers and other inputs, were found to be using the supplies to start their own plantations. Biley asked himself: "What if my father could monitor his plantation remotely?" To provide such a solution, WeFly developed their employee monitoring tool, which allows farm managers to assign tasks digitally to their workers using a centralised SMS system, whilst receiving real-time information back from employees regarding work progress and task completion.

"Plantation owners typically subscribe to one interactive mapping a year, and at least one VR tour per month. They get to view their plantation from the comfort of their home, on their laptop or mobile phone from any location in the world," says Biley. Cashew nut farmer Jean Kouame says, "Driving hours every weekend became tiring. WeFly helped me manage my plantation without having to travel. It has brought confidence in my workers and improved my production."

WeFly is also working with a 3,000-member cocoa cooperative to

map more than 9,000 ha of land outside Abidjan. Once the plantations are mapped, the drones are used to provide images of farm evolution over time and real-time weather reports. This information, used in conjunction with aerial images of agriculture plots, is expected to help smallholders better access loans as evidence of collateral. "Most smallholder cooperatives are usually very traditional in data collection which makes them lose financial opportunities," says Biley.

To complement the drone services, WeFly has also developed a phone application called ScanLeaf, which helps farmers diagnose and detect crop diseases. "The majority of small farmers

cannot afford the service of an agronomist. With ScanLeaf, we turn their phones into an agronomist and, with a simple snap, they get immediate diagnosis and good practices they have to follow," Biley explains. ScanLeaf has been piloted with 1,542 cocoa farmers and a further 46,000 farmers have recently signed up. As well as expanding services across Côte d'Ivoire, the start-up is also in discussions with potential clients in Mali, Nigeria, Senegal and Togo. ■

In Côte d'Ivoire, entrepreneur Joseph-Olivier Biley is providing a variety of digital farming solutions using drone technology



© WEFLY AGRI

SMART GREENHOUSES

Kenyan farmers optimise water use with mobile phones

Remote monitoring of greenhouses is allowing Kenyan smallholders to irrigate their crops from afar and improve their quality of life.

Toby Penrhys-Evans and Bob Koigi

Locally-built greenhouses and solar-powered sensors linked to a drip irrigation system are enabling Kenyan farmers to efficiently manage water use on their crops. The sensors, which are linked to farmers' mobile phones via SMS, regulate the water supply channelled through drip lines, and also monitor temperature, humidity and soil moisture in the greenhouse. The technology is reducing the labour required for manual irrigation and increasing crop yields. Nairobi-based Illuminum Greenhouses is the company behind the innovation and, since 2014, the agri-tech firm has built 1,200 greenhouses across Kenya with 5,500 smallholder farmers using the technology.

Wooden and metal greenhouses constructed by the company are also helping to reduce the risk of crops succumbing to pests and disease when grown without cover, and are enabling farmers to improve their productivity. "Greenhouses allow farmers to grow hybrid seeds (capsicum, cucumbers and tomatoes) that have a longer harvest period and up to four times greater yield compared to open field seeds. This massive increase in yield over a small growing area with less risk exposure to pests and diseases results in increased revenue to the farmer," explains Taita Ngetich, cofounder and chief of operations for Illuminum Greenhouses.

"The average cost of an 8 m by 30 m metallic greenhouse fully equipped with drip technologies, installation, and greenhouse farming training, costs US\$4,500 [€4,000], while the average income of smallholder farmers per year is about US\$2,000 [€1,800]," says Ngetich. To make the structures affordable and avoid paying the total cost upfront, the company has created an asset finance mechanism – taking the constructed greenhouse and the crops grown as security. "In this way, farmers pay up to 20% of the total value instead of the entire amount and we structure the repayment to match with their harvesting cycles," explains Ngetich. "We proved this works over 2017 and 2018, where we constructed greenhouses for 345 farmers

5,000
farmers have adopted greenhouse remote-monitoring technology



© ILLUMINUM GREENHOUSES

and only requested 10% deposit and recouped the balance over the

harvesting season. We now hope to bring on board financial institutions and government to scale this method."

Recognising the need to continuously innovate and expand what it offers to farmers, Illuminum Greenhouses has developed an updated version of the irrigation technology.

"We have started building an online analytics interface accessible via smartphones that will provide actionable insights on field conditions, water usage, warning indicators, diagnostics and other useful information," says Ngetich.

Farmers' lack of financial data often makes it difficult for lenders to credit score them. To bridge this funding gap, Ngetich is looking to develop a new credit-scoring approach using the Illuminum technology. "Farmers may not have financial footprints, but they have data from our sensors which lending partners can use to credit score these farmers. By sharing data on irrigation patterns, yield harvested per season, price per kilo of produce harvested, historical weather patterns and farming records, we believe we can have a credit score," he says.

Illuminum Greenhouses was one of four winners of the CTA Agrihack 2018 competition – which supports young entrepreneurs in ICTs for agriculture – that each received a prize of €7,500. "The [online analytics] system will capitalise on Kenya's strong smartphone adoption, as 83% of the country's internet penetration was through smartphones in 2017. This [development of the platform] has been made possible by CTA which is funding this development and will allow farmers to access big data and machine-learning technologies," states Ngetich. ■

Smallholders are regulating their water supply using solar-powered sensors linked to drip irrigation systems and their mobile phones

FARMING INVESTMENT

Building Jamaica's credit-worthiness with blockchain

Pioneering technology in the Caribbean is aiming to help financial institutions make better farming investment decisions in order to provide unbanked farmers with credit.

Natalie Dookie

In a first for the Caribbean, blockchain technology will soon be used to create an alternative credit score for Jamaican farmers who want to increase their bankability. The technology will store farmer records and create profiles using information regarding farm revenue, expenses and profitability to create secure digital ledgers. Farm Credibly is the pioneering start-up behind the system, which collects and evaluates the farmer data.

Most small farmers in the Caribbean find it challenging to access credit because the majority of farming activities are paid for using cash and so, typically, there is no paper trail to validate a farmer's economic activity. However, using the profiles and credit scores made available on the Farm Credibly website, financial institutions will be able to establish a farmers' creditworthiness.

The profile information will be sourced from verified business transactions, as well as through third-party partnerships with suppliers, distributors and consumers, so the farmers will not have to provide any data themselves. "It means that once a farmer is ready to get a loan at a bank, it's a much easier process for them because, suddenly, they have a track record," explains Varun Baker, Farm Credibly's CEO. And, while the farmers' personal details and transactions will be protected, a public, trusted operational track record will be created.

A winner of CTA's Pitch AgriHack in 2018, Farm Credibly used the award money to enable the company to launch a pilot project in August 2019 to assist 10 farmers to expand their Scotch Bonnet chilli pepper production. The pilot, which is also supported by a grant from the Development Bank of Jamaica, aims to facilitate farmers' access to micro-loans through its blockchain platform. Through the same platform, Farm Credibly will simultaneously launch an accrued funding option, whereby individual investors can view farmer profiles, and directly invest in the Scotch Bonnet farms.

"To date, Farm Credibly has access to a database of more than 200,000 registered farmers, and we are embarking on an engagement with the Jamaica Manufacturers and Exporters Association, which will greatly enrich our credit scoring," Baker continues. After the company's pilot is completed towards the end of 2020, Baker anticipates that more farmers and financial institutions will be attracted to the platform. ■



In Jamaica, a pioneering start-up is using blockchain technology to create profiles and credit scores for farmers

Soilless growing New hydroponics

IN JAMAICA, a new hydroponics system, dubbed 'Roottube', has been developed to make the production of root tubers, such as yams and Irish potatoes more labour-friendly, financially rewarding, efficient and sustainable than traditional farming methods. "Standing pipes house the tuber as it grows and allow them to have a uniform shape," says Yanque Yip, entrepreneur and CEO at TSOTARE Agricultural Innovators – the company behind the innovation. "The system protects the yams from drought, excess rain, praedial larceny, pests and disease," he continues. In April 2019, Yip received a financial boost to jump-start his venture after topping the Democratizing Innovation in the Americas Urban Lab programme held by The Trust for the Americas.

Green surfing Planting trees

AN INTERNET search engine run by a German start-up has planted 50 million trees in 16 countries, financed by using 80% of their profits from advertising. Ecosia, founded in 2009 by Christian Kroll, claims to have removed the equivalent of 2.5 million t of CO₂ from the atmosphere as a direct result of their reforestation work and to be on target to plant 100 million trees by the end of 2019. "If we're to stop the world heating above the 1.5°C warned about in the IPCC [Intergovernmental Panel on Climate Change] report, we need to plant trees at scale," says Kroll. One of the company's 20 partners worldwide is the Jane Goodhall Institute in Uganda where 250,000 trees have been planted, some creating corridors to allow chimpanzees safe passage between forest patches.

CONSERVING NATURAL RESOURCES

Reducing water raises rice yields in Tanzania

After enduring recurring spells of drought, floods and poor harvests, Tanzanian farmers are taking up climate-smart skills to bolster farming efficiency.

Kizito Shigela

In Tanzania, rice farmers who have long experienced extreme weather events are harnessing climate-smart agricultural techniques to boost their yields, whilst curbing environmental degradation. Under a 5-year project dubbed Strengthening the Capacity for Climate Change Adaptation through Sustainable Land and Water Management, farmers in the Morogoro region are adopting innovative techniques to prevent soil erosion, and reduce their water and wood requirements. The project, which started in 2016, is run by Sokoine University of Agriculture with support from FAO.

Mwajuma Kassim is a rice farmer and project beneficiary in Kidugalo village, eastern Morogoro, where more than 3,000 farmers have adopted the System of Rice Intensification (SRI) – a technique of growing more rice with less water and fewer seeds. The method

entails transplanting 8-10-day-old paddy seedlings instead of waiting for 30 days to plant them to improve crop rooting. Kassim says that planting fewer seeds than usual, and keeping the paddy plants alternately wet and dry rather than draining the field, allows plants to get more oxygen. This practice reduces competition among the plants, while controlling the water each seedling receives to condition them to thrive in both wet and dry conditions – thus increasing their resilience to drought and floods. Kassim says that her harvest in 2019 will be her best in more than a decade and that she will reap the fruits of her labour 3 weeks earlier than usual.

Mwanaidi Msungu, another farmer in the same village who is applying the SRI technique on her 4 ha farm, explains that she was a laughing stock when she started applying the method 2 years ago. “Those who were laughing at me are now the ones who beg me to teach them. I have reaped 57 bags of rice in 2019. I hardly got 15 bags when using the traditional method,” she says.

In the highland areas of Morogoro, contour bunds have been used to prevent soil erosion and promote water retention. Farmers have received training in how to lay contour lines, dig trenches and produce pineapple trees to provide reinforcement for the bunds; pineapple production also provides an alternative source of income. With the skills acquired through the project, 47-year-old Hamisi Jaka is able to prevent soil erosion on his farm. With a hand hoe, he creates contour ridges known in Swahili as *fanya chini* to slow down the flow of water from the hill. “I am not worried at all about the floods; the risk of my crops being washed away is minimal,” he states.

To reduce deforestation and increase climate resilience, the initiative is also encouraging farmers to switch to energy-saving stoves that are more efficient than traditional cooking methods, and use less firewood. Tanzania has one of the highest rates of deforestation in sub-Saharan Africa, with about 372,000 ha of forests destroyed every year, according to FAO’s 2015 *Global Forests Resources Assessment*. “Trees are key to protecting soil from erosion, purifying the air and water, and reducing climate change, but many are lost as demand for wood increases,” says Godfrey Pyumpa, a district water engineer involved in implementing the project. “We encourage local residents to plant trees and they have responded positively in that regard,” he continues, explaining that so far, around 200 farmers have planted 4,308 tree seedlings of different species. The hardwood and fruit tree nurseries provide the means for future energy consumption, but also a means for economic growth and food security. ■

To increase climate resilience in Tanzania, rice farmers are adopting sustainable land and water management techniques



Sustainable learning

Greenhouse gas inventory

A FREE E-LEARNING COURSE launched in March 2019 provides the knowledge required to build a sustainable national greenhouse gas inventory (NGHGI) and assess GHG emissions and removals from the land use sector. It is aimed at staff in relevant agencies tasked with the preparation of the NGHGI, and allows attendees to understand, among other topics, the enhanced transparency framework of the Paris Agreement. Developed by FAO, the course reflects the goal of the United Nations Framework Convention on Climate Change to tackle global warming, as well as the guidelines of the Intergovernmental Panel on Climate Change to provide an updated and sound scientific basis for supporting the preparation and continuous improvement of NGHGI's.

✦ For more information visit: <https://tinyurl.com/yymeorkd>

Resilient rice

Drought resistant farming

AN INNOVATIVE research programme in Madagascar has led to the selection of a rice variety, Foffa 182, which produces 0.5 t/h higher yields than traditional seeds, and is better adapted to drought. Over the last 2 years, 40 farmers have collaborated with researchers of the Altitude Production System and Sustainability at the Ministry of Agriculture, and agronomists of the Direct Seedling Grouping of Madagascar to test about 50 varieties of upland rice in the Madagascan highlands. The different varieties are cultivated under real conditions by smallholders who evaluate the plants according to precise criteria: size of the plants, productivity, adaptation to climate change, shape and taste, size of grains, and tolerance to weeds and diseases.

DIGITAL FORECASTS

Stepping up climate-smart efforts in Malawi

To help the growing number of Malawians effected by droughts, floods and emerging pests and diseases, a climate-resilience project is scaling out tailored weather technologies and advisory services to smallholders.

Busani Bafana

Weather-based index insurance, drought tolerant seeds and ICT-enabled weather information services are some of the approaches and technologies that are being promoted and scaled up through a climate-resilience project in Malawi. With the support of CTA, the National Smallholder Farmers Association of Malawi (NASFAM) has been implementing the Scaling-Up Climate-Resilient Solutions (CRS) project since 2017, and has so far reached 65,000 farmers, most of them women.

Across the five project districts of Mchinji, Mzimba, Nkhota Kota, Ntchisi and Zomba, CRS developed a prototype weather-based insurance index to demonstrate the benefits of weather-based insurance to smallholders. "It has the potential to build the resilience of smallholder farmers by providing a pay-out in bad years to help farmers survive and protect their assets. And through the promotion of drought resistant seeds, we ensure seed availability to smallholder farmers at affordable prices, and sustain seed demand among them," says Wycliffe Kumwenda, head of NASFAM's farm services unit.

Also helping to increase the climate resilience of the farmers are tailored weather forecasts and agricultural advisory services relating to specific crops and locations, which are sent to farmers through their mobile phones. Once digitally registered with the project, the farmers can use the information received to sequence their cropping activities, for



© BUSANI BAFANA

Farmers in Malawi are increasing their maize yields using drought-tolerant seed varieties and conservation agriculture techniques

example, planting when the rains are anticipated.

The availability of drought-tolerant maize at farmer level in Malawi is low, with most agro-dealers operating in urban areas far from smallholder villages. To address this issue, NASFAM has intensified seed fairs at the village level, which have also demonstrated the demand for seed varieties to local agro-dealers and seed companies. Since 2017, over 4,100 smallholder farmers have attended the seed fairs which are held each year.

Farmers are also receiving training in conservation agriculture techniques, which is helping to enhance their productivity. "I started practising conservation agriculture in 2013 when I saw a drop in my soil fertility. The use of holes dug in the ground and mulching helped me improve my yields. I used to harvest 15 bags (50 kg) of maize from my plot; now I have 40 bags," says Mtonga, who also grows drought-tolerant groundnuts and pigeon peas on her 8 ha plot. ■

FREDRIKE PRAASTERINK

“We need a strategy that focuses on the transformation of food systems”

Professor Frederike Praasterink is a lecturer in sustainability and future food systems in the Netherlands. She strongly believes that leadership at the local level is needed to transform food systems.

Susanna Cartmell

There is no time to lose. The global population is increasing and climate change is impacting on the world's ability to feed itself. At the same time, nutrition problems remain with too many people malnourished and many others over nourished and obese. It is time to rethink the global food system. Professor Praasterink gives her insight into what she feels needs to be done.

The world faces a huge challenge to feed a growing population in a time of climate change and environmental degradation. Surely, without a healthy world, it is not surprising that too many have unhealthy diets?

That is right, and the increases in food production needed to feed a growing and wealthier population cannot be achieved by simply extrapolating our current production and consumption trends. This would undermine the very resource base on which the food system itself depends. If you look at the world's strategies for food production, we have been focusing quite a bit on sustainable intensification and still do, which concerns producing more with less and

the efficient use of resources, etc. But intensification has brought biodiversity loss and soil degradation, and this, in the face of a global malnutrition problem where one in every three citizens worldwide suffers from one of its forms: too much, too little, or the double burden of too many calories but too little micronutrients.

So now the world is slowly becoming aware that, in addition to sustainable intensification, we also need a strategy that focuses on transformation of food systems toward a sustainable and resilient state. Preserving our ecosystems as well as the health and wellbeing of people, and reaching the Sustainable Development Goals, really is dependent on a structural transformation of the food system – making it ‘net positive’ rather than ‘less bad’.

I am pleased to see that a growing number of organisations, including FAO, the World Business Council for Sustainable Development and also our own Dutch Ministry of Agriculture, have adopted, or have programmes and activities on, the strategy of transforming food systems.

How do you define and describe transformation of food systems?

Our team at the Future Food Systems professorship, a research group at HAS University of Applied Sciences, has been working for some years on defining the transformation of food systems. We work on this in collaboration with a Dutch foundation called the Transition Coalition Food – an organisation of more than 150 businesses, NGOs, governments, and knowledge and education institutes. The coalition was formed about 3 years ago, and is actually a ‘bottom-up movement’ based on a collective feeling of urgency that something needed to be done in addition to what we already do in the ‘usual’ innovation programmes.

So, we have defined transformation of food systems in a number of transition paths; one focuses on redesigning agricultural production systems towards more diversified agro-ecological production systems that are climate resilient, for example, growing polycultures (a diversity of crops) rather than monocultures to regenerate soils and biodiversity. And



Professor Frederike Praasterink emphasises the need for coalitions as part of the strategy for transforming food systems

circular production, for example, by using food waste streams as feed for animals, or by using edible insects like black soldier fly larvae that upcycle organic waste to high quality proteins and fats.

Another transition path is on food consumption, which involves moving towards sustainable diets that consist of much more plant-based foods, including plant proteins. These sustainable diets should also help work towards more preventive healthcare, through food, the food environment and lifestyle.

We also work on business models based on true cost accounting, which includes the hidden cost of our food, cost for loss of biodiversity, CO₂ emissions, and healthcare costs due to unhealthy lifestyles. A team of seven of our students are currently undertaking a very interesting assessment of the perceptions in our agri-food sector on true cost accounting and how it can be applied.

And what exactly do you mean by a systems approach?

With our systems approach we look at the food system as a whole, not just chains, to define intervention strategies that would help reduce specific problems, such as food waste and losses. We have developed a number of steps, and

usually work with groups of people that are involved in the field to make a food systems analysis. We look at the priority issues, the patterns of behaviour that cause them, the underlying structures and the paradigms that make the problems persist. This sounds all a bit conceptual but, in fact, it is very practical when applied to a specific situation or theme. This results in a series of interventions that could be applied in the short, medium and longer-term.

For example, we organised a masterclass at the beginning of 2019, with highly motivated students from different courses as part of an honours programme and in cooperation with a national foundation on food waste. Instead of looking at food waste as the problem, we looked at food waste as the *symptom* of an unsustainable system. So, instead of focusing on what to do with food waste, we looked at why food waste happens again and again – what are the structures, patterns, models and paradigms of the food system that continue to cause food waste at various levels. This led to an intervention that did not just target the re-use of waste, but also, the underlying patterns. The interesting thing is that, when you work on the paradigms of food waste, you realise that they are actually similar to the paradigms of other

food system problems like biodiversity loss. These paradigms are, for example, productionism, profit maximisation, and a disconnection from food and nature. Leverage points can be on all these system levels, but changing the paradigms is really transformative.

You are building this movement, but would you say it is very much a Western approach or is it happening on a more global scale?

I think it is happening on a global scale. And interestingly, the younger generations, for example our students here at my university, really understand the challenge that we face, and want to be part of the solution. Look at the climate marches. So I am very hopeful that there may be a ‘silent revolution’ of the younger generations that will lead us all to sustainability.

But we have very little time and we are already exceeding a number of planetary boundaries from our food system. We are contributing a quarter more greenhouse gases from agriculture and food than from other sectors, so clearly, we need to do something more radical than what is happening currently. However, transition starts with awareness that food systems are related to other issues; climate and food and water security, for instance, are all inter-related so we cannot just apply a quick-fix or a technology push.

Worldwide, the food system needs to be changed and Western countries maybe need to change the most. Dietary patterns are an example – reducing meat consumption and eating more fruit and vegetables are simple things, but very effective for the global system.

To adopt the strategy of transforming food systems, we need to work in coalitions. And we need leadership to transform food systems, both formal leaders like presidents, policymakers or captains of industry, as well as ordinary people as leaders in their community or circles of influence. Never underestimate how your sustainable choices can contribute to big change. ■

MURIELLE DIACO

The circular economy in Africa

Launched in 2016, the Djouman platform brings together African start-ups and investors looking to initiate joint innovation projects. Managing director of the platform, Murielle Diaco, explains the company's objectives.

Vincent Defait



Through her company, Djouman, Murielle Diaco is building youth capacities in agroecology and green entrepreneurship for a more sustainable future

The circular economy may seem rather nascent across the continent; do you feel that the pace of development towards a more sustainable future is fast enough?

The circular economy has always been present in Africa, through many practices, such as the sparing use of raw materials, the reuse of products, and 'tontines' (economic cooperatives), which are part of the participatory economy for promoting the sharing of knowledge and services. Africa is leaning towards a 'Westernised' consumerist economy and starting mass production, with enormous internal and external pressure on African populations and their leaders to consume more, and in a linear fashion. The challenge is presenting other, more inclusive and sustainable models of development, as people get the impression they are being prevented from attaining what developed countries possess. At ACEN – the Africa Circular Economy Network – we explain that development involves drawing on what we already know how to do.

Where do you see the most exciting examples related to agribusiness?

We are seeing many permaculture and agroecology projects emerge. We

are therefore starting to imitate ecosystem models instead of monoculture models. In Burkina Faso, for example, associations and small enterprises have developed agroecology projects, where they have combined traditional skills with innovative methods that reuse production residues to make improved compost or treat crops. In Benin, the Jardins de l'Espoir (Gardens of Hope) – an incubator of agriculture projects with educational demonstration farms – has developed a compost made from rice residues called BOKASHI. In South Africa, initiatives are underway to ensure food security in shanty towns where people grow their own produce.

What inspired you to launch Djouman and how do you see the future of your company?

My main motivation was to help Africans to be self-sufficient. I was spurred on by the many projects aimed at creating greater sustainable development in Africa. These projects, however, are limited because they lack connections to global networks, financing and skills. The idea of Djouman is therefore to bring all that to the players who are already doing interesting things in the field; we want to develop a network in sub-Saharan Africa between countries with relatively similar development problems, so they can learn from one another.

Concerning our vision for the future, we also made the decision to engage in youth training projects. At Djouman, we want

to enable young people to shoulder the responsibility of sustainability by creating their own income-generating activities through entrepreneurship. Towards this end, we are building youth capacities in agroecology and green entrepreneurship through AgroBootCamp training centres.

Consumers are beginning to make more ethical decisions, which is driving change in agribusiness to be more sustainable and use resources more efficiently, but how can policymakers also support this?

Policymakers are aware that we cannot continue to exhaust all the resources, for example, through ultra-intensive farming. The move to action, however, is slow. At Djouman, we are encouraging the creation of regulatory frameworks that force industrialists to take greater account of their impact. We know consumer pressure on major brands, forcing change, works, so we need to call on civil society players in order to put forth proposals and persuade policymakers to impose restrictive frameworks. Without restrictions, nothing will happen.

In addition, we need to shed light on responsible and sustainable initiatives that work well, such as 'green businesses' which have minimal negative impacts on the global or local environment, society and the economy. We need to create dialogue between all stakeholders – private and public sectors, associations – to find solutions for how to transition towards increasing such enterprises to achieve sustainable development. ■

SPORE

Dossier

**ENHANCING
AGRICULTURAL
EXTENSION
WITH ICTS**

To enable smallholder farmers to improve production, reduce crop loss and ultimately increase productivity, it's crucial to transform agricultural extension services through impactful decision-support tools and digital know-how.

DIGITALISING EXTENSION

Supporting advisory services for smart farming

Digitalisation is improving the agricultural extension system by providing services at the right time, and facilitating adoption of new agronomic practices, resulting in yield improvements and higher incomes for farming households.

Tiane Cline

Traditionally, small-scale farmers make decisions based on their own experiences, influenced by conventional practices and collective knowledge, but this does not necessarily translate into productivity or profit. “Hands-on extension services, ranging from soil preparation, irrigation scheduling, selecting pest resistant cultivars and integrated pest management strategies in Africa’s agriculture sector is crucial because the potential to safeguard global food security is lurking, but the infrastructure, skill and social development do not yet exist to unlock such potential,” explains Marili Mouton, an agronomist working in South Africa.

If Africa’s agriculture sector is to be transformed, Mouton believes that smarter ways of working are needed and the answer lies in innovating extension services with ICTs.

Village-level extension via video

According to the International Food Policy Research Institute (IFPRI), in Ethiopia video as a form of agricultural extension reaches 24% more farmers when compared to other kinds of agricultural extension; and extension agents using video make greater efforts to visit farms and provide follow-up advice than those who do not.

“This IFPRI study led to the development of our video-enabled approach, which, in a controlled evaluation, was found to be seven times more effective in terms of adoption of new practices, and 10 times more effective on a cost-per-adoption basis,” explains Rikin Gandhi, Digital Green’s executive director. Digital Green was launched in India in 2008 as a non-profit to work with smallholder farmers. In 2011, the organisation started to work in Ethiopia with the Ministry of

Agriculture’s vast national extension system; more than 60,000 extension agents are tasked with reaching 60 million farmers.

Digital Green’s videos feature local community members sharing testimonials or demonstrating a practice. “By enabling rural community members to play an active role in creating and shaping content, Digital Green gives even isolated communities a voice,” adds Gandhi. Village-level extension agents (trained by Digital Green) screen the videos among groups of 20–25 farmers using battery-operated, mobile projectors. Mediators facilitate the screening, engage the audience in discussion, answer questions, capture feedback and motivate the community to adopt the featured practice.

For Digital Green, data is key – the extension agents who screen the videos capture the number of viewers reached,





RiceAdvice, a bilingual Android app, is providing extension agents and smallholder farmers in Mali, Nigeria and Senegal with field-specific recommendations

their questions and interests, and the number who apply the featured practice. Analysis of this data and feedback inform the production and distribution of the next set of videos in an iterative cycle that progressively addresses communities' needs.

Over 6,000 videos in multiple languages screened to 2 million rural Ethiopian households since 2009

While video remains at the centre of Digital Green's extension approach, the company is now exploring mobile app-based solutions to link farmers to markets

as well as mobile app-based training and quality assurance for extension workers. "We now incorporate digital technologies such as interactive voice response (IVR) and SMS to deliver complementary or reinforcing messages," says Gandhi.

Since 2009, Digital Green has facilitated production of more than 6,000 localised videos in 50 Ethiopian languages and dialects, which have been screened by 17,000 frontline workers to reach more than 2 million rural households. "We believe that, with recent developments in technology, it is possible to provide more nuanced solutions to farmers if the potential of these technologies is used more effectively," says Gandhi.

Reaching out with radio

As a medium for agricultural extension, radio is easily accessible and affordable. However, it is not always

suited to smallholder farmers, as information is primarily broadcast to the masses and not necessarily in minority languages. This is something the Syngenta Foundation for Sustainable Agriculture (SFSA) sought to change through their innovative partnership with Kilimo Media International in Kenya.

"Broadcasting in Swahili is not good enough," explains Paul Castle, SFSA communications manager, "which is why SFSA decided to broadcast Kenyan farm advice in vernacular languages like Borana, Kimeru, Kikamba, Kimaasai and Kikuyu." By working with vernacular radio stations, SFSA has found radio to be an innovative and cost-effective medium for agricultural extension. "You don't need to read and write, or have internet connectivity or even a TV. Thanks to mobile phones, radio has become a lot



› more democratic. Listeners can send in messages using their phones and the agricultural extension officers we work with agree – it is a way for them to reach a wider audience,” adds Castle.

To allow farmers to ask further, contextually-relevant questions, SFSA has also established listener groups who meet with an extension officer after a radio broadcast. Planning meetings are also held with extension officers, and other agricultural experts. “This is a new approach for these stations that were essentially previously only playing music,” says Castle. “These stations have essentially set up their own agricultural calendars but they also have to react flexibly if there is a sudden threat (like drought). And, in this way, radio can be quite innovative and create real impact.”

The results speak for themselves – the amount of people calling in to radio shows rose from 0.03% to 29% and radio listenership rose from 59% to 96% within 3 years. Interestingly, the numbers show that these small stations also reached a far larger catchment area than SFSA had originally planned: “Because they’re broadcasting in languages which are spoken on both sides of the border,

there are people listening in via the internet in Uganda and even southern Ethiopia,” Castle explains.

Going mobile

While radio plays an important role in advancing agricultural extension in Africa, mobile is also key. Yet, according to a 2018 study from the Pew Research Centre, sub-Saharan Africa still has the lowest smartphone penetration compared to the rest of the world. For companies using smartphone applications to extend agricultural extension services, connectivity remains a barrier to entry.

Farmers using the RiceAdvice app showed average yield gains of 0.6 to 1.8 t/ha

In sub-Saharan Africa, the number of households growing rice in irrigated and rain-fed lowland is estimated at around 4.7 million. Yet rice productivity is low due to sub-optimal crop management practices by smallholder farmers.

Using an interactive approach integrating radio, mobile phones and apps, Farm Radio International is providing trusted information to farmers to improve agricultural practices

Enter RiceAdvice, a bilingual Android app that gives NGOs, extension agents and smallholder farmers in Mali, Nigeria and Senegal direct access to field-specific recommendations. Providing essential information at the start of each season, RiceAdvice also gives advice on key in-season practices like fertiliser application and weeding. As many rice farmers may not own a smartphone, agricultural extension officers (also often farmers themselves) provide farmers with RiceAdvice recommendations after entering detailed information such as rice-growing conditions, variety, typical practices, expected sowing date, fertiliser availability, market price, etc.

“Filling in the data is fairly easy as the questions are framed in such a way that they are easy to answer. Once this information is filled in, extension officers can help smallholder rice farmers to set yield targets based on their available budget or desired/recommended production levels. Once farmers get used to smartphones and

can use RiceAdvice, they'll have direct access to field-specific recommendations," says Dr Kazuki Saito, an AfricaRice agronomist.

RiceAdvice is based on research repackaged into a format that is both useful and accessible for farmers. Face-to-face interviews and post-harvest surveys are then used to improve the app. Rice farming guidelines are newly generated each season in order to remain as accurate as possible, so although the app can be used offline, internet access is required to get the latest updates.

"Traditional blanket recommendations for soil fertility management practices have been introduced to rice farmers. However, these blanket recommendations have not been updated regularly, and are therefore quickly outdated," explains Saito. In a 2015-2017 trial conducted in Mali, Nigeria and Senegal, farmers using the RiceAdvice app showed average yield gains of 0.6 to 1.8 t/ha.

In fact, most farmers who used RiceAdvice reported increased yields and incomes, and reduced fertiliser use. "Studies by AfricaRice have shown that, compared to farmer practices, adoption of RiceAdvice recommendations can increase rice yield by about 20%, leading to an increase in profitability of about US\$200 [€180] per hectare per season," ends Saito. RiceAdvice is reaching around 10,000 farmers each season.

Capitalising on capacity strengthening

Enhancing digital and face-to-face agricultural extension to farmers through training is something that fresh produce delivery service, Ojay Greene, is working towards. Founded by Yvette Ondachi, a Kenyan scientist, her business is on a social mission to increase the income of smallholder farmers. "Farmers work the hardest in this country. It's so sad to work so hard and not get a return. Year in, year out, they're doing the same thing... Ojay Greene is about improving productivity but also bringing together and enriching communities," emphasises Ondachi.

Ojay Greene produces and sources fresh fruits and vegetables from smallholder farmers to sell to supermarkets, restaurants and hotels in urban areas. The Kenyan company cuts out the

middle man by providing smallholder farmers a market for their produce, as well as technologies and strategies to improve production. Farmers are divided into groups of 10-200 farmers within a neighbourhood or community, and assigned an Ojay Greene agronomist. Agronomists use a combination of community-based meetings during their visits as well as SMS to communicate with farmers about production, inputs, and disease control, among other issues, throughout all stages of the farming process as Ojay Greene requires that the farmers remain in frequent communication with them. "It's not just about enriching the community, it's about enriching a continent, changing the landscape of sub-Saharan Africa and feeding the world," ends Ondachi. By 2020, Ojay Greene hopes to reach 20,000 farms across Kenya and is looking to expand into neighbouring countries.

National level extension

In Ghana, 59% of the country's workforce are involved in agriculture in some way. Yet one of the biggest challenges that the country faces is educating its smallholder farmers. To bridge the gap between agricultural extension agents and farmers, Ghana implemented a national e-agriculture system in 2011 through its Ministry of Food and Agriculture.

The platform enables farmers, processors and other stakeholders to exchange opinions and resources relating to agriculture. The platform includes three elements. The first is known as 'e-Farm Information', where farmers can use the e-agriculture call centre facility - at no cost - to find out best farming practices in local languages. There's also an e-Learning and Resource Centre, which provides useful information for all actors in the agricultural value chain. Finally, extension officers are equipped with digital tools to collect farm and farmer data through digital tools to help provide enhanced advice to farmers.

In Côte d'Ivoire, with support from the World Bank, the National Agency for Support to Rural Development created an electronic agricultural extension services system in 2018 to reach as many farmers as possible, even those in remote areas, to improve farm

Participatory video for extension

Digital Green is producing and sharing agricultural videos to extend advisory services in Ethiopia

The challenge:



60,000 extension agents:
60 million farmers

The solution:



Videos shown to groups of farmers using battery-operated, mobile projectors

The impact:



6,000 localised videos in 50 languages and dialects



More than 2 million rural households reached



Approach is 10 x more cost-effective than traditional extension



Adoption of better farm practices increased 7-fold

SOURCE: DIGITAL GREEN

› productivity and access to markets. The e-extension platform serves as an IVR-server and call centre through which farmers can pose technical questions and seek advice on farming practices. “This project will ensure that farmers have timely information on key aspects of the agriculture value chain such as the seed market and that public institutions can collect agricultural and rural statistics for more efficient sector policies

and strategy,” states Pierre Laporte, World Bank’s country director for Côte d’Ivoire. The 5-year initiative aims to reach 6.1 million smallholder farmers. Like many African countries, the agriculture sector remains an important driver of Côte d’Ivoire’s economy accounting for 22% of GDP and more than 74% of exports, with the majority of smallholders operating on less than 2 ha of land.

“As the African population continues to expand at a rapid pace, digital extension is key in ensuring that food security is met,” emphasises Mouton. Through innovative extension services that improve production and increase both productivity and yield, smallholder farmers in Africa are managing to, and will continue to, adopt smarter, more impactful and sustainable agricultural practices going forward. ■

Digital integration for extension by radio

Farm Radio International (FRI) is changing the way radio is used by bridging the divide between broadcasters and listeners through experiments that combine radio, mobile phones and the internet. The aim is to provide the most cost-effective and impactful digital extension to farmers.

Uliza (‘ask’ in Swahili) is FRI’s innovative extension platform for audience engagement, monitoring and quality assurance that integrates radio, mobile and IVR systems. The online platform allows partner radio stations to engage hundreds, even thousands, of listeners who use their mobile phones before, during, and after farm radio programmes air. Listeners can vote, register for alerts, request the delivery of specific, crop-related information and get their questions answered. The process is quick, easy, participatory and – most importantly – free. Listeners also leave messages on Uliza, providing feedback on the programmes and how these can be changed to suit their needs.

Content is delivered to listeners in their own language, eliminating literacy barriers. Broadcasters upload episodes each week to Uliza, and then FRI staff and subject matter specialists involved in the project listen to the episode and provide feedback to the station team so they can improve subsequent episodes. Broadcasters also access audience data in real-time using Uliza’s digital dashboard. This information helps the broadcasters to better understand the farmers who call in – they can gather feedback, access listener-generated content and provide information and services that help their listeners.

To date, more than 70 of FRI’s radio partners in Burkina Faso, Ethiopia, Ghana, Kenya, Mali, Nigeria, Senegal, Tanzania and Uganda have used Uliza to interact with more than 210,000 individual listeners. Uliza makes farm radio better for broadcasters and better for small-scale farmers. “That is why I am proud of Uliza,” says Kevin Perkins, FRI executive director. “Radio programmes invite listeners to share their experiences or their opinions or ask their questions using Uliza. The resulting data goes right back to them – via the radio programmes they listen to,” adds Perkins. “And they can be confident that the collective, anonymised feedback they offer really is reaching decision-makers, because it is going out on the airwaves that everyone listens to – including the decision-makers.”

Uliza services

Using tech innovation to reach radio listeners



Based on numbers from our 2017-18 Annual Report

farmradio.org | farmradio

FARM RADIO RADIOS RURALES
INTERNATIONAL INTERNATIONALES

INTERVIEW

Nasir Yammama: A technological approach to enhancing the impact of agricultural extension

.....
Inioluwa Oluwabemi

How do you see the challenge of providing effective agricultural extension in Africa?

Extension faces a great manpower and technology deficit in Africa; the ratio in Nigeria is about one extension agent to about 2,000 farmers, which is outrageous. It is impossible to say we need to get more extension agents because that alone would not solve the problem. The best approach is to leverage on available technologies and new media to be able to deliver extension services – especially those that can provide information and training to farmers.

With the high proliferation of mobile phones in Nigeria, it is important that this technology is stepped up to cover rudimentary extension services. For instance, imagine a farmer who has invested in and applied agrochemicals and then it rains the next day washing them away. A text with the weather forecast would save this farmer much money and effort.

Also, simple things like how to reduce spacing between crops to enhance yields can be communicated via phone calls, voice or SMS messages. So we need to combine mobile technology and human presence to work hand in hand to reach more farmers. Without extension, there is no way we can produce the food that the world needs.

Which innovations and approaches do you feel are best placed to overcome this challenge?

What is needed is to increase the use of available technologies to not only capture information or data, but also to deliver it. In terms of capturing data, new technologies such as drones and satellites should be used. The establishment of call centres is also effective in terms of information delivery and, although this comes with charges – as voice, data and even SMS messages cost money – there are ways to innovate around this to bring costs down. We also need to adapt the financial model so that farmers can afford extension; for example, adding the cost of extension services to the inputs received.

What impact is your company, Verdant, having in providing information services to farmers in Nigeria?

We have built a two-way communication system whereby we send out information to farmers, but they can also request additional information at any time. So far, we have 8,000 active farmers and it is fascinating to know what they ask for. A lot of farmers see the promise in using agricultural data for decision-making, and send requests regarding weather forecasts, finance, and the best technology – ranging from seeds to machinery.

How do you ensure that your services are meeting farmers' needs and helping women, as well as men?

One of our greatest values as a company is that we try not to be too removed from the farmer. We constantly interact with farmers and have established demonstration farms where they live. Most farmers would only adopt an approach, such as using some agro-chemical or improved seed, after seeing how it performed on another farm. We are also in continuous contact with research agencies which research and develop technologies, such as new seeds and animal husbandry techniques. Our goal is to popularise these new technologies to smallholders. So the most prominent and cost-effective discoveries, especially new seed varieties, are indeed pushed to farmers through Verdant.

We also endeavour to take note of what farmers want, especially in terms of culture and social realities, and we try to provide the services in a manner that can be useful to them for decision-making and improved productivity. We launched a special rice programme in Kano, having encountered a group of 12 women who grow over 35 ha of rice despite constraints like access to inputs, markets and basic infrastructure. We've been working with these women, using mobile technologies to help them in their dealings, and telling their stories in order to attract attention around their farming.



© VERDANT

Nasir Yammama, founder and CEO of agri-tech value chain company, Verdant, in Nigeria is providing mobile solutions to enhance agricultural extension messages to farmers

MALAWI

Accessing agricultural extension by video

By embracing modern technology and engaging enthusiastic young people, the work of an NGO in Malawi is extending the reach of agricultural extension across the country.

Charles Mkoka

With the right policies, innovation and investment, agriculture on the African continent could be transformed into a powerhouse, not only to feed the growing population but to create decent employment for millions of young people, states *The Digitalisation of African Agriculture Report* by CTA and Dalberg Advisors. As seen in other sectors, technology is critical to affecting change and driving development and, in agriculture, digitalisation could be a game changer in boosting productivity, profitability and resilience to climate change.

In another recent report, *Byte by Byte: Policy Innovation for Transforming Africa's Food System with Digital Technologies*, by the Malabo Montpellier Panel, the authors state that digitalisation can “improve the agricultural extension system by providing services at the right time, attaining scale, and facilitating adoption of new agronomic practices, resulting in yield improvements and higher income for farming households.”

In Malawi, to make the most of technical advances to enhance extension approaches, international NGO, Access Agriculture, is working with budding youths as Dee Jays (DJs) in villages and major trading centres. The DJs reach out to farmers with extension messages shared through electronic devices, such as mobile phones.

Developing agriculture with DVDs and mobile phones

In 2015, Access Agriculture provided three DVDs with a compilation of agricultural videos to 95 DJs in the southern region of Malawi, with advice on growing rice, fighting striga weed and growing chilli. Apart from one video, all



© STEVEN JANSSEN

30 farmer-to-farmer training videos were made in other parts of Africa and Asia and then translated into local Malawian languages. “Access Agriculture promotes the use of videos in local languages to support extension advisory services. In the case of Malawi, there are four languages in which the videos are being shared, namely: Sena, Yao, Chichewa and Tumbuka,” says Ronald Kondwani Udedi, country focal person for Access Agriculture in Malawi.

Jeffery Bentley, who has conducted research on the distribution and impact of the videos, says that the DJs copy the DVDs from Access Agriculture. They then share the videos on memory cards, USB flash drives or through mobile devices costing between €0.05 and €0.20 for each video. Virtually all of the DJs distributed at least some of the DVDs and were able to generate income from this activity. In addition, the videos have helped build community respect for the young entrepreneurs.

The DJs are not agricultural extensionists but have proved a viable alternative for distributing farming advice. Udedi adds that Access Agriculture is now working in collaboration with other organisations such as Feed the Future’s strengthening agricultural and nutrition extension (SANE) initiative. “The SANE partnerships intend to include DJs as part of the district agricultural extension services system, village agricultural committees, area stakeholder panels, district stakeholder panels and district agricultural extension coordinating committees. Stakeholders in agriculture are now realising that DJs are playing a crucial role in reaching out to farmers who are in hard-to-reach areas due to poor roads and difficult terrain,” Udedi explains.

One of the DJs distributing the videos is Silaji Fanuel, who manages a mobile phone and digital accessories shop based at Mangochi Turn Off Trading Centre in Balaka district. He told *Spore* magazine that he asks his clients, mostly farmers, if they have the capacity to watch the videos on their phones as he does not have a DVD writer. “I have been doing this for the last 3 to 4 years,” states Fanuel. As a result of sharing the videos, some farmers started growing chilli for the first time and others responded by controlling striga, which they had never been able to do before.

Agricultural videos have been produced and distributed by Access Agriculture in southern Malawi



© PAUL VAN MELE

After watching a video on chilli farming, smallholders are taking up production of the crop for the first time

Model farmers and advisors

Phemia Mpombwe is a retired teacher and one of the successful women farmers who have benefited from the extension videos obtained from one of the DJs at Migowi Trading Centre in Phalombe district. “After watching the video shared by the DJ, I acquired knowledge used in rice growing in my area. This has resulted in me harvesting 140 bags of rice weighing 62 kgs each,” she states excitedly. “Despite failure of maize as a staple crop, rice will help me and my family. I will sell some of it and be able to buy necessities for the home and my children. I will use the money from rice sales to buy additional chickens.”

Mpombwe adds that, as result of the bumper rice harvest, she is now a role model farmer in the area attracting others to learn from her. Farmers are now flocking to her field to tap her expertise on how she has had such success.

Meanwhile, one of the DJs has won a smart projector through the Access Agriculture’s 2019 Young Entrepreneurs Challenge Fund competition. Osman Majid, based at Nathenje in Lilongwe, was distributing videos about farmer’s rights to seed. The video, which was filmed in Rumphi district in the northern region, shows how farmers preserve indigenous seed using traditional knowledge. “The projector will be used to show videos to famers and people of Nathenje and other surrounding areas. We will be showing the videos to farmers, including the youth, to advise them of the importance of agriculture,” he said after being announced as the winner.

By July 2019, 6 years after being established, the Access Agriculture video platform has attracted 270,000 people (www.accessagriculture.org), mainly from Africa and Asia, including from thousands of development organisations and education institutes. According to a 2018 study titled *Quality farmer training videos to support South-South learning*, in 54 countries, there are over 1,000 visitors to the site who appreciate the easy search function, and the quality and relevance of the videos. ■

CARIBBEAN

A community approach: digital innovations for extension

Following a training course in technology stewardship, actors in the Caribbean's agri-food sector are implementing ICT approaches to provide agricultural advice and support to their local communities.

Keron Bascombe



© KERON BASCOMBE

Agricultural extension workers in the Caribbean are adopting ICTs to support innovative agricultural practices in their local communities



To better facilitate training and knowledge transfer among Caribbean agricultural communities, 20 actors involved in the agri-food value chain from Trinidad and Tobago – and now working across the region – took part in a 2-day capacity-building workshop ‘Introducing Technology Stewardship for Agricultural Communities of Practice in the Caribbean’ in April 2019. The participants, who included farmer association representatives, extension officers, as well as agricultural consultants, were introduced to the concepts of technology stewardship (see box).

“Technology stewardship is not the same as ‘IT support’,” says Gordon Gow, professor of communication at the University of Alberta and one of the course facilitators. “Technology stewards need to know how to engage their community members to identify opportunities and challenges; they need to be able to acquire and configure appropriate digital ICT platforms to support innovative practices; and they need to be able to evaluate and report the outcome of their efforts back to the community and to organisational sponsors,” he explains

Optimising cocoa production

One course trainee, Sara Bharath, is an agronomist and cocoa expert with 22 years’ experience. In 2011, she began volunteering with cocoa farmers in Trinidad, where she gained insight into what was missing in terms of extension services. “Unfortunately, there was limited hands-on training over a consistent and prolonged period, which is what many farmers need in order to build new and progressive habits and to make a difference with respect to quality and quantity,” she explains.

In 2016, Bharath started working with the Trinidad Micro Lot Project in Oregon in the USA, which works with small Trinidadian farmers to improve skills in cocoa production. Emphasis was placed on cocoa field management, timing and handling of harvesting, as well as appropriate conditions for the fermentation process, which is required before cocoa can be processed into chocolate. Starting with 40 farmers, the initiative aimed to increase quality and, by doing so, get farmers a better than world market price. The project purchases beans from the small producers and transports them to the USA to be sold to craft chocolatiers.

“Micro Lot producers are paid at least US\$5/kg [€4.44] for dried beans. The local market was at the time [2016] paying nothing more than US\$3/kg [€2.66] and with zero traceability on the beans,

and little to no quality control was carried out (so the beans were substandard). The international market consistently pays US\$3–4/kg [€2.6–3.5] for dried beans of similarly high quality and quantity,” explains Bharath.

Bharath admits that despite her demanded expertise, she is not a ‘tech savvy’ person, although she recognises the power and advantages of ICT tools. “For me, understanding [through the ICT training course] how to use these tools in a more systematic way was very beneficial, especially given the limited resource environment that is common in our agri sector,” she says. Since the training, Bharath has been using WhatsApp as a means of information dissemination and troubleshooting with the teams she has trained throughout the region. The most recent application has been to remotely monitor the fermentation process of beans in St. Vincent while she is away conducting work in Trinidad. Her team is able to send over photos and spreadsheets in real time for her to review and send back comments/decisions via voice notes or calls.

Also making the most of social media channels to train local cocoa farmers is Matthew Escalante, programme officer for the Cocoa Development Company of Trinidad and Tobago (CDCTT). “The course allowed me to understand which ICT is most applicable to the communities that CDCTT serves. We started implementing what was learned [in the course] in the small community of Lopinot using WhatsApp, Facebook and Instagram,” he explains. “These digital tools are used by our cocoa producing families and are picture-based which community members respond to. We have sent videos on cocoa picking, harvesting and handling. However, it has been a challenge getting feedback from the community; our work is in progress,” he adds.

A local focus

“The low budget approach to implementing technology use was the most valuable aspect of the ICT training,” states Christopher Alexander, quality assurance manager at the Farmers’ Market and Quality Assurance Department of the National Agricultural Marketing and Development Corporation (NAMDECO) of Trinidad and Tobago. “Our field officers were able to form a WhatsApp group to support the Moruga Farmers Cooperative producers of the Moruga Red (scorpion) pepper,” he continues. Through an on-the-ground outlet, Farmers’ Market provides quality assurance

“These digital tools are used by our cocoa producing families and are picture-based which community members respond to”

› services for small farmers and cooperatives, and individuals of complementary agricultural sub-sectors, such as artisan and cottage industries, and small-scale agri-processing.

“We have established key officers who manage planning, accounting and advisory services for cooperatives. Focus is placed on communication with community leaders, sharing information, scheduling meetings and updating farmers. Often, producers seek price information or logistics for our farmers’ market activities,” Alexander says.

“Whilst some farmers are keen to embrace new technologies...many farmers own a smart device but are still unaware of how to use it”

Responsible for monitoring the department’s farm certification programme, Alexander assigns field officers to small farmers within a particular area. The officers carry out farm visits, during which they record produce information, such as the date of crop planting, the expected date of harvest and harvest volume, and details on the state of the field, i.e. pest and disease incidences. These data are recorded on the National Agricultural Market Information System (NAMIS) database, which also contains market data from 2001 to the present day for over 40 commodities regularly traded at farmers markets in the country. Producers subscribed to NAMIS access the database via the website when they want to check local produce prices, and buyers can also access the database when they are looking to purchase produce.

Gateway app to modern technology

Jeet Ramjattan, a field officer with the Extension Training Information Services Division of the Ministry of Agriculture in Trinidad and Tobago, has interacted with over 3,000 farmers during his career. “I saw the role of a steward as complimentary to my ongoing engagement activities with farmers. As a field officer, it is expected that I take the lead in determining the needs of farmers and be the intermediary as farmers use ICTs in order to meet these needs. Agronomy, crop production, market information, sources of credit, among other farm services, are all accessible through the use of ICTs,” Ramjattan says.

In the east of the country, Ramjattan provides services to farmers via the Orange grove WhatsApp group. The farmers utilise the platform strictly for farming-related queries and solutions; for example, they often enquire about market prices for the commodities they produce including baigan (eggplant), caraille, cucumbers and lemons. Using the WhatsApp channel, Ramjattan has also been able to introduce the producers to NAMIS, and how to access price and volume data on a daily basis through the WhatsApp platform.

“Another farmer out of the group needed information on [the specific variety, available amount and price for] squash pumpkin seeds, so I sat with him to teach him how to write an email to a foreign supplier requesting information on the seeds, and then following through at organised intervals to get an import license. This involved signing up with TTBiz Link, an online service for license and permit procurement,” Ramjattan explains.

However, whilst some farmers are keen to embrace new technologies to increase their access to information and markets, Ramjattan admits, “Not everyone is there yet; many farmers still rely on face-to-face interactions. Many farmers own a smart device but are still unaware of how to use it.” ■

Participatory ICT extension

Since 2017, the University of Alberta, Canada, has been undertaking participatory action research to develop and test open education resources on technology stewardship. The research is targeted towards agricultural practitioners and extension agents in developing countries with limited resources, and intends to improve knowledge transfer capabilities using methods of social learning.

In March 2018, a 2-day technology stewardship course was tested with 20 agricultural and fisheries extension officers from across the Caribbean at the University of the West Indies in Trinidad and Tobago. Participants were introduced to the concepts of stewardship and ‘community of practice’ (COP) – a group who share a common concern/interest. The participants were guided through a set of activities to explain how they would identify community needs, select appropriate ICTs to meet those needs, conduct pilot tests with their identified COP, and evaluate the results.

“We present a series of steps they can take to identify the needs that a COP might have... and the ICT tools that might address that

need – and then look at a way to introduce those tools through a platform, such as Facebook, WhatsApp or Google,” says Dr Gordon Gow, a course leader from the University of Alberta. Participants were particularly eager to establish Facebook pages and WhatsApp messenger groups for use in, for example, plant disease diagnostics.

A final session involved participants creating individual action plans to outline an activity that they would conduct and complete after completion of the course. This could include a community engagement activity to identify ICT opportunities, a rapid prototyping exercise of a selected ICT, or the design of a campaign to implement an ICT.

“I know how to organise an initiative, set objectives, choose a specific ICT tool, and create a campaign to test, more or less by trial and error, if it’ll be effective with helping the farmers – or not,” says Michael Flowers, a course participant from the Department of Agriculture in the Bahamas.

Sophie Reeve

SPORE

Agribusiness

MARKET OPPORTUNITIES

*Cotton transforms Mali's
handicrafts sector*

*Smallholders access the sweet
potato snack market*

30

AGRI-FOOD SYSTEMS

*Groundnut production boosts
profits for Zambian farmers*

*Nigeria increases tomato paste
production with good practices*

32

FINANCE & INSURANCE

*Making index-based
insurance profitable*

34

TRADE & MARKETING

*The potential for women
to tap into Africa's free
trade area*

36

BUSINESS LEADERS

*"Quality is the key to
success!"*

38

TEXTILE TRAINING

Cotton transforms Mali's handicrafts sector

Through local support projects and initiatives in Mali's cotton value chain, craftspeople are acquiring new equipment and skills to increase in-country textile processing.

Soumaïla Diarra

In West Africa, the cotton value chain is opening up new market opportunities for small-scale artisans. The Support Project for the Cotton-Textile Subsector (PAFICOT), which ran from 2008 to 2013 and was supported by the African Development Fund (ADF), aimed to diversify cotton distribution networks by providing craftspeople with spinning and weaving equipment (hand carders, spinning wheels, distaffs, large looms of different types), as well as with dyeing tools (bowls, scales, protective equipment). Mali's Ministry of Agriculture estimates that 2,000 craftspeople (including 1,413 women) benefited from the project's capacity-building activities, which included business creation and management training.

Aïssata Camara is one of 2,000 Malian artisans who has received equipment and training for her cotton textile business

One beneficiary of PAFICOT is 57-year-old Aïssata Camara, who runs a dyeing business with six other craftspeople. Under the project, she received entrepreneurship training and equipment including gloves and protective masks. As well as selling dyed fabric at 2,000 CFA francs (approx. €3) per metre, Camara also makes items out of local cotton. Her business brings in an average monthly profit of 400,000 CFA francs (€615). Overall, thanks to the PAFICOT project, the cotton processing industry is on the rise. "I can make a good living now from selling cotton-based fabrics," she explains. "There's been a boom in cotton processing over the past 8 years or so. Professionals working in the sector have joined forces to create the Malian Network for Organic Cotton Processing."

The network has its own store in the capital, Bamako, where it sells organic cotton products to craftspeople throughout the value chain, such as natural dyes, thread and other vital supplies. "We're also working with organic cotton farmers," adds Camara, as "the network gives them an outlet for their produce."

Having also received training and equipment, 30-year-old Assan Gopé seized the opportunity to set up an online store selling textile products,

Machallah Boutique, in 2017. "I can sell 50,000 CFA francs (€90) of clothing each day to customers from as far afield as France, Senegal and, more recently, the United States," he explains.

According to the Ministry of Agriculture's figures, Mali produced 721 t of cotton in 2018, which is more than any other African country. The sector accounts for close to 40% of rural incomes, and 22% of the country's export revenue. Despite this, around 90% of cotton produced in West Africa is still exported raw to Asia. Only 2% of the cotton grown in Mali is processed domestically and local markets are swamped with cheap imports.

721 t

of cotton produced by Mali in 2018

2,000

artisans have benefited from capacity building

"No country in the subregion processes more than 5% of domestically grown cotton," explains Abdel Ramane Sy, president of the Youth Association for Cotton Development in Mali. For that reason, when PAFICOT came to an end, Mali adopted the West African Economic and Monetary Union's Cotton-Textile Agenda – funded partly by ADF – which aims to have 25% of cotton processed locally between 2011 and 2020. Currently, Mali processes only 5% of its production. ■



© ABDOLAYE MAHAMADOU

Smallholders access the sweet potato snack market

An agri-processing company in Tanzania producing nutritional, sweet potato-based foods is providing a ready market for local women and young farmers.

James Karuga

In Tengeru in northern Tanzania, 12 farmer groups are working with a local sweet potato processing company to enhance their incomes and increase the availability of nutritional products for children and adults. Better Markets for Crops Products Limited (BMC) supplies the farmers with up to 120,000 orange-fleshed sweet potato (OFSP) vines and, once the roots have matured, the company buys them back from the farmers at between TSh 200–300 per kg (€0.07–0.12). The roots are then processed by BMC into a variety of goods, including flour, puree bites (OFSP-based noodles or pasta), spice dubbed ‘mchuzi mix’, and OFSP crisps.

BMC works mostly with farmer groups made up of women and youths. The company was founded in August 2016 by Zena Mshana, who carried out her own research into OFSP processing prior to establishing the business. “I was motivated to improve nutrition by promoting consumption of bio-fortified products in Tanzania where there are many cases of stunted growth in the population, due to vitamin A deficiency,” says the entrepreneur, who received training on food safety and quality in small-scale processing from the International Potato Center in 2017.

As well as increasing their incomes, the farmers working with BMC have learnt about best post-harvest handling techniques – such as storing the OFSP roots in wooden boxes to prevent spoiling for up to 3 months – and various home recipes for OFSP-based adult and baby foods. Irene Robert Lukumai is among the farmers working with BMC and, since 2018, has been supplying



the company with between 100 and 700 kg of roots per month depending on her production levels. According to Lukumai, having a ready market for OFSP roots has increased her income by 50%. “They also trained me on how to tend the growing vines on the farm and increase my growing capacity,” she says.

In 2016, BMC bought 20 t of OFSP tubers from their farmer network, which increased to 70 t in 2018. In 2019, they bought 45 t from January to April, and each month are processing on average, 8–10 t of OFSP roots into products. Sales of these products generates monthly revenues of between TSh 10–17 million (€3,830–6,525) for BMC, with the flour and crisp products most popular among customers. Around 50% of BMC’s products are sold to supermarkets, 30% through school campaigns

Through her company, Better Markets for Crops Products Limited, Zena Mshana is providing healthy snacks to the local population and income opportunities for women and youths

and 20% to hospitals. The company currently employs 14 full-time women and youth staff members who are involved in the processing, packaging and distribution of the products, and 5–10 part time staff who are involved in marketing the goods.

Mshana aims to expand the reach of BMC’s OFSP products to five new regions in Tanzania and to supply 100 schools and 10 hospitals in 2021. The company also hopes to expand into Kenya, Rwanda and Uganda by 2025. “We get encouraged to continue our work when we see people’s health improving by consuming our OFSP products,” says Mshana. “The patience and hard work has been worthwhile.” ■

IMPROVED SEED

Groundnut production boosts profits for Zambian farmers

Greater access to improved groundnut seed in Zambia and training in crop management is increasing smallholder productivity and market access in the face of diminishing cotton prices.

Doreen Chilumbu

Small-scale farmers in the Chipata, Katete, Minda, Nyimba and Petauke districts of Zambia are moving away from cotton production, and its dwindling harvest prices, to cultivate new and improved groundnut seed varieties. The drought-tolerant and high-yielding groundnut seeds are helping to increase food and nutrition security in the country, as well as the yields and livelihoods of smallholder farmers. The improved seeds are the result of a research and development project, Strengthening Food Legume Seed Delivery Systems in Malawi, Mozambique and Zambia, which has been funded by the Agricultural Productivity Programme for Southern Africa (APPSA). Efforts of the project, introduced in 2014, have so far reached over 1.4 million direct beneficiaries across the three countries.

Through the initiative, farmers are also being linked up with private seed companies to secure guaranteed markets for their production. In the Petauke district of Zambia, for example, farmers have been partnered with the Unit Seed Company since 2014, and the project provided smallholders with enough basic groundnut seed to plant 68 ha. Before the cropping season was over in 2015, the seed was already secured at a purchase price of ZMW 6.47 (€0.45) per kg by the company.

“I have found seed production of certified groundnut seed to be beneficial in terms of income generation, which has enabled me to buy cattle, a plough, build a house, and purchase 22 bags of fertiliser,” says Lenard Daka, lead farmer



Zambian smallholders are cultivating improved groundnut seed varieties and using conservation agriculture techniques to improve their productivity and incomes

from Felesiano village in Petauke. Daka asserts that before the programme was introduced, most farmers were struggling to meet their needs as their cotton harvests could not be sold for lucrative prices at the market. “Other farmers in my group are now able to provide food for their families and school materials for their children,” he continues.

Emelia Chikubabe from Kumanzi village, also in Petauke, says that after receiving training in entrepreneurship skills, crop management and conservation agriculture under the project, she is a more knowledgeable farmer. “I used to plant the same crop year after year, rather than rotating my crops or planting a range of crops together to grow more, maintain soil health and diversify my family’s diet,” she says. “I have learned that while indigenous seeds are important to protect genetic diversity, improved seeds help farmers to adapt to changing climate conditions, fight crop diseases and produce higher yields,” she adds.

68 ha

of basic groundnut seed planted in
Zambia

40

seed varieties have been developed
and released

Through collaborative research efforts in the three APPSA implementing countries, over 40 seed varieties have been developed and released for other crops, including for legumes, maize, rice and sorghum. “Some of the improved crop varieties have been developed with a focus on high yield and quality, early maturity, adaptation for abiotic and biotic stresses, as well as tolerance to major diseases and pests of the specific crop,” says Monica Murata, APPSA programme coordinator. ■

REDUCING WASTE

Nigeria increases tomato paste production with good practices

Nigerian tomato farmers are overcoming production challenges to increase the quality and quantity of their yields, and access a ready market for their produce.

Oluyinka Alawode and Sophie Reeve

Thanks to agricultural advice, access to high-quality seeds and fertiliser, along with training in good agricultural practices, Nigerian tomato farmers are increasing their yields and cutting down their post-harvest losses. During the harvest season, tomatoes flooding onto the market causes a glut, and farmers experience significant losses with most of their yield going unsold and left to rot. However, Tomato Jos, a for-profit social enterprise and agricultural production company, is training smallholder farmers in best practices to produce quality tomatoes to use in their tomato paste.

Despite producing 65% of tomatoes grown in West Africa, Nigeria remains the largest global importer of tomato paste. Few tomato paste factories exist in the country due to various challenges,

such as low-quality tomato production. And, with most producers unable to identify a consistent bulk buyer, up to 1.35 million t of fresh tomatoes are wasted each year.

To address these problems, Tomato Jos, which was set up in 2014 by Mira Metha and her partner, Shane Kiernan, is buying tomatoes for processing at harvest time. The company has so far worked with around 100 farmers in Nigeria's Middle Belt to teach best agricultural practices, such as preparing the soil prior to seeding and installing drip irrigation. By selling to Tomato Jos, the trained farmers consistently earn around

five times more than they could achieve at local markets, even when prices crash during the peak season.

Initially set-up in Panda, Nasarawa State, the company has since moved to a 500 ha farm in Kaduna, north-east Nigeria. By overcoming challenges on its own farm, such as virus outbreaks, harsh weather conditions and water shortages, Tomato Jos is able to identify with issues experienced by local farmers and offer practical solutions. And, as a result of adapting production to mitigate these challenges, the company is able to produce 40-50 t per ha of tomatoes; 10 times the national average. "Maybe they're [the farmers] making 7 t per hectare now; we think they can get to 30 t per ha if they follow our system," says Metha.

Tomato Jos has over 20 full-time employees who are enthusiastic about its model of making farming productive for smallholders in Nigeria. Youths from the communities are also employed to work in the tomato fields helping to apply water and fertiliser. In April 2019, Metha announced that tomato paste production had begun and official operation of the brand will start in 2020. For now, they are selling the paste at the local market in 25 kg buckets and 250 kg drums, with the buckets selling for ₦7,500 (€18.50). "Drums will be sold to institutional buyers while buckets are for smaller consumers," Metha explains.

The company plans to expand its farmer network in order to supply 10% of Nigeria's demand for tomato paste, which is estimated at 200,000 t annually, according to the Federal Ministry of Agricultural and Rural Development. ■

Training in good agricultural practices is helping Nigerian tomato farmers increase their yields and reduce their post-harvest losses



© FAO

CUTTING COSTS AND BUILDING SCALE

Making index-based insurance profitable

Tech firms, brokers and insurers are working to make index-based insurance profitable and sustainable without subsidies, by cutting costs, sharing data and improving efficiency.

Helen Castell

Index-based or 'parametric' insurance is increasingly viewed as the most cost-effective way of protecting smallholder farmers' livelihoods against weather and climate risk. Advances in technology mean weather data is more detailed and reliable. And because farmer pay-outs are triggered by easily measurable events – for example if rainfall in a certain region and timeframe exceeds or falls short of a contracted amount – the cost of sending field officers to calculate and verify losses is removed.

But, while initiatives like the World Bank's Global Index Insurance Facility (GIIF), which facilitates access to finance for smallholder farmers and micro-entrepreneurs, are expanding steadily – to date, GIIF's regional partners have covered over 23 million beneficiaries with over €670 million in insurance – making the product profitable without subsidies remains a challenge. Bangladesh-based insurer Green Delta, for example, stated in early 2019 that, while it continues to roll out its crop insurance product under GIIF, it is not yet profitable and still relies heavily on a government subsidy.

Scaling up without increasing costs

Index-based insurance faces a chicken-and-egg challenge. While it relies on

scale to reduce per-client costs, the expense of expanding into new regions or markets often cancels this out, notes Rahab Kariuki, chief innovation officer at ACRE Africa.

Tech firms, brokers and insurers are trying to solve this by boosting efficiency, stripping out distribution and other costs, and sharing data and expertise. In Mali, Tel Aviv-based start-up OKO is working to cut costs by distributing index-based crop insurance directly to farmers via mobile phones through a partnership with French telecom giant Orange and insurer Allianz/Sunu. OKO founder Simon Schwall says sending out field agents to markets to explain the product remains an unavoidable expense for now. However, the rest of the process can be completed remotely and has potential for additional automation.

Under OKO's current beta launch, which uses satellite weather data to offer maize farmers protection against deficient rainfall, farmers who have an Orange SIM card simply dial a code into a basic mobile phone. They then receive a free call-back from OKO to provide a quote based on their crop type, field size and location, and finalise their registration. Once farmers pay the premium – typically 3-6% of the insured value

for around 0.5-2 ha of land – via mobile money, they are covered.

Schwall says the crop insurance product – which is not subsidised – has the potential to dramatically reduce client acquisition costs and should become profitable when it scales up to 30,000-50,000 insured farmers, at which point, renewal costs could be as low as €1-1.50 per farmer.

Automation targets costs

London-based Skyline Partners is also relying on automation and cost reduction to develop index-based agricultural insurance products that it aims to be fully commercial and self-sustaining without subsidies. Skyline's model is to partner with agricultural service providers, such as suppliers of agri-tech, data or equipment, to develop insurance products to sell through their existing distribution networks with small and mid-sized farmers, according to co-founder Gethin Jones.

Skyline undertakes all risk modelling on insurers' behalf, taking responsibility for ensuring that products comply with regulations, are affordable for farmers and have a distribution route, adds co-founder, Laurent Sabatié. By taking this on, insurers' operational and customer acquisition costs can be reduced,



OKO insurance is distributing index-based crop insurance directly to farmers via mobile phones

while also allowing agri-tech partners to increase their range of services and competitiveness for farmers, Sabatié explains.

At the time of speaking, Skyline said it was on the brink of signing up distributor and insurer partners for a pilot for pomegranate farmers in Maharashtra, India as well as pilots for mixed crops in Madhya Pradesh and tea in Assam, all insuring against adverse precipitation and temperature. Skyline is also in talks with a potential distribution partner for a similar pilot in Côte d'Ivoire and ultimately plans to roll out the service globally, says Jones.

Scale is the path to profitability

Reaching scale is critical to making index-based insurance commercially sustainable for private-sector providers, according to Carlos Boelsterli, CEO of Microinsurance Catastrophic Risk Organisation (MICRO), an established designer and implementer of climate-risk-related insurance solutions. "For MICRO, the magic number is just above 300,000 clients," he says.

In the last few years, MICRO has been expanding into Central America, launching a pilot in Guatemala in early 2017 to offer index-based insurance against drought, excess rain and

earthquakes, which it introduced in El Salvador in July 2018. It currently has more than 15,000 clients in these two countries. Over the next 3 years, MICRO will expand into Colombia and two more countries that are yet to be confirmed.

Collaboration is key

Data sharing and collaboration could prove one way of achieving scale, reducing costs and therefore achieving low- or no-subsidy profit more quickly, states Kariuki at ACRE Africa. While ACRE has invested in buying its own weather stations and ground station, this is not affordable for most start-ups, she notes.

Targeting women for faster scale-up

While moving away from subsidisation remains a long-term aim for the agri-insurance market, government investment is still required to raise awareness about the product. And, with women consistently accounting for more than 60% of ACRE Africa's customers, identifying women's groups to receive education might yield the best results in terms of insurance up-take, argues Kariuki. While on a small scale, ACRE's experience suggests that women may be more open than men to experimentation with new products. Their relatively high participation in savings groups also makes them more likely to have money available for insurance premiums.

ACRE is, however, currently studying the possibility that agricultural insurance may be negatively impacting household nutrition. When insurance helps a farm thrive, some male smallholders may be encouraged to expand their business, by taking over the small plot typically cultivated by women as a kitchen gardens, to use for commercial farming, she says.

ACRE would like to help share its technical skills, especially related to pricing, with more start-ups and even farmer aggregators, Kariuki says. One option is to develop an IT platform or enterprise resource planning software which insurance distribution specialists like OKO – which is already in talks with ACRE – could use to source real-time price quotations for offering insurance in specific locations. This would help ACRE expand, including beyond its current focus of Eastern Africa, while helping the whole industry scale up. "If we're the only ones who can do this, the market is not going to grow," says Kariuki. ■

MARKET OPPORTUNITIES

The potential for women to tap into Africa's free trade area

New initiatives are emerging to empower women traders and entrepreneurs to take advantage of the increased border trade and reduced tariffs as a result of the operationalised Africa Continental Free Trade Area (AfCFTA).

Bob Koigi

Despite accounting for two-thirds of the agricultural workforce and growing 70% of all food produced on the continent, most African women are stuck at the primary stages of production and carry out just 10% of basic food processing. This cuts them off from the benefits of value addition, including increased markets and incomes.

The women who do manage to venture into trade do so informally, even as they cross beyond their country borders, with

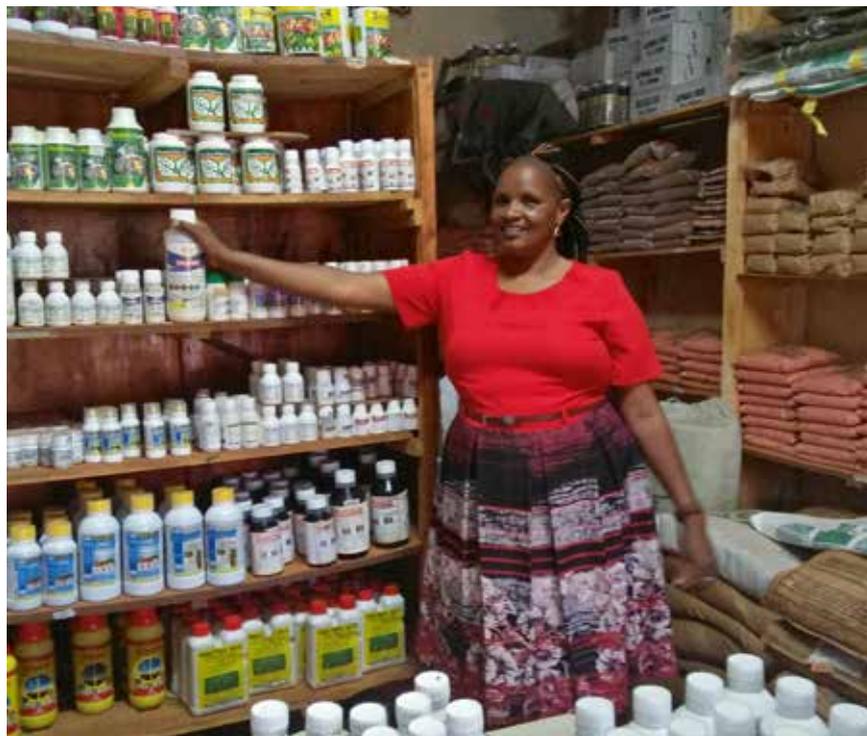
studies indicating that women represent up to 70% of informal traders across sub-Saharan Africa. This, despite the tough informal environment occasioned by stringent border processes, including high clearance fees for goods, long procedures of obtaining documents, and gender-based harassment and corruption. However, AfCFTA provides a chance for women to move into formal markets for high value crops, opening the doors to a combined and diversified

consumer base of more than 1.2 billion people.

Training in trade

The declaration by member states to the trade agreement, to reduce tariffs on 90% of goods traded on the continent, is set to herald increased markets for women traders as demand for raw products intensifies. Yet, even with the numerous new opportunities presented by the implementation of the world's largest single market, women entrepreneurs continue to face capacity and market access challenges, including a lack of finances to grow their businesses, and training to make the most of these markets. These gaps hinder women from fully reaping the benefits of AfCFTA. However, initiatives are underway to assist women-led businesses in accessing the new trade regime.

VALUE4HER, launched in July 2018, is one such initiative. Funded by CTA and implemented by the African Women Agribusiness Network Afrika (AWAN-Afrika) and the Africa Women Entrepreneurship and Innovation Forum, VALUE4HER has been training women traders on four areas of scaling-up their businesses. These include financial inclusion, market access, quality control and agri-tech. The trainings take the format of seminars, business-to-business fairs, masterclasses and matchmaking sessions. Specific subjects cover branding and product packaging for various markets, methods to facilitate traceability of produce to meet export market requirements, and the institutions to approach to access business finance.



© BEATRICE NKATHA

VALUE4HER trainee, Beatrice Nkatha, received training in business management to develop her agrovet store where she stocks pesticide products



Nkatha has expanded her business to become one of the largest sorghum suppliers in Kenya

“The level of graduation from primary production, to running market-led agriculture businesses among African women is still very slow. The idea of the project is therefore to create a network of African women entrepreneurs in agriculture who are able to galvanise their supply chains and pull together their resources, their agricultural experiences and expertise in order to move agricultural products and reach markets efficiently and cheaply,” says Sabdiyo Dido, senior technical advisor on value chains and agribusiness at CTA.

A boost for women-led businesses

Amina Farah is the founder of Khayraad Development Association in Somaliland and is a beneficiary of the VALUE4HER project. Farah, who has run a fish business since 2004, received training from AWAN-Afrika on the benefits of adding value and expanding to neighbouring markets when she joined the organisation in 2008. As a result, she ventured into the fish drying business in 2010 and now exports dried sardines and yellow fin tuna to Ethiopia, Rwanda,

the United Arab Emirates and Yemen. To satisfy growing demand, she has also started building her own boats, which saves her the cost of hiring fishing boats and increases her fish stock.

Studies indicate that up to 70% of informal traders in sub-Saharan Africa are women

From selling 0.5 t of fish per week before the project at €4/kg, she now sells up to 5 t of fish each week with 1 kg fetching €10. “I also don’t have to worry about the shelf life because the [dried] fish can go for months while maintaining the same quality,” she says.

Beatrice Nkatha, another VALUE4HER trainee, has been running a sorghum farm in eastern Kenya for 10 years. She started with 40 out-growers who were earning €0.15/kg. Since joining AWAN-Afrika and being trained on business

management and market access, she has expanded her outgrower network to 14,000 farmers who now earn €0.30/kg. Through this expansion, Nkatha is helping to reduce poverty in her area and has seen her business become one of the largest suppliers to East African Breweries Limited, Kenya’s largest brewery company.

Digitising the network

To leverage the impacts of the project and open up women’s businesses to more markets, a digital platform known as ‘Value4Her Connect’ was officially unveiled by the initiative in June 2019. The online marketplace allows women traders to create their business profiles, showcase what they sell, and learn from their peers. It has already attracted more than 400 members. Notable components of the platform include a Women2Women forum that provides an avenue for women to connect, trade and exchange information, and an information section that highlights market entry requirements for produce. ■

MAÏMOUNA SIDIBE COULIBALY

“Quality is the key to success!”

Maimouna Sidibe Coulibaly explains how her company Faso Kaba, which means ‘corn country’ in Bambara, Mali, became one of the leading suppliers of improved seeds adapted to the Sahelian climate.

Soumaila Diarra

Whilst living in the US in the 1980s with her husband who was working as an agronomist, Maimouna Sidibe Coulibaly discovered improved seeds and returned to her home country of Mali with the conviction that there was a market for these varieties. In a region where farmers traditionally recycle their own seeds, it took her nearly 20 years to get the funding she needed to launch her business. Today, Faso Kaba is tackling low adoption of improved seed, and works with international research organisations, such as the International Maize and Wheat Improvement Center (CIMMYT), to test new varieties.

In 2017, together with Professor Ruth Oniang’o, you won the Africa Food Prize. What is different about your seed company that made it stand out to the jury?

When I was in the US, I noticed that the farming plots and crop fields all looked as if someone had pruned them. I wondered why our fields in Mali were so irregular, with plants of different sizes in the same field, and why our yields were lower. I asked the question and was told that American farmers use improved seeds. So, I started inquiring about seeds, and I got interested in the work. I even worked at a seed company there. I decided that when I returned I would sell improved seed varieties to help our farmers enhance their yields.



Maimouna Sidibe Coulibaly's company Faso Kaba sells seeds of groundnut, maize, rice and sorghum that are adapted to the Sahelian climate

My company works with small packages of 1 and 5 kg, sold according to each region. For example, for a farmer in Banamba (a town in the north-west of the country), we have recommended varieties for this area. For a farmer from Sikasso (in the south of the country), we have varieties adapted to the local levels of rainfall. We sell what is appropriate for the production area. If you want to plant maize, we can suggest varieties that are adapted to the changing climate, including low rainfall. We also have adapted varieties of groundnuts, maize, rice and sorghum.

What drove you to start your business and how did you overcome the challenges that you faced?

My mother was a farmer; I worked in her field, and I could see that her yields were low. In the US, I saw maize fields that were so totally different to my mother's fields and those of other farmers in Mali. When I came back, I couldn't get funding because nobody knew about the seeds I was selling. I went around all the banks, and they'd say, "Who's going to buy cereal seeds? People are used to keeping part of the harvest and sowing

© ABDOULAYE MAHAMADOU



Faso Kaba seeds are sold in small packets to make them more affordable for farmers

it the following year.” I would tell them this is a lucrative business in America. Fields are cultivated specifically to produce cleaned, certified and packaged seeds for sale. But the banks wouldn’t believe me. Until the day I came across AGRA (the Alliance for Green Revolution in Africa), which already worked in this area in Eastern and Southern Africa. I met representatives of AGRA, who believed in my company, my ambition, my vision. They gave me a grant spread out over 30 months, and that’s what started me off. This was in 2007.

“It’s perseverance and courage that can convince a donor to invest”

A year earlier, Sassakawa Global, a Japanese NGO, had guaranteed my first loan for 5 million CFA francs (€7,600). I needed to set up at least 50 rural seed sellers at village level, produce and sell 180 t of seeds, have a working office, staff, and be registered with the tax authorities. I exceeded all of these objectives.

As you have explained, you had trouble convincing investors and banks to help finance the launch of your business. What advice would you give young entrepreneurs who face the same problem?

You need a minimum amount of funds to get started, because investors don’t give anything to start-ups – they give money to improve or expand a business, but not to start it. You need to do all you can to start off with your own funds or look for credit from suppliers. And then you have to believe in yourself, to love what you’re doing. It’s perseverance and courage that can convince a donor to invest.

You started off selling selected seeds from your home. Now your business has grown considerably. On what did you build your success?

Quality is the key to success! If you don’t have quality, the client won’t come back. If you sell high-quality seeds, they come back, they tell their neighbours, and other clients come in turn. So your focus has to be on quality, on meeting your commitments, being available, explaining things properly to customers. We also sell 1 kg and 5 kg packets to be affordable to everyone.

“If you sell high-quality seeds, they come back, they tell their neighbours, and other clients come in turn”

Do you think that the evolution of digital tools and their place in agriculture concerns a seed company like yours?

Definitely, especially in marketing. If we can put our products online, people can see them, even if they live far from Mali. And if everything is well detailed and available, they can buy online. Today, we sell via mobile money transfer services. People call, we agree on the quantity, price, we give our account number or the phone number registered with Orange Money and the customer pays. We send them the package and they pick it up at their local village shop. This morning, I sold 250,000 CFA francs (€380) worth of seeds this way. ■

PAUL WINTERS

"Youth should be part of the conversation about rural development"

Assistant vice-president of the strategy and knowledge department of the International Fund for Agricultural Development (IFAD), Paul Winters, highlights the factors that need to be in place for rural youth to prosper.

Yanne Boloh

IFAD's 2019 Rural Development Report focuses on creating opportunities for rural youth. What are the key factors required?

There are three factors that are fundamental to the development of rural youth: productivity, connectivity and agency, which is a sense of empowerment. Regarding productivity, hopefully they will have had a certain amount of education, but that tends to focus on cognitive skills. Young people tend to have less experience with non-cognitive skills like leadership, teamwork, and working well with others, and this matters a lot for productivity.

Being connected is also critical, whether through traditional infrastructure, like roads, or via digital technologies such as mobile phones. It's all about accessing markets and information. The evidence also shows that you need a sense of empowerment to take advantage of the productive skills and the connectivity you have.

Some countries are more advanced in transforming their economies. How can others join them?

There needs to be investment and part of that needs to be in rural areas. Many countries only invest in urban areas, but this just leads to migration. In rural areas, you need to create opportunities, and there is a lot of potential for agriculture to be inclusive. You can invest



© DANIELE BIANCHI/IFAD

in agriculture in such a way that it is sustainable and allows small-scale producers to participate. So, the decisions that countries make now can determine whether their young people will be able to participate in the transformation of their economies – or not.

The majority of young people in sub-Saharan Africa will end up in agriculture. The question is whether they are going to be involved in back breaking, staple crop production, or whether there will be a much more dynamic environment to allow agriculture to become a driver of change in rural areas, and create opportunities on and off farms.

Paul Winters speaks on the importance of investing in agriculture to create employment opportunities for youths in rural areas

Young people can be very good agricultural entrepreneurs. They are tech savvy, and they know how to sell things. Instead of farming themselves, they will buy products from farmers in their communities, process them and sell them on the market, providing income generation for themselves and other young people.

We need to look at the opportunities in the entire food systems and not just in agriculture.

Rural youth

Analysing the key factors of success



Of the 1.2 billion young people aged 15-24 in the world, almost 1 billion live in developing countries, and half of these in rural areas. IFAD recognises the vast potential of this population, whose energy and dynamism are needed to transform rural areas, but also food systems. There are, however, many obstacles: young people are twice as likely as older people to be unemployed, not to mention the high level of working poverty among the youth.

IFAD's 2019 *Rural Development Report* uses concrete evidence to identify who rural young people are, where exactly they live, and the constraints they face on their

path to economic self-sufficiency. The authors explore this subject through different perspectives, including the position of countries on a scale of rural transformation and the economy as a whole. They highlight several risks, because creating opportunities does not mean that young people, especially young women, are able to seize them.

Investing in young people is undoubtedly a key factor for success in sub-Saharan Africa's development. However, the investment needs to be seen differently, given the unprecedented pace and nature of current demographic, technological and climate changes. IFAD insists that it is impossible to develop rural youth policies without a broad integration of rural development. Indeed, when economic and social opportunities are limited, targeted support for young people in rural areas is ineffective.

2019 Rural Development Report: Creating Opportunities for Rural Youth

By IFAD

IFAD, 2019; 294 pp.

Downloadable as a PDF file from: <https://tinyurl.com/y5jvezoa>

Digital technology is one of the keys to transforming economies. Are infrastructure and investments to support technologies keeping up?

Things are moving in the right direction. There is a lot of opportunity, for example, through the digital revolution, but to take advantage of these opportunities requires investment, and we need to figure out how to make those investments advantageous for young people. There is a lot of talk about digital markets instead of physical markets, which involve a digital platform where buyers and sellers can interact. But this won't happen automatically – you have to have someone to set that up. You have to make sure that the buyers, like supermarkets and restaurants, are there on that digital platform, then you need to make sure that the seller – either farmers or farmers organisations – are also on this platform. It's a great example of how to take advantage of the digital revolution, but it requires some action. In particular,

we need to show young people that the market is there and they can access it through technology.

How can young people have more of a say in the opportunities that could be made available to them?

Young people are excluded from a lot of the policymaking and decisions that affect their lives. It's rare even for ministers of youth to be young, and committees that work with governments on behalf of youth only sometimes include young people. And so, in political processes, young people tend not to be as involved as they should be.

IFAD's 2019 *Rural Development Report* mentions the need to actively engage young people in policymaking. That does not mean having a separate youth council, but that youth should be part of the overall conversations about rural development, and investment, so that they are part of the decision-making process. ■

Innovation

Empowering youth

Youth Revolution describes how Kiara Nirghin, a 16-year-old high-school student from Johannesburg, overcame severe health issues to win first prize at the 2016 Google Science Fair for her innovative solution to drought using orange peel waste as a cheap, super-absorbent material to help soil retain water. The book includes input from leading women in education and science and examines the issues surrounding stagnant youth innovation, the dangers of lacking diversity in science, technology, engineering and maths, and documents her path to international recognition.

Youth Revolution: #BeTheChange

By K Nirghin

Zebra Press, 2019; 232 pp.

ISBN: 978-17-7609-356-4

€12

www.zebraprepress.co.uk

Youth unemployment

Job opportunities

Engaging Africa's rural youth in agri-business is a method for tackling unemployment, but there is a lack of evidence over the effectiveness of government interventions for improved policymaking in the area. This report looks at the achievements and limitations of three interventions introduced by governments and development partners across Africa: inspiring youth to engage in agriculture, facilitating access to resources and participating in collective action.

African Rural Youth Engagement in Agribusiness: Achievements, Limitations and Lessons

By M Yami et al.

Sustainability, 2019, 11, 185; 15 pp.

Downloadable as a PDF file from:

<https://tinyurl.com/yxma4y9b>

BUILDING BETTER FOOD SYSTEMS

New approaches for the future

Three new reports focus on food systems and production in Africa to achieve food security and end malnutrition and poverty. Digital technologies, better policies and new farming approaches are all highlighted as means to achieve these aims.

James Thorp

Worldwide, too many people still face hunger as highlighted by the latest UN report on food security and nutrition (<https://tinyurl.com/y4jgjobs>) – the total number of people suffering has increased to 830 million. Whilst most of these are undernourished, which is particularly severe in Africa, three quarters of obese children worldwide also live in Africa and Asia. According to three new reports, food and agricultural systems must urgently address these issues.

Agriculture in Africa presents insight into the state of agriculture on the continent, as well as giving recommendations for positive change. The first part of the report provides an overview of the sector, as well as key facts and figures – for example, only 6% of African arable land is irrigated, compared to 14 and 37% in Latin America and Asia, respectively. The latter half addresses the different topics introduced in the overview, whilst also including short interviews (e.g. with Nigeria's Minister for Agriculture and Rural Development) and 2-page analysis articles. Areas identified for possible improvement include: increased fertiliser usage, improved irrigation to mitigate climate effects, precision agriculture, and greenfield investment.

Also outlining their strategy for the transformation of African agriculture is the African Development Bank (AfDB) in their report, *Feed Africa*. The report outlines how the Bank is working

towards ending extreme poverty, eliminating hunger and malnutrition, making Africa a net exporter of agricultural commodities, and moving Africa to the top of key agricultural value chains. As part of AfDB's 'High 5' focus areas for Africa – to light up and power, feed, integrate, industrialise, and improve people's quality of life – this report demonstrates how the Bank is seeking to help convert African agriculture into a 'business-oriented sector' that is globally competitive. The report predicts that transforming commodity chains and agro-ecological zones will open up markets worth €76 billion per year by 2025.

Digital technologies also present an opportunity to transform Africa's agricultural sector. *Future of Food* recognises that such technologies are already improving the information and engagement levels that consumers and producers seek, as well as delivering 'smarter' public services and farms. However, the authors acknowledge that adoption levels vary greatly and remind us that digital technologies have inherent risks, including service providers accumulating too much market power. But, the positive potential certainly outweighs the risks. In particular, the report states that digital technologies have a significant ability to improve the efficiency, equity and sustainability of food systems through the collection, storage, analysis and sharing of information digitally. ■



Agriculture in Africa 2019
By the Oxford Business Group & The OCP Group
OBG & OCP, 2019; 28 pp.
Downloadable as a PDF file from:
<https://tinyurl.com/y6cutjfa>



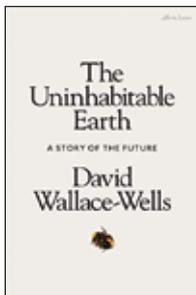
Feed Africa
By the African Development Bank Group
AfDB, 2019; 22 pp.
Downloadable as a PDF file from:
<https://tinyurl.com/yyqnsufu>



Future of Food: Harnessing Digital Technologies to Improve Food System Outcomes
By the World Bank Group
WBG, 2019; 44 pp.
Downloadable as a PDF file from:
<https://tinyurl.com/y647qqf5>

Climate kaleidoscope

Clarifying the scale of the crisis



The title of David Wallace-Wells' *The Uninhabitable Earth* is succinct, deadly, and the contents of this book do not pull any punches. Never has there been a more highly publicised book to underscore the seriousness of global warming and the impacts that are already evident.

The book is split into four readable parts: an introduction on how severe and complex climate breakdown is; an overview of 12 aspects of climate change, from

'climate conflict' to 'unbreathable air'; analyses of how we got into our present climate trajectory and what we might be able to do about climate breakdown; and finally, a philosophical take on humankind's arrogant self-centredness that has led to this climate situation.

For most readers, including policymakers interested in learning about climate change, the first two sections are the most important, but do not make for comfortable reading. For ACP agricultural development policymakers and practitioners, the book is an essential read. Wallace-Wells references the World Bank estimate that by 2100, the coolest months in tropical Africa and the Pacific will be hotter than the warmest months of the 20th century. The book also highlights the estimate that under (the not unrealistic) 5 °C of warming by 2100, the world will have 50% more people to feed, with 50%

less grain to feed them, with the tropics already inhospitable to efficient crop production. This chapter also highlights the staggering levels of arable soil erosion – estimated at 75 billion t a year – and nutrient loss in plants.

The author covers the 2018 water-shortage in Cape Town, revealing that, rather than being an issue of excessive individual consumption as highlighted by the media – it is an ever-present systemic issue. Agriculture and industry account for 70-80 and 10-20% of global freshwater use, respectively. Furthermore, 4 billion people already face water shortages for 1 month of the year and 500 million all year round; and the situation will only get worse. The book also highlights the dramatic fact that "reefs support as much as a quarter of all marine life and supply food and income for half a billion people", yet, due to ocean warming and acidification, 90% of all reefs will be threatened with extinction by 2030.

Reading any part of the book makes it clear that we really have run out of time, prevaricating is no longer an indulgence, and radical solutions are now a necessary comprehension. ■

The Uninhabitable Earth: A Story of the Future

By D Wallace-Wells

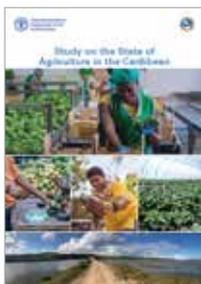
Penguin, 2019; 336 pp.

ISBN: 978-01-4198-887-0

www.penguin.co.uk

A fresh approach

Caribbean agriculture revisited



There has not been a substantive analysis of the state of agriculture in the Caribbean since 1981, an oversight that the *Study on the State of Agriculture in the Caribbean* sought to address. The comprehensive report covers 19 countries and focuses on the region's low returns in agriculture, unpredictable climate, high imports and declining exports. These uncertainties have also dissuaded the youth from working in the sector, resulting in stagnation and

an absence of innovative ideas on how the industry should move forward.

The lack of competitiveness and productivity in the region is highlighted by the report and there is a strong emphasis on the need for agriculture to diversify and embrace new solutions in order to reflect the changing economic and social environment. The report also underlines that there is very much an opportunity for growth in the Caribbean agriculture sector, suggesting improved regulation in

agribusiness as one way to spur growth, as well as increasing competition within the agri-food value chain.

A more attractive setting for investors will increase agricultural development, which in turn will help to reduce poverty, the report states. The authors also emphasise the need for development within the aquaculture and fisheries sectors of the Caribbean Sea, where over-fishing and natural resource degradation has led to a catch decline of 25% since the 1990s, despite fishing efforts having "almost doubled" since then.

In summary, Caribbean agriculture needs to be more inclusive, sustainable and competitive; this report offers the recommendations to make such a vision obtainable. ■

Study on the State of Agriculture in the Caribbean

By FAO and the Caribbean Development Bank

FAO and CDB, 2019; 212pp.

ISBN 978-92-5131-488-3

Downloadable as a PDF from: <https://tinyurl.com/yxd4vspk>

Will agriculture's digitalisation bridge or widen the gender gap?

SABDIYO DIDO BASHUNA

Digitalisation: a tool for gender equality



Sabdiyo Dido Bashuna,
Senior Technical
Advisor, CTA

Digital technologies are set to revolutionise Africa's agriculture and value chains. From tools for predictive weather analysis and advisory services, to market linkages, financial access and macro agricultural intelligence, the sector is abuzz with ground-breaking digital innovations that are changing how agricultural information is shared, services accessed and produce marketed. Through digitally-enabled agriculture, smallholder farmers have digital identities that include farm data and ecological information, which enables them to access tailored agronomic, market and credit services. According to CTA and Dalberg Advisors' 2019 *Digitalisation of African Agriculture Report*, up to 390 digital solutions are operational, serving different segments of agricultural value chains.

Of the agricultural workforce in sub-Saharan Africa, 40-50% are women, whose productivity, according to FAO and World Bank studies, is 20-30% less than men. This gap is attributed to gender differentials in access to productive resources and services. Digital solutions have enormous potential to bridge this gender gap, yet according to the CTA/Dalberg study, women only constitute 25% of 33 million smallholder users.

There are four imperatives to ensure digitalisation bridges the gender gaps in agriculture:

1) Reflecting gendered needs

Design of digital solutions in agriculture is not necessarily driven by sound

understanding of gendered needs of the agricultural workforce, neither by a desire to bridge the current gender gaps. Digital solutions aimed at increasing access to agronomic advice, inputs, and credit address proximity challenges. This is a crucial first step, but fails to influence the gender barriers that underlie effective use of services.

The design of digital solutions needs to be underpinned by an understanding of socio-economic and cultural influences on digital technology use; decision structures that determine farm resources allocation; women-learning pathways and the agency to act based on means and preference-based support. These important prerequisites have posed key failures for agri-tech transfer in the past, such as lack of gender disaggregated data on needs, means and preferences. To address this, digital technology providers could, among other measures, partner with socio-purpose organisations to reflect gender and other human elements when designing solutions.

2) Working within women's time and space

Most digital solutions in agriculture have delivery systems that are phone-based and rely on availability of a mobile network. Access to agricultural resources and services through mobile phones means that rural women have the convenience to access information and learning resources in their own time, and within their own space. However, according to the GSM Association, which represents the world's mobile industry, women in low income countries are 10% less likely to own a mobile phone and, on average,

26% are less likely to use mobile internet than men. By default, the significant number of rural women will miss out on the digital dividends in agriculture. It is therefore essential that other delivery systems, such as rural radio and women's peer networks, are used as complementary approaches to reaching women farmers and entrepreneurs.

3) Ease of use of digital technologies

Digital technologies are generally intimidating for users of low literacy levels. Two thirds of the world's illiterate are rural women, and digital literacy amongst women is far lower than for men. When designing digital solutions for agriculture, simplicity and ease of use is key in attracting women farmers and entrepreneurs. Designing and delivering services through local languages can also facilitate access for more female users. Additionally, going beyond SMS to IVR (Interactive Voice Response) to simplify content cultivates interest from female users. Using peer networks, like facilitating young digital entrepreneurs to not only market the solutions but also show scope for usability among women could offer promise for faster recruitment of women users.

4) Cost of digital services

Experiences from our current projects show that a high percentage of women adopt digital services when they are subsidised, reinforcing the belief that women are more receptive to innovations, but, as the grants end and services become more commercial, the percentage of women users drops. This is a clear indicator that cost becomes a barrier to the continued use of digital services. ■

D4Ag and gender: bridging the gap



Swetha Totapally,
Associate Partner,
Dalberg Advisors

The need to bridge the gender gap in agriculture is clear. Despite making up at least 40-50% of the farmer population in sub-Saharan Africa, women face disadvantages in accessing enablers that help facilitate equitable participation and value capture in agricultural markets. These include access to inputs and assets; drivers of strong market linkages such as market intelligence; mobility and buyer connections; access to basic infrastructure, and a supportive enabling environment. Women in agriculture are under-represented in skilled jobs, and female-headed households experience lower productivity and lower income than male-headed households.

By offering better information and skills to women, connecting them with buyers, and informing and supporting the enforcement of policy, digitalisation for agriculture (D4Ag) solutions could make a meaningful impact in access to these drivers and outcomes for female farmers. Yet, as highlighted in the opinion piece by CTA's Sabdiyo Dido, we are a long way away from realising that potential.

Only 25% of users of D4Ag solutions are women and the discourse mostly

focuses on two related explanations: I) women don't have sufficient access to digital devices and tools; and, II) they face greater digital and general literacy challenges than men, making it difficult for them to take advantage of the solutions. While both of those points are true and important, I think our sector is overlooking an equally important challenge: explicit intent to serve women. The reality is that the D4Ag worlds and gender worlds don't have sufficient overlap:

- D4Ag enterprises are focused on building business models that work, and these enterprises feel that focusing on women (who, as stated earlier, face more challenges than men) would make their work much harder. In the course of our research of nearly 400 enterprises, we struggled to find organisations that specifically focused on reaching women. Until commercial enterprises actually choose to serve women and see them as important long-term customers, meaningful change in terms of access is unlikely.
- Some donors have made mainstreaming gender into digital solutions for agriculture a priority. In most cases however, donors still separate agriculture portfolios from gender portfolios and even when gender experts work with agricultural

experts, competing interests can stifle cooperation. Without donor focus and prioritisation, we are unlikely to see commercial enterprises make the shift themselves.

Overcoming the intent gap is a precursor to helping women use digitalisation to support their activities in agriculture. Donors have a key role in leading the way. They can also help reduce the cost of doing business for enterprises by increasing the time needed for investments in organisations that prioritise women; developing gender disaggregated data; funding studies on how women would want to use digital solutions, supporting the use of extension agents; and helping connect D4Ag enterprises with local partners focused on gender. We have a significant opportunity to change course before the divide becomes even larger, and harder to alter.

Bridging the divide means that donors will need to work differently internally (e.g. pairing gender experts with or even embedding them within agriculture teams giving grants), and even prioritise different metrics and criteria for success. Working differently is a matter of will, choice and human relationships. Sometimes, that can be harder than finding the next trendy company to back, but don't we owe it to our women farmers to do so? ■

Poll

Can digitalisation provide the transformation needed for women in agriculture?

Yes 69%

No 31%

Other debates

Find *Spore's Opinion* pages and two other blogs on this topic online. New debate topics are published each month on the *Spore* website:

<https://spore.cta.int/en/opinions>

Forthcoming articles

September - October 2019

© CTA



DOSSIER

AI in agriculture

Innovative new AI solutions are helping to transform agriculture, making it less labour-intensive and more efficient

INTERVIEW

Parmesh Shah

Digitalisation: World Bank support for agri-tech initiatives in Kenya

OPINION

Digitalisation

With the increase in big data, is 'smart' farming ethical?

READER SERVICES

Write to Spore

CTA - Spore
PO Box 380
6700 AJ Wageningen
The Netherlands
Fax: +31 317 460067
Email: spore@cta.int

READ SPORE ON-LINE

spore.cta.int

Subscribe to Spore

Please note that for new readers only subscriptions to the e-version of *Spore* are available.

Subscribe to the free newsletter at:

<http://eepurl.com/zd5IT>

You can also subscribe to *Spore's* social media channels to receive live updates from relevant events, as well as notifications about new articles as they are published.

Follow *Spore* on:

- **Twitter** @spore_mag
- **Facebook** @CTASpore
- **LinkedIn** @Spore Magazine

Reproduce Spore

- *Spore* articles, but not pictures can be freely reproduced for non-commercial use, if credited as coming from *Spore*. Please send a copy to the editors.
- Reproduction for commercial use requires prior permission.

ACCESSING CTA PUBLICATIONS AND SPORE EPUBS

CTA publications marked  may be downloaded free-of-charge as PDF copies from CGSpace: <https://tinyurl.com/y6aecrsw>

Please note: CTA publications are no longer available as hard copies.

Spore EPUBS

Spore is now available as an EPUB from Apple iTunes. The latest issue of *Spore*, and all other issues, are available at <https://tinyurl.com/y482ffj2>

Spore can also be accessed on Google books at <https://play.google.com/store/books/author?id=CTA>

SPORE is the quarterly magazine of the Technical Centre for Agricultural and Rural Cooperation (CTA). CTA operates under the Cotonou Agreement between the countries of the Africa, Caribbean and Pacific (ACP) group and the European Union and is financed by the EU. • CTA • Postbus 380 • 6700 AJ Wageningen, The Netherlands • Tel: +31 317 467 100 • Fax: +31 317 460 067 • Email: cta@cta.int • Website: www.cta.int • **PUBLISHER AND CHAIRMAN OF THE EDITORIAL BOARD:** Michael Hailu • **EXECUTIVE EDITOR:** Anne Legroscolard • **EDITORIAL BOARD:** Stéphane Gambier, Isolina Boto, Benjamin Addom, Piet Visser, Toby Johnson • **EDITORIAL STAFF:** Managing editor: Susanna Cartmell-Thorp, WRENmedia, Fressingfield, Eye, Suffolk, IP21 5BW, UK • **CONTRIBUTORS:** O. Alawode (Nigeria), M. Andriatiana (Madagascar), B. Bafana (Zimbabwe), K. Bascombe (Trinidad and Tobago), Y. Boloh (France), H. Castell (UK), D. Chilumbu (Zambia), T. Cline (South Africa), V. Defait (India), S. Diarra (Mali), S. Dido (Netherlands), N. Dookie (Trinidad and Tobago), O. Frost (UK), A. Gross (Netherlands), ISO Translation and Publishing (Belgium), J. Karuga (Kenya), B. Koigi (Kenya), E. Maduka (Nigeria), D. Manley (France), C. Mkoka (Malawi), I. Oluwagbemi (Nigeria), T. Penrhys-Evans (UK), S. Reeve (UK), K. Shigela (Tanzania), J. Thorp (UK), A. Touré (Mali). • **DESIGN:** Vita, Italy • **LAYOUT:** C. Lavenir, P. Pothier, Intactile DESIGN, France • **PRINTER:** Latimer Trend & Company, UK • © CTA 2019 - ISSN 1011-0054



COLLECTION
PRO-AGRO

Available
now from
CTA

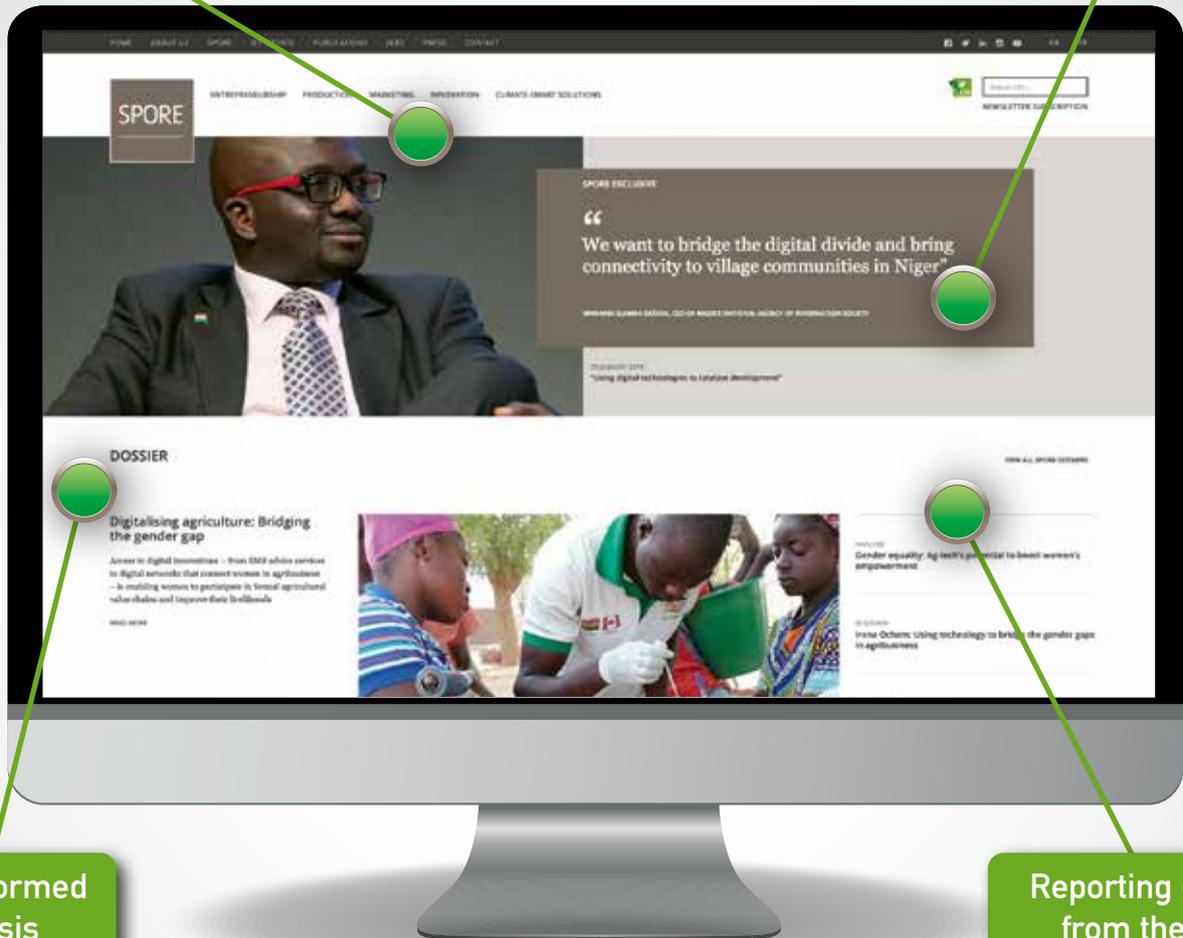
Pro-Agro: The farming manual of choice

**Essential reading for the tropical
and subtropical agriculturalist**

DISCOVER THE NEW SPORE

Focus on agribusiness
and innovation

Exclusive interviews
with leading experts



More informed
analysis

Reporting directly
from the field

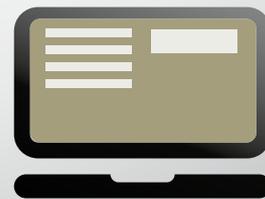
Get the latest on agricultural development with just one click



SMARTPHONE



TABLET



COMPUTER

