

BYTE BY BYTE

Policy Innovation for Transforming Africa's Food System with Digital Technologies



Ghana has a rapidly developing digitalization environment. According to the World Bank's EBA ICT Index, Ghana ranks among the top five best performing African countries.ⁱ The EBA ICT index score of 5.5ⁱⁱ out of 9 indicates a strong enabling digital environment with regards to laws, regulations and policies.¹ Secondly, according to GSMA's Mobile Connectivity Index (MCI)ⁱⁱⁱ, Ghana's mobile internet adoption rate and usage increased by 15 percent within the last four years, with an MCI score of 52.7 in 2017.^{iv} The country is performing particularly well in 3G network coverage and in providing the first 4G services, affordable handset prices, gender equality in terms of the labor market, and a higher ratio of bank accounts held by women, as well as content availability in terms of mobile services in local languages.²

Institutional innovation

At the institutional level, the Ministry of Communication (MoC) plays a critical role in developing an enabling digital environment and a framework to support the digitalization of the economy. The MoC was established out of the Ministry of Transport and Communications in 1993 to promote Ghana's rapid development into a knowledge-based society and a smart economy. It further aims to strengthen the institutional

and regulatory framework for managing the ICT subsector, enhance the adoption of ICTs, including in the agriculture sector, and facilitate the provision of quality meteorological data and forecasts in support of weather-sensitive sectors. Under the MoC, eight agencies and statutory bodies work to formulate policies leading to the cost-effective creation of ICT infrastructure and services in order to promote economic competitiveness across all sectors.³

Moreover, the National Information Technology Agency (NITA) was established by Act 771 in 2008 as the ICT policy implementing arm of the MoC. NITA is responsible for developing and promoting new, innovative technologies, ensuring the growth of ICT through continued research and development in partnership with the private sector, planning and technology acquisition strategies, and assisting the government to generate growth and employment by leveraging ICT and public-private partnerships.⁴

ICT infrastructure in Ghana is further overseen by the National Communications Authority (NCA). The 1996 National Communications Authority Act and the 2008 Electronic Communications and Transactions Act were passed to strengthen the capacity of the Authority. The NCA grants

i Overall, Ghana ranks 22nd out of 62 included countries in the EBA.

ii The EBA ICT indicator measures laws, regulations and policies that promote an enabling environment for the provision and use of ICT services, particularly in rural areas. The index ranges from 0-9 (9 indicating high performance). An index equal or higher than 4.5 is identified as 'developing' and 'prospering' in the regulatory framework performance and therefore considered as high performers in our cluster.

iii The GSMA Mobile Connectivity Index measures the performance of 163 countries (44 African countries), against the four key enablers of mobile internet adoption - infrastructure, affordability, consumer readiness and content and services. The index ranges from 0-100 with 100 indicating high national capacity to support the adoption of mobile internet.

iv Ghana's MCI increased from 45.8 in 2014 to 52.7 in 2017.



licenses, ensures fair competition, establishes and monitors quality of service indicators, educates and protects consumers, authorizes type approval and equipment standards, and coordinates international radio frequency.⁵

Although the Ministry of Food and Agriculture (MoFA) is not the primary driver in the digital transformation process, some of its units, including the Statistics, Research and Information Directorate (SRID) advocate for the use of modern technologies and ICTs in the agriculture sector. SRID provides relevant, accurate and timely agricultural statistics such as the annual market surveys to provide information on commodity prices and information for stakeholders. These are increasingly based on big data and captured by digital technologies, including tablets and mobile phone apps.⁶ MoFA's ICT Unit emphasizes the use of ICTs in agriculture⁷ and has adopted five principal elements and objectives to stress the ministry's strategic approach to the e-Agriculture model:

- **ICT policy:** Promote a pro-competition policy and regulatory reforms to encourage the uptake of ICTs by stakeholders in the agriculture sector. Facilitate the establishment of public-private partnerships to collate and disseminate agricultural information domestically and internationally. Create awareness on the e-Agriculture platform through TV, radio, newspapers and social media.
- **ICT access:** Foster access to ICT and dissemination of information for underserved populations, particularly the poor in both rural and urban settings, ethnic minorities, youth and women. Develop and maintain a National Agricultural Database of farmers and agricultural and other information.
- **ICT Capacity:** Develop the capacity of directorates, projects, institutions, units and individuals to respond to ICT agriculture workforce demands. This also includes the creation of staff-stakeholder-centered learning environments, MoFA Information Centers, multi-use telecenters and piloting emerging alternate technologies that foster inexpensive, low-power alternatives to PCs.
- **ICT applications:** Demonstrate innovative ICT applications in local languages and with cross-sectoral objectives including: agriculture, conflict management, democracy and governance, economic growth and trade, education, energy, environment, health, humanitarian assistance, natural resources management, poverty reduction, urban programs, and women in development. Develop or acquire applications to collect, collate, store, archive and share information.

In addition to government ministries like the MoC and the NCA, the ICT sector in Ghana consists of various private partners including telecommunications operators, internet service providers, VSAT data operators, software developers, broadcast institutions, ICT education providers, and others. Also, a

number of private companies and some start-ups have begun to offer (smart) phone apps and services with features relevant to the agriculture sector.

Policy and programmatic innovation

In 2003, Ghana devised a roadmap for the development of its information society and economy through the Ghana ICT for Accelerated Development Policy (ICT4AD). The policy seeks to engineer an ICT-led socioeconomic development process with the potential to transform Ghana into a middle-income, information-rich, knowledge-based and technology-driven economy and society. On agriculture, ICT4AD modernized the sector through the use of ICTs to improve on the sector's efficiency and productivity and to develop an agribusiness industry. In addition, ICT4AD aimed to promote basic as well as cutting-edge agriculture-based R&D to improve the yields, agricultural processes and productivity of some of the country's main crops including cashews and cacao; and to support the development of marketable value-added agricultural products capable of competing on the domestic, regional and global market. In detail, the strategy encouraged market research through the use of ICTs. It also endorsed the development of Geographical Information Systems (GIS) applications to monitor and support sustainable environment use, and food insecurity and vulnerability information and mapping systems. In addition, the strategy aimed to revitalize agriculture extension services by empowering and equipping farm extension service workers with relevant ICT skills, to establish an agriculture information system, to utilize ICTs to link farmers and farmer groups to resources and services, and to reduce preharvest and postharvest losses in agricultural production through the development and adaptation of improved technologies.⁸

The ICT4AD is currently in its fifth phase (2019-2022) with a focus on the production, development and delivery of ICT products and services with less emphasis on ICT deployment and exploitation, which had been the focus of earlier phases.⁹

The importance of ICT development was further embedded in Ghana's second National Agricultural Investment Plan (NAIP), the Medium Term Agriculture Sector Investment Plan II (METASIP II) covering the period 2014-2017. The investment plan emphasized accelerated agricultural modernization and sustainable natural resource management in order to transform the agriculture sector and to increase productivity, output and incomes, create jobs, and ensure food security. Greater involvement of the private sector was envisioned, as well as increased investment and management of the sector as a whole. To facilitate access to input, research, technology and product markets, the NAIP outlined various links to be established between smallholders and agribusinesses. The plan specifically advocated for the use of mass extension methods such as radio, TV, and communication vans for knowledge dissemination. In addition, the institutional coordination



for agricultural development was improved through District Agricultural Advisory Services using ICT and other digital technologies, providing advice on productivity enhancing technologies. E-governance platforms that disseminate information and engage the public sector were optimized to increase investments and to accelerate the creation of jobs in agriculture. Furthermore, the use of ICTs, especially mobile phones and media to disseminate market information and the use of early warning meteorological information from the Meteorological Service Agency were promoted.¹⁰

In 2017, the MoFA released an ambitious policy framework, Planting for Food and Jobs (PFJ) 2017-2020, committed to increasing agricultural productivity and catalyzing structural transformation through increased farm incomes and job creation. Part of the framework is the use of e-Agriculture platforms, which are implemented in collaboration with the ICT Unit of the Ministry. The main objective of the e-Agriculture platforms is to provide affordable, prompt and efficient agricultural services, which are delivered through the use of the internet and other ICT services.¹¹ The e-Agriculture program, which was already implemented in 2011, includes components such as the e-Farm information, a service accessible via free calls that informs on best farm practices for cassava, yam, cocoyam, rice and maize, in local languages. Other components include the Call Centers, a phone service that links farmers with specialist support, e-Learning and Resource Centers, a web portal, and e-Field extension services. The e-Field-extension aims to collect farm and farmer's data through use of digital technologies by agriculture extension officers. Besides the mapping of farmlands, collection of biometric data and disease and pest monitoring is established in order to boost accurate and prompt response to field needs and support an early control system to safeguard food security. While the e-Agriculture platform helps farmers source and market their outputs, the success of the PFJ strategy itself, including the provision and collection of accurate data and information, and the timely payment of subsidies to farmers in remote areas will heavily rely on the extent to which mobile technologies are being deployed and used among smallholders.^{12, 13}

To complement the outlined policies and strategies to expand and improve the ICT infrastructure and availability of e-services, the government passed the Data Protection Act, 2012 (Act 843), safeguarding personal information and data privacy. A Data Protection Commission was established as an independent statutory body to ensure and enforce compliance with the Act.¹⁴

Through the MoC, paperless port operations, an integrated e-immigration, e-procurement, e-parliament, e-justice and e-cabinet system as well as smart workplaces were initiated and represent a significant milestone in Ghana's journey to creating an enabling digital environment. In addition, the National Digital Property Addressing System (NDPAS), launched in 2017, aimed to provide every property in Ghana

with a unique digital address.¹⁵ Under the framework of the World Summit on Information Society, 69 Regional Community Information Centres have been built in nine different regions in Ghana.¹⁶ Their objective is to bring government e-services including passport services and birth registrations to rural areas, and to disseminate information on health, local government, environment, and agriculture.¹⁷

In 2018, with support from the World Bank and the Rockefeller Foundation, the government opened the Accra Digital Centre to attract and retain ICT and information technology enabled services companies, promote entrepreneurship and job creation, foster digital innovation through ICT R&D programs, and provide technology solutions to various sectors of the economy through partnerships with private sector firms, existing innovation spaces, academic institutions, investors, and other stakeholders. The center provides a Mobile Applications Laboratory (mLab) and an Innovation Hub (iHub). The former is designed to host offices, different testing labs for robotics, AI and other emerging ICT areas. The iHub is a co-working space, suited for start-ups and entrepreneurs, with a large event space for hosting events.^{18, 19}

The MoC also leads on different ICT initiatives. In addition to a digital terrestrial TV program and enhancing the broadband capacity in the country, there are two flagship programs. Through the e-Transform project, which is jointly led by the MoC and the World Bank, the government aimed to establish unique electronic identification systems and enable access to public services while promoting better admission to online transactions and financial services. Through the innovative applications, the focus was to improve service delivery in the priority areas of health, education, agriculture, judicial, and parliamentary services. Furthermore, in 2008, the government initiated the Eastern Corridor Fiber Optic Backbone program, investing approximately US\$43 million in the development of a solid and dependable ICT infrastructure. The project was implemented by the MoC as part of the ICT infrastructure development with the vendor Alcatel-Lucent Denmark, which aimed to bridge the digital divide between rural and urban communities.²⁰

While some of the start-ups and technologies focus on providing one specific service to farmers, there are some that offer overall farm management support. Ghanaian start-up Esoko offers such data services in Ghana and other African countries. Through the Esoko data collection tool, farmers can monitor and analyze their farm records. The service, which can be accessed via a smartphone app or website, can link farmers to advisory services, markets and market prices, and financial services. Farmers are able to make payments directly via the Esoko smart-card system and can subscribe to the Esoko service for US\$1 per month.²¹ While Esoko targets farmers in order to provide digital services, the data that is captured through the digital platform is also being used as a source of



big data by the MoFA. Through one of Esoko's services, Insynt, 34,000 farmers have been profiled by the MoFA.²²

The start-up Trotro Tractor has been operating in Ghana since 2016, providing a mobile hiring service for agricultural tools and equipment, including tractors and machines. Since most farmers who need ploughing services are unable to reach out to mechanization centers, tractor services or operators, the service offers an option especially for smallholder farmers to request a tractor service through text messages or the online platform. Through the platform, smallholder farmers are then able to schedule and prepay for services. In addition to the benefits for the farmer, the tractor owners are able to monitor movement and work progress of their equipment.²³ Recently, Trotro Tractor has been awarded for one of the five best AgriTech Solutions by AppsAfrica Innovation Awards 2018.²⁴

Other providers offer services related to trade, marketing, mobile banking, and insurance. AgroCenta, founded in 2015, has established three platforms: AgroPay, AgroTrade and AgroMart. AgroPay enables farmers' access to digital services such as mobile money payments, micro-lending, input financing and crop insurance, while AgroTrade links farmers with large buyers and ensures direct trading. With AgroMart, everyone can get involved as a distributor, helping smallholder farmers to sell their produce at fair market prices. Currently, over 30,000 farmers are registered to one of the AgroCenta services.²⁵

In addition to African companies and start-ups, international companies are also established in Ghana. In 2010, Ignitia, a Swedish company, started their work in Ghana. The company developed a tropical forecast model with an accuracy of 84 percent, predicting weather down to a specificity of 3 km x 3 km. Each morning the subscribers receive a 48-hour rain forecast via SMS in their local language, specific to their location. The service costs only a few US cents per day, and as the technology is easy to use, the service is accessible for most smallholder farmers in rural areas. In 2017, Ignitia had 330,000 subscribers in Ghana alone and has since expanded its services to Nigeria and Mali.²⁶

Ghana has been performing well in devising an enabling environment for the use of digital technologies across sectors. The country's institutional and policy commitments are significant, establishing the MoC and setting up the ICT4AD Policy. Particularly through increasing private sector involvement, Ghana has achieved a remarkable mobile internet coverage of 3G and 4G networks and has been able to address gender inequality with respect to the use of mobile and internet services. Although Ghana has been one of the first African countries with laws to protect personal information, serious measures to address cybercrime and to establish online child protection are urgently needed.²⁷

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