

Tapping into Digital Technology Platforms to Increase Agriculture Productivity in Africa

By Johan Burger
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Introduction

Africa is a bit of an anomaly as far as agriculture is concerned. On the one hand, it has 65% of the world's available uncultivated arable land, and it has the potential to feed the world. However, a country such as the Democratic Republic of the Congo (DRC), which has the potential to feed Africa's 1.2 billion people, struggles to feed its own population of about 70 million.

On the other hand, the continent is a net importer of food to the tune of US\$41 billion annually. This figure is set to grow to US\$110 billion by 2025 should nothing change. We also find that the average age of farmers in Africa is about 63 years, and 85% of farming activity takes place on smallholder plots of 2 - 3 hectares each. At the same time, the youth of Africa are fed-up with the poverty of their parents, who are struggling within the agriculture sector, and are migrating from the rural areas to the cities in the hope of finding a better paying job. Unfortunately, most of them end up unemployed and disillusioned, living in squalor in shacks made of corrugated iron and wood. Those that can, migrate to Europe and elsewhere.

We also find that about 60% of Africa's population is employed in agriculture, but the contribution of the sector to GDP is at about 25%, on average.

There are various reasons for the low productivity of the agricultural sector in Africa. The size of the smallholder plots, as mentioned, places constraints on the size of the harvest. In addition, the lack of modern irrigation techniques, poor road and rail infrastructure, lack of knowledge of modern farming practices, lack of knowledge of market needs and marketing per se, lack of financing, old age of farmers, lack of political will to bring about meaningful change, poor supply chain channels (including the absence of cold chain facilities) and high post-harvest losses all contribute towards the unacceptably high food import figure. Populist policies of governments pulling out all stops to remain in power have contributed towards this situation.

There is therefore a strong motivation to industrialise and commercialise agriculture. The sector needs to increase its productivity, and to attract the youth back into the sector by increasing the image thereof and making it appear to be "sexy" for the youth. Currently, when they do get involved in the sector, it is at the sexy part of the value chain, i.e. marketing and sales, and not at the coal face on the farms.

According to the African Development Bank (AfDB), Africa has the world's youngest population. Sixty percent of its 1.2 billion people are under 25 - but only 3 million jobs are created for some 12 million young people who enter the workforce each year. While developed nations turn to robots, blockchain, artificial intelligence and machine learning to solve agricultural challenges, simple, mobile phone-based offerings could produce great results in Africa.¹

Digital technologies are increasingly being embraced to make farming more interesting. These technologies can be transformational for Africa. Amongst others, there is an increasing need for farmers to access real-time information as climate change brings erratic weather, making traditional knowledge on planting seasons unreliable.

An increasing number of technology initiatives in the agriculture sector are becoming available. Technology is making it easier to get involved in the various sub-sectors of the agriculture industry, as an investor, a supplier, a farmer and as the market. These initiatives, it is hoped, will help the farmers to address many of the challenges and constraints they are currently experiencing. It is also hoped they will attract the youth and entice them to move back into the sector. Below are a number of initiatives that are based on digital technology, all with the aim of supporting the farmers of Africa in various ways.

myAgro: Technology Application in Mali and Senegal

myAgro was founded in 2011 and now operates in Mali and Senegal in West Africa. Seeds and fertilizer are two of the biggest costs in a smallholder farmer's life, but they are sold differently than any other product. While farmers can buy US\$1 of sugar or 50 cents of oil at their local store, seeds are only sold in bulk – at the cost of US\$100. The founder of myAgro wanted to make buying seeds more like buying oil or sugar, and to create a system that provides farmers with credit. She subsequently developed a savings-based payment model for seeds and fertilizer, as well as training.²

Today myAgro has a team of 300 with its headquarters in Bamako, Mali and a second office in Thiès, Senegal. In a 5-year period, the idea of using mobile technology as a savings platform has evolved from a 240 farmer trial to a multi-country program that serves over 30,000 farmers, proving that farmers can and want to save. myAgro is on track toward its goal of reaching 1 million smallholder farmers and increasing their income by US\$1.50 per day by 2025 to move above the poverty line and into the middle class.³

The myAgro system works as follows:

- It is a mobile layaway system for farmers to save and pay for agricultural inputs
- It operates via scratch-it cards that contain value (a prepaid card system like phone minutes)
- These scratch-it cards are available at local convenience stores, giving smallholder farmers relatively easy access to it
- Accounts are identified by the farmers' unique mobile numbers
- Farmers text the scratch-it codes to a number to "deposit" their money
- Farmers need to text an order command to make their purchase and have it delivered to them

In the long-term, myAgro sees its model bringing about structural changes in two areas: how governments and multilaterals fund the agricultural sector, and how the financial inclusion sector provides services to smallholder farmers. The company is of the opinion that when myAgro can demonstrate the power of mobile layaway to serve farmers and the bottom of the pyramid, there will be a major disruption in traditional antipoverty strategies for the sector at large. When financing is self-directed from smallholder farmers themselves, it will be sustainable. The market will react to this unlocked capital by providing better and more useful services or products.⁴

eMsika in Zambia

In Zambia, there are 60 agriculture suppliers that provide supplies to 1.3 million farmers and 2,500 agro-dealers across Zambia, making the ratio of suppliers to farmers 1 to 7,000. This has led to farmers and agro-dealers having to travel long distances, losing valuable time and money while being exposed to accidents and theft.

Zambian startup eMsika is helping farmers find, buy and receive agricultural inputs in a fast, trustworthy and convenient way, as well as access markets for their produce. eMsika is an e-commerce store for farmers, listing over 300 different products in 10 different categories of agricultural input, including poultry, crop protection chemicals and seeds. They enable their clients to source inputs and even contact suppliers in their local language. They also serve areas in Zimbabwe, the DRC, Namibia and Mozambique, with plans to eventually spread across Africa. They have 6 suppliers across different agricultural sectors, including livestock, poultry and horticulture, plus a database of 500 farmers and 200,000 from affiliates.⁵

The solution also helps farmers sell their own produce. Farmers complain after harvesting of lacking markets in which to sell their produce. Those that exist either under-price them or take a very long time to pay the farmers for their goods. eMsika offers farmers a more efficient and affordable process. They have also introduced a call centre for farmers who want to know more about certain products before buying them. Those in remote areas now have the same opportunity as those in urban areas to get any farm inputs from suppliers of their choice. eMsika has introduced m-commerce features that supplement the use of their website for all customers that are in areas of limited or no internet.⁶

FarmCrowdy in Nigeria

Nigeria's first digital agricultural platform, FarmCrowdy, aims to help smallholder farmers improve their production. These smallholder farmers struggle to get the financing needed to improve farming methods and boost their yields. FarmCrowdy is trying to fix this by connecting farmers directly with local investors to generate a healthy return for both the investors and the farmer. Most of these small-scale farmers are abandoning their farms and migrating to the cities because they cannot commercialise their operations due to poverty and a lack of finance and access to markets.

FarmCrowdy encourages Nigerians to participate in agriculture while going about their normal day jobs. Investors select the kind of farms they want to invest in via the firm's website shop, and then release the funds to FarmCrowdy to set it up. Options for investment include maize, poultry, cassava and tomato farms. FarmCrowdy advertises a 20% return every 6 months. After the investment cycle, investors can choose to cash out or reinvest on the platform. Upon receiving investor funds, FarmCrowdy hires farmers, leases land, and helps source seed or buy animals. The farmer gets 40% of the profit, the investor gets another 40% and Farmcrowdy takes 20%. Farmcrowdy plans to expand into markets in west and east Africa.⁷

This digital agricultural platform is another example of Africa's ability to step up and create the technology to deal with these and other problems. Necessity is the mother of invention – this has always been true for Africa. FarmCrowdy has developed an exchange business model where it links up the investor on the one hand with the farmer on the other hand. It goes further than just linking up, and ensures that land is leased, and seed and other inputs are procured. By hiring the farmers as well, FarmCrowdy can ensure that competent farmers are selected. It does seem that crowdsourcing will work well in this instance.

Making farming a lucrative option by providing the factors of production (land, capital and labour), FarmCrowdy is taking the steps to ensure that hopefully, amongst others, the youth would be willing to take agriculture more seriously. The kind of returns envisaged are not small change at all. This is the kind of approach that Africa needs to bootstrap the industrialisation of the agricultural sector. All that now remains is that the projects must be transparent and characterised by good governance. The last thing that Africa needs is for this kind of empowering project to run afoul of the law. FarmCrowdy's business model has served as the basis for various other initiatives, some of them mentioned below.

Farmer in Suite in Nigeria

Another technology platform closely aligned with that of FarmCrowdy, is that of Farmer in Suite. According to the startup founders of the platform, the agriculture system in Nigeria is marred by subsistence farming, lack of access to agribusiness innovation systems, near zero extension workers and lack of access to finance. To increase domestic food production, rural farmers require access to funding, farm input supply and farm extension services. Their vision is therefore to provide investment solutions that help absentee farmers make a return on their investment.⁸

The "Farmer In Suite" platform gives farm sponsors an opportunity to "own" farms and generate a profit while going about their other businesses. They can monitor progress on their farms through their dashboard using an internet-enabled device from anywhere in the world. The platform's main points are as follows:⁹

- The investor gets the opportunity to become a farmer, monitor the farm's progress and generate a guaranteed profit on the farm investments by sponsoring rural farmers
- The investor makes a difference by creating local employment and empowering the rural farmers to increase productivity and improve their livelihood
- The investor helps to fight global food security challenges by increasing Nigeria's domestic food production
- The investor gets the opportunity to make a social impact by providing school kits for disadvantaged children in rural areas

Typical farms available for investing, include the following:

- Maize farms
- Soybean farms
- Poultry farms

Their website provides the following rationale for joining Farmer in Suite¹⁰:

- Profitable investment: Farm sponsors can benefit from profit sharing between 8 - 25% of investment per farm cycle
- Empowering Farmers: Their farmers are able to keep their jobs and optimize their lands to increase productivity and improve their livelihood
- Food Security: Farm investors' participation help increase Nigeria's domestic food production and therefore ensures food security
- Social Impact: For every block of farms sponsored, Farmer in Suite provides school kits for a poor child in the rural area

Alosfarm in Nigeria¹¹

Another enterprise with a value proposition similar to that of FarmCrowdy, is Alosfarm. It is a combination of tools, services and capabilities into a seamless, all-in-one-place solution for farmers, agribusinesses and enterprises. It is also an all-in-one indirect farm management platform to optimise pre-harvest and post-harvest farming activities. In addition, it collects and aggregates alternative farm datasets, which can then be fed into any destination wanted.

As for streamlining pre-harvest farm activities, Alosfarm provides crisp action points about the farming techniques, hand-holding for processes, field support, updated information for enhancement in farming knowledge, thereby providing real-time information to the farmers. This entails:

- Providing action points
- Reporting and intelligence during farming
- Simplify and streamline access to farm inputs
- Drive costs down by cutting down man-hours

As for automating post-harvest farm activities, Alosfarm connects farmers, agribusinesses, buyers and delivery logistics in one simple, seamless interface, minimising the human resource components required to execute the procurement processes in the agricultural value chain. It entails the following:

- Automate the buying and selling of farm produce
- Streamline interactions into a process flow
- Drive post-harvest losses down to zero
- Boost efficiency and profitability

Thirdly, in the field of agricultural data automation, Alosfarm continuously provides simple data transmission infrastructure for organisations working with local farmers and real time agro data and content for farmers, online and offline, anywhere in Africa. One can feed this collected data into any desired destination via mobile, SMS, or in one unified web interface. It entails the following:

- Simple data transmission infrastructure
- Credit scoring technologies
- Improving sustainability practices
- Gaining critical insight into all processes

In addition to the above, its Enterprise Features include purchasing automation for enterprises with complex purchasing functions. Its Partners Integration function involves the enabling of key businesses like logistics to integrate in their procurement process.

Farmgate Africa in Nigeria

Farmgate Africa (FGA) is a subsidiary of FarmCrowdy Group, and was recently launched as a technology-driven agro-trading market place for agriculture commodities in Africa. The purpose of FGA is to bridge the gap between rural farmers and processors. Buyers have the opportunity to purchase commodities directly from farming clusters through technology.

According to Maseka (2019)¹², the FGA platform will build relationships between local farmers and major processors, aggregating commodities while paying attention to the unique specifications of the buyers. Nigerians from everywhere can fund the process of buying and selling what farmers have already harvested. This will give every farmer the opportunity to sell his/her produce to major buyers through FGA's portal.

Its business model is to bring the farmers closer to the processors by eliminating several layers of intermediaries. Farmgate thereby optimizes market access to African farmers and also improves their income by at least 30%.¹³

According to FGA's website, it provides for the trading and purchasing of commodities. Products include cattle, ginger, sorghum and maize. There are as of 8 April 2019, 8 commodity collection centres, 7800 farmers supplying commodities, 25000 metric tons of commodity available for purchase and 8000 metric tons of commodity available for trading.¹⁴

On the purchasing side, FGA sources high quality produce for millers, food manufacturers, brewers or other bulk commodity buyers. How the commodity trading platform works, is that the trader selects from FGA's range of agricultural commodities to trade. The trader then specifies his/her desired trade volume, whereafter an assigned account manager gets in touch to close the deal. At the end of the investment period, the investor gets back his/her capital and yield.¹⁵

eFarmers Nigeria

eFarmers Nigeria is the first of its kind in the Nigerian agricultural sector. It connects the Nigerian-based farmer and agro-allied businesses to numerous customers in Nigeria and abroad by offering free classified ads service. It is a business division of Evansville Industries Limited. eFarmers Nigeria provides a digitalised farm-based market for advertising agro products and services free of charge from anywhere at any time.¹⁶

Sellers can¹⁷:

- Post ads for free with images
- Get live updates about agricultural products' market prices and services
- Diversify or increase their service delivery, i.e. offer special discounts to their customers
- Get listed on Top Rated products
- Get product reviews and recommendations
- Receive calls, text messages and emails from authentic buyers

Buyers can¹⁸:

- Buy anything by simply calling or sending a message to the seller and agreeing on the purchase terms with sellers directly
- Get special deal updates from their favourite farmers
- Rate and write reviews of their closed trades
- Share and promote their favourite seller's products on social media with a click
- Report a seller if they are dissatisfied with a product or service

M-Shamba in Kenya¹⁹

M-Shamba is a solution for the smallholder farmer leveraging on the power of the mobile phone. It is seen as an agritech social enterprise. M-Shamba has embraced the use of latest emerging technological tools like Artificial Intelligence, Machine Learning, the Internet of Things and Blockchain in creating sustainable solutions for the farmer. Their solutions entail the following:

- **Interactive Voice Service:** This has proven to be the easiest and most effective way to disseminate information to the smallholder farmers in rural areas. Their voice platform works with/on any local language
- **Virtual Call Centre:** To avoid expensive infrastructure, M-Shamba has simplified the use of a call centre through their innovative call centre platform
- **Interactive SMS:** They broadcast short messages on agronomy, weather forecasts, climate change adaptations, gender mainstreaming, enterprise development and many others through their SMS service
- **Customized Mobile Applications:** M-Shamba develops customized mobile apps for their target audience. They can customise apps on GIS, Surveys, Monitoring, Evaluation, Trade, Learning and Financial Inclusion

M-Shamba has also launched the following programmes:

- **Digital Literacy:** As farmers must understand some basic digital concepts, M-Shamba has a detailed program on imparting digital skills to the rural population
- **Market Access:** M-Shamba links farmers to markets through an approach where the markets are identified and farmers are supported to grow crops that meet the quality demands of the targeted market. M-Shamba employs commodity aggregation to meet the needs of the markets.
- **Farming as a Business:** This program helps farmers evolve from farming as a lifestyle to farming as a business. Farmers are provided with various resources and tools to enable them create enterprises on their farms

According to the statistics on their homepage, the following performance levels have been achieved:

- Smallholder farmer families reached: 68,546
- Acres of land covered so far: 400,040
- Amount of commodities traded: US\$12 million
- Number of farmer cooperatives they have worked with: 90

Hello Tractor

Farmers throughout developing economies remain trapped in poverty despite US\$6 billion in aid spent each year over the past 5 decades to improve agricultural production and raise standards of living. This is due, in large part, to the disorganized and often antiquated agricultural value chains that persist across emerging markets. As a result, the individual farmers are often left without access to the information and inputs that are critical to improving their livelihoods. Without the right knowledge, labour, and equipment, farmers struggle to properly cultivate their land and plant on time, leading to underproduction and lost income. The Hello Tractor platform enables farmers to request affordable equipment inputs, while providing enhanced security to tractor owners through remote asset tracking and virtual monitoring. This value extends to all stakeholders in the mechanization ecosystem.²⁰

Hello Tractor is an Internet-of-Things (IoT) solution that supports the improved efficiencies, profitability, and transparency in the tractor contracting market. Their solution begins with a tractor monitoring device that can be installed on any tractor, connecting it to the Hello Tractor cloud. Once connected, the device transmits relevant data across their ecosystem.²¹

The solution works with the following stakeholders:

- Tractor owners
- Smallholder farmers
- Banks
- Dealers

Purchasing a tractor is out of the question for most smallholder farmers, but paying for tractor services is within reach. This creates an opportunity for tractor owners to provide service-for-hire – but first they must identify and organize smallholder farmer demand. Traditionally, this has occurred through word of mouth and poorly coordinated referrals: a friend of a friend knows a farmer in need of ploughing and sends him/her to a tractor owner, cooperative, or hiring association that may or may not be able to deliver the requisite service. Average farm sizes are under one-hectare and plots span large geographies, making the coordination of tractor deployment difficult. Scheduling and recordkeeping is done by memory or by hand, if at all.

Hello Tractor aggregates smallholder farmers' requests for tractor services on behalf of tractor owners, while providing enhanced security through remote asset tracking and virtual monitoring. This allows tractor owners and manufacturers to expand their markets, reaching new customers who were previously inaccessible. Their solution begins with a hardware monitoring device that can be installed on any tractor, connecting it to the Hello Tractor cloud for remote data tracking and analytics. This durable, adaptable, and affordable device is designed for rugged use and extreme weather conditions. It is fitted with an international SIM card for higher connectivity, but can store activity data locally if no connection exists.²²

Once the device is in place, data is transferred to Hello Tractor's mobile applications, where it is displayed in a user-friendly format. The Tractor Owner App incorporates a number of tools to enhance a tractor owner's business and operations, including accessing new customers, increasing efficiencies and improving oversight. This leads to lower costs, higher revenues and increased trust and transparency.

Farm Capital Africa in Kenya

In Kenya, millions of small-scale farmers are locked out of the country's formal economy. In 2014, Alex Muriu created Farm Capital Africa with the goal of generating wealth through investing in profitable business ventures in the underfunded agricultural sector. Farm Capital Africa uses the internet to raise funds and mobile money to disburse to agripreneurs (small-scale farmers between ages 25 and 35 — mostly youth and women). The aim is to connect them with investment groups that can help them access funds to scale up their agricultural ventures. Through its investor networks, Farm Capital Africa participates in a profit- and loss-sharing arrangement between the agripreneurs and the investor. The company provides input financing to small-scale farmers by partnering with local agrovets (places where farmers can buy agricultural and veterinary products). On joining the programme, they can pick inputs from the agrovet on credit and pay upon harvest.²³

What Alex Muriu in effect has done, is create an agriculture cooperative. Basically the cooperative finances the operations of the farmer, and gets paid at harvest time. The farmer's land typically serves as collateral for the credit he/she gets from the agrovet. This is somewhat similar to the FarmCrowdy initiative in Nigeria. Given that the initiative is financing the working capital cycle of the farmer, which can be up to a year, it must be financed from somewhere. Given the long operating cycle, the margins must be sufficiently generous to finance this cash cycle gap. In South Africa, the cooperatives were owned by the farmers themselves, and they kept the margins low. In this instance in Kenya, the investors want a return on their investment. Elsewhere in Africa, we have also seen corporates such as Olam International helping its smallholder farmers with their working capital requirements, interest-free. This is one way of locking in your suppliers, and locking out competitors as far as supply is concerned.

FarmDrive in Kenya

Also in Kenya, FarmDrive is addressing the lack of access to finance for smallholder farmers from the formal financial ecosystem. Many of their troubles could have been eased through quality farming inputs and modern equipment. However, financial institutions were unwilling to provide them with the financing to do so. They needed capital to help grow their farms beyond the subsistence level, yet banks would only provide loans to larger established commercial farmers with credit histories and collateral.

FarmDrive has developed an innovative alternative credit-scoring model that can be used by financial service providers, such as banks, to assess the creditworthiness of farmers and allow more smallholders to access financing, while still protecting banks from defaults. Through FarmDrive, farmers can apply, receive and repay their loans using their mobile phones. FarmDrive's role is to bring together all the information already available on smallholder farmers.²⁴

Initially, FarmDrive operated in partnership with a single microfinance organisation, but has since positioned itself as a data analytics company targeting its software at financial service providers keen on lending to smallholder farmers. FarmDrive has also partnered with a large telco in Kenya – growing its network of smallholder farmers from 3,000 to more than 100,000 overnight.²⁵

Once again we find the innovation activities of Africa using mobile technology to address problems in society at large. As the saying goes, necessity is the mother of invention. When Thomas L. Friedman so eloquently stated that the world is flat (with technology being the leveller), he must have been thinking about Africa!

FarmMate in Africa

FarmMate, a digital application for farmers in Asia, the Middle East and Africa (AMEA), was launched by New Holland Agriculture to provide useful tools to farmers to help them in their daily work. The app supports farmers with agronomic advice and useful tools. FarmMate users can find detailed information on New Holland's equipment and how it can benefit their farming operations, as well as insights on farming practices, news and dedicated services that will improve their overall after-sales experience with the brand.²⁶

FarmMate aims to provide farmers with solutions on how to get the best from their fields and from the crops they are cultivating. The app will be customised for each market so that the news, promotions, products and agronomic information provided will always be relevant to the user.

The main menu provides four choices, i.e. Agronomy Tips, Products, Distributors and News. In addition, it provides useful insights on successfully growing the most widespread crops in the user's area such as corn, potatoes, rice and wheat. FarmMate also provides farmers with useful tools for their daily activities, such as a currency converter, details of promotions on spare parts and services available at their dealership, weather forecasts, and news about New Holland products and activities in their country.²⁷

As per New Holland Agriculture's website, the app allows one to remain updated on the latest products and news, to get ready for promotions and discounts. It will also be a valuable source of valuable agronomic information and suggestions on the most crops. FarmMate offers the following useful features:²⁸

- One can browse New Holland Agriculture product catalogues, view videos and pictures and download brochures.
- The Agronomy feature will guide one in all the cultivation stages of the most common crops, with advice and suggestions from experts.
- The Distributors function allows one to quickly find and contact the nearest authorised reseller or service.
- By creating an account, one will also have access to locked card collections, full brochures and technical bulletins.

ThriveAgric²⁹

ThriveAgric links smallholder farmers to access to finance to grow their crops. They use data-driven best practices to increase their yields and link them to a profitable market. They enable this by giving investors an opportunity to fund these farmers and get predictable returns upon harvest. Over the past 18 months, they have worked with 11467 farmers in 12 states in Nigeria. Amongst others, their farmers also raised over 750,000 birds. In the next 3 years, they plan to reach 1 million smallholder farmers spread across Africa.

According to ThriveAgric's website, they improve the world in the following way:

- By solving Africa's food shortages
- By developing farming communities
- By using technology to increase yields and productivity. Their extension workers use an App that provides up-to-date information and their farmers get automated messages.
- By generating exciting returns for their farmers, who get as much as twice what their average yields would have been

How does this process work?

- The investor decides to subscribe to a farm by creating an account, using his/her email to get started
- The investor then chooses a farm or farms and the quantity they want, and then pay the subscription fee. This can be done online
- The investor gets multimedia updates from happenings on the farm and the farmers' lives. These updates help the investor to keep track of events and offer practical knowledge on the process of production, from start to finish.
- Upon successful harvest, expected returns of proceeds from produce are sold and distributed to the subscribers, all within the stipulated time. The expected returns are as stipulated in the write-up of the respective farms on the website of ThriveAgric.

Growcropsonline.com³⁰

Growcropsonline is a platform that allows busy people to farm. They offer farming services and contract farming via this platform. It is based on the premise that anyone can own and run a real farm online from anywhere on his/her mobile phone or laptop, at home, in the office and on the road. The investor simply chooses a crop at a desired location, chooses a land size, and pays for it online. A certificate is sent to the investor as evidence of the booking of the desired number of slots.

Over the period of planting, weeding, spraying herbicides and harvesting, the investor is prompted to pay online for each of the services. He/she is also entitled to visit their farm parcel at anytime through a Pre-book Appointments System. During the visit, the farm manager would be available for any questions and enquiry. The farming process is insured from planting to harvest so the investor never loses money.

The investor can at any time request an assessment of the value of the farm and he/she can sell their interest in the farm to anyone they choose.

After harvest, the harvested produce would either be delivered to the investor or sent for processing where the processed product is sold off according to the investor's instructions on a platform established for that purpose.

Growsel³¹

Growsel is a financial inclusion, nonprofit agricultural crowdfunding organization that connects underserved Base of the Pyramid smallholder farmers with lenders around the world to alleviate poverty. What makes Growsel different, is the following:

- Their local partners verify and screen the farmers to whom loans are given
- Funding is not enough to support local farmers. Growsel provides global agricultural best practices to smallholder farmers such as pest prevention/mitigation, farming tools, technology and inputs to support their farm cultivation process and yield

- There is a 0% interest on loans for smallholder farmers

For the lenders, the system works as follows:

- Lenders can alleviate poverty by providing loans as low as US\$20 to smallholder farmers
- Their principal gets repaid to them after cultivation
- They can then recycle these funds to support another farmer

For the smallholder farmers, the systems works as follows:

- They sign up or contact the local field partners of Growsel
- They get verified to have their farm crowdfunded at 0% interest, whereafter they start a farm
- They then gain access to improved inputs and agricultural best practices, and grow their produce
- They finally make their repayment after cultivation to access more interest-free loans

Much of the process of registration, both as a lender and as a farmer, is driven by the website of Growsel. Lenders sign up at www.growsel.org/login. Farmers sign up at the same link, and then follow the process described in the paragraph above.

Conclusion

Africa's agritech industry remains underdeveloped with huge potential. By focusing on the various players upstream and downstream, suppliers and buyers, a lot of value can be unlocked by tapping into the utilities of modern technology. The various players are using technology to solve the challenges of the various stakeholders. The above examples are by no means an exhaustive list of the available technology available within the agriculture sector. Other examples include MbeguChoice and Probitry Farms.

These applications and platforms, by helping to increase the productivity of the farming community, are addressing the challenges of food insecurity in Africa. Should this productivity change significantly, it can help Africa save on its annual net import bill of US\$41 billion. This money could be used elsewhere much more productively, such as contributing towards the annual spend on infrastructure development where there is an annual requirement of between US\$130 billion and US\$170 billion. Import substitution can also improve the balance of payments and create more jobs in the process.

In addition to farmer productivity, which is only one aspect of the equation, the sector can also use technology to improve market access, as well as knowledge about the most appropriate markets on any day.

It is obvious that the Farmcrowdy model, which links investors and farmers, together with creating access to a market, has been emulated in a number of countries throughout Africa.

Africa has actively been embracing mobile and digital technology. Innovators in Tanzania and Togo have both used e-waste to build 3D-printers. Kenya has been the scene of M-Pesa, M-Schwari, M-Kopa, and M-Akiba, to name but a few applications. Given the challenges Africa faces, the use of technology can play a substantial role in addressing them.

As the supply of smart phones increase in Africa (and there is an influx of cheap smart phones), the access to broad band internet improves, the cost of data is reduced and the level of education improves, technology will increase its impact on the agriculture sector of Africa. Hopefully it will not only lead to an increase in food security, but will it also increase the chances of the youth once again embracing agriculture as a career option.

The author, Johan Burger, is a senior lecturer at the Nanyang Business School, Nanyang Technological University, in Singapore. Johan can be reached at johan.burger@ntu.edu.sg.

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