![1 World Connected — Data-driven Research to Bring Billions Online](logo)

JAGUZA FARM TECHNOLOGY

PROVIDING FARMERS WITH LIVESTOCK INFORMATION VIA MULTI-MEDIA SOURCES IN UGANDA

Photo credit: Jaguza Farm Technology

EXECUTIVE SUMMARY

Founded in 2013, Jaguza uses information and communications technologies (ICTs) – such as its Livestock App – to facilitate the sharing of indigenous farming knowledge and enable poor farmers to obtain better prices for their products. In addition to printed how-to guides, Jaguza uses a variety of ICT tools, including websites, social media, blog posts, and Short Messaging Services (SMS), Unstructured Supplementary Service Data (USSD), and mobile, offline, and online web applications. Jaguza's model allows farmers to easily pick up new farming methods that can diversify and improve their yields and production. Jaguza also helps rural farmers sell their livestock directly to growing urban and foreign markets. There are more than 30 ethnic groups in Uganda, each with its own indigenous farming methods, and Jaguza's model is designed to centralize and encourage farming knowledge transfer.

Keywords: ICTs, multi-media platform, livestock, farmers, agriculture, Uganda

CONTEXT

Agriculture plays a crucial role in Uganda's economy, as it accounted for about 23.6 percent of gross domestic product (GDP) in 2016, 46 percent of export earnings, and an estimated 72 percent of all Uganda's working population, according to the Uganda Country Commercial

Guide. Agriculture income growth is one of the important factors that contribute to the reduction of poverty in Uganda. Yet, agriculture income growth was not driven by the adoption of modern farming techniques and practices, according to a poverty assessment conducted by the World Bank. Much of the land in Uganda has not been cultivated, farmers have not utilized agricultural inputs to improve their crops, and far fewer are using extension services. Moreover, little is known about how Ugandan farmers find information about agriculture practices, but there are projects that indicate the increasing use of mobile phones among farmers.

Uganda is striving to create an enabling environment for the application of ICTs in agriculture. The country was one of the 12 beneficiaries of the mFarmer Initiative Fund, and the World Bank financed the country's $248 million Agriculture Cluster Development Project to improve agricultural productivity, which includes an important technology component. Lutheran World Relief Uganda, through a partnership with Centenary Bank and the telecommunications operator Airtel, launched a mobile group savings solution that provides a secure, convenient, affordable, and fast way for savings and lending groups.

Uganda			
Population (UN, 2015)	40,141,262	**Fixed broadband subscriptions (%) (ITU, 2016)**	0.26
Population density (people per sq.km) (UN, 2015)	166.54	**Mobile cellular subscriptions (%) (ITU, 2016)**	55.07
Median household income (Gallup, 2006-2012)	US$ 1,775	**Individuals using the Internet (%) (ITU, 2016)**	21.9
Education (Mean years of schooling) (UNDP, 2013)	Male: 6.4 Female: 4.3	**Individuals using the Internet by Gender (%) (ITU, 2016)**	N/A

PROJECT DESCRIPTION

Many farmers in Africa rely on indigenous farming methods handed down from generation to generation. To address this issue, Afrosoft developed and launched Jaguza Livestock in 2017, an e-Agriculture mobile application to improve livestock production and productivity in Uganda and beyond. Afrosoft IT Solutions is leveraging modern technology to build a national and eventually global central database of indigenous farming knowledge, and then organizing farmers into a network to share best practices from across the country. It offers a mobile monitoring system for farmers to detect individual movements of cattle, and health and fertility status of cattle, and was developed in tandem with programs to raise awareness among livestock farmers regarding early detection of livestock diseases.

Committees are formed at the village or parish level by a volunteer community veterinarian in consultation with a local community council chairman of the villages. The chairman is equipped with basic livestock information concepts to raise awareness among locals and encourage them to monitor, guide, and report any problem in the communities to the Jaguza

expert for action in real time. Consultation and dialogue with communities help empower villagers and improve access to livestock information through use of their mobile phone.

The system can be used online and offline, to accommodate users in areas with limited Internet access. The offline system helps farmers in rural communities to use the system without an Internet connection, store their information and access it locally, and then sync he information with the cloud server when Internet becomes available. The system acts as central repository for information from various locations that helps researchers, veterinarian, extension workers, and policy-makers access information regarding their areas of interest. Livestock data and agricultural information is collected from farmers who are linked with relevant veterinary firms and cross-referenced with external data gathered from the livestock laboratory, applying predictive and analytical modules that accurately predict livestock diseases before they spread to the rest of the farm and infect others. They send farmers low-cost, easy-to-understand voice alerts and reminders for care seeking, as well as actionable information and advice to help quarantine livestock disease outbreaks. Users pay using their existing mobile credit so that no upfront seasonal costs are necessary. The general subscription model to have access to the complete range of services is $7.00 for a three-month period.

The system for detecting diseases is inserted into the animal's ear or attached to one of its legs. The device sends data via a wireless transceiver and uploads it to the company's central network operations system, where it is compiled and made available to the livestock producer via the Internet. The system has the ability to track, trace, and monitor the health condition of individual animals in real time. Jaguza continuously monitors using electronic ear tags to track the movement of animals, and an alert is sent to the farmer in case the animals move out of the mapped area, farm, sub-county, or region. This allows livestock managers to continually monitor their animals' location and core temperature to determine which animals might be sick, and which others they have been in contact with.

Jaguza also has a resource center, which is a database platform offering a wealth of animal and agricultural information, good farming practices, and other agricultural information mainly based on livestock. In addition, it also comes with a module for animal feed that shows how much feed the animals consume, and helps the farmer calculate their feeding expenditures for the animals in order to obtain profitable and accurate results. Furthermore, it helps a farmer to market their livestock products. Pictures are captured with a description of the location, terms of sale, prices, contact person, etc., and uploaded to the cloud server, where potential buyers can view all the details.

Jaguza provides extended online advisory services from veterinarians. In this module, the farmers will also ask questions to veterinarians online, and will be provided with answers to help them improve on the livestock's productivity. Jaguza will help farmers, the government, and other stakeholders map and monitor farm animals as well as the number of livestock farmers in the particular districts with details of the animals they have. Furthermore, users, veterinarians, and the government will be enabled to see how a disease is distributed geographically, but also any given animal's disease can be viewed against other information like rainfall maps, vegetation maps, rivers, swamps, etc.

There are 85 volunteer veterinarians 89 of whom are women and 125 farmers (92 of whom are women) that have received online training. In person training consists of one week of on-site training of the trainers, and then those trainers conduct two-day sessions with local farmers. Doctors who conduct trainings are compensated $1 for each farmer they train.

They currently serve five districts, 292 farms, 2,935 farmers, and have been operational in the full form for 11 months. In addition to Uganda, the project has scaled up to serve Fiji, Namibia, and Mozambique and soon South Africa

Project details			
Technology	Online and offline app	**Training**	One week of on-site training of the trainers followed by 2-day training of local farmers by trainers.
Year program started	June 2017	**Cost to users**	US$ 10 for application, both online and offline US$ 1 for a 3-month subscription US$ 1 for 2-day training US$ 1 for a 3-month subscription
Geography	5 districts: Kayunga, Pallisa, Masindi, Mbarara, Mbale	**Total cost of program**	Fixed cost: US$ 85,000 Operational cost: US$ 2,200 per month
User profile	Farmers in five rural districts of Uganda; two-thirds male and one-third female; all ages	**Associated organizations**	IST Africa, Ministry of Agriculture, Uganda Communication Commission, Uganda National Council for Science and Technology, African Forum for Agricultural Advisory Services *(AFAAS)*

PROGRESS AND RESULTS

The Jaguza App is currently operational in more than 40 communities across 62 local Ugandan farms. The project targets more than 6,023 livestock farmers, with over 8,300 unique users every month, and users are especially taking advantage of animal health data, outbreak alerts, and educational content.

The innovation has helped rural folks access veterinary services and locate the whereabouts of their cattle when they stray. The SMS & USSD services, surveillance (GIS), analytics, and reporting for livestock diseases and fertility have lead to better management of livestock and higher productivity.

Direct Project Beneficiaries

LOCATION	SEX DISTRIBUTION		AGE DISTRIBUTION (YEAR)		
	MALE	FEMALE	0-14 yrs.	15-65 yrs.	65+ yrs.
Kayunga	854	332	249	586	251
Pallisa	765	362	301	527	259
Masindi	967	267	300	534	400
Mbarara	880	359	250	639	350
Mbale	874	363	233	637	367
	4,340	1,683	1,333	2,923	1627

The app is improving the productivity of the farms as well. Farmers get informed about prices, and make smarter business decision on the agricultural market. Furthermore, there is a demonstrable reduction in diseases, and farmers post and report their success stories.

Jaguza provides extended online advisory services from veterinarians. By doing so, Jaguza Tech will create job opportunities among university graduates since it has the ability to support approximately 60 veterinarians online who respond to different questions asked by livestock farmers and guide them for higher productivity.

Jaguza has received a number of awards and recognition for their innovative work. They won an Acia Award in 2017 from the Uganda Communications Commission (UCC), received the Commonwealth Telecommunications Organisation (CTO) youth innovation e-agriculture award in 2016, and the International Telecommunication Union (ITU) Telecom World Entrepreneurship Award in 2015. The Technical Centre for Agricultural and Rural Cooperation (CTA) Africa also ranked Jaguza among the nine-best agriculture projects in Africa in 2015, and as one of the top 20 projects in East Africa by Ashoka Change Maker.

CHALLENGES

Lack of telecommunications infrastructure – There is limited ICT infrastructure in the areas that Jaguza serves. It is necessary to make offline capabilities a standard feature to account for the limited availability of Internet. Backhaul connectivity is also difficult to secure.

Limited and irregular electricity access – In addition to limited telecommunications infrastructure, the communities where Jaguza application is deployed also have limited and irregular electricity access. This makes access to offline tools incredibly important.

Lack of awareness among users of ICT-based tools – There is limited awareness about the necessity of information to prevent talk to the local counsel (LOC) of the village to bring awareness to the farmers, but user adoption is still a struggle.

Lack of sustained funding – There is paucity of funds to rollout most of districts, since each district need a lot of training and awareness building activities

JAGUZA'S SUGGESTIONS FOR FUTURE PROJECTS

Understanding the needs of the farmers initially is essential – Jaguza's success demonstrates the value of community outreach and understanding the target audience, since one cannot merely devise a new technology without taking their needs into account. Gaining user input early on is a head start toward developing a useful and successful program that centers on the needs of the target group.

Structure of the training needs to cater to local sensitivities–For instance, **there** is a high degree of language diversity among the rural populations being served. Thus, translators are needed in certain areas. Their experience suggests communication with the user requires being responsive to the preferred language of the farmer.

Data collection and digital literacy training is important – Even though the number of animals each farmer has is added to the platform and helps develop the service, the farmers must still learn how they can benefit from the program, in part, by improving their digital literacy skills.

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