

## An Assessment of e-Extension Platforms in Kenya

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**Abstract:** *The use of ICT in agriculture within developing countries has quickly gained popularity among development agencies, the private sector and even the government. ICT for agriculture (ICT4Ag) services such as trade platforms, notification platforms and advisory/extension services have been developed. This has been catalyzed by the growing number of farmers with access to ICT devices such as mobile phones. Among the available services, advisory/extension platforms have gained popularity among farmers and agriculture stakeholders in the developing world. These platforms have proven to be of importance to farmers who are curious about new farming methodologies, strategies to improve their yields, breeding techniques, among other factors. The ICT platforms employed include SMS, mobile applications, Interactive Voice Response systems, social media platform such as Facebook and Twitter, chat applications such as Whatsapp, blogs, radio programs and tv programs. The aim of this research was to assess the e-Extension platforms used in Kenya, whose purpose is to advise millions of farmers across different parts of the country using ICT platforms. 28 government e-Extension officers employed to advise farmers using ICT platforms were interviewed. The officers represented 15 different counties in Kenya. The study made important findings that would inform the government, agriculture extension content providers, and other stakeholders on critical aspects to be considered in deploying and managing e-extension platforms among a population of diverse users within a developing country.*

**Keywords:** *e-Extension, ICTs, ICT4Ag*

### 1. INTRODUCTION

The availability of ICT tools and services in the developing world have revolutionized key economic activities such as agriculture. Most processes in the value chain of sectors such as agriculture have been automated using ICT tools and services. Besides the key value chain processes such as production, activities that directly involve the farmer such as acquiring

knowledge for best practice and marketing have also had their share of ICT applications. For most developing countries, the mobile platform is the primary computing device. In addition, the mobile phone has been recognized as a tool of vast potential for economic transformation [1] in key economic sectors of developing countries [2], and has therefore become the default delivery platform for most social and economic empowerment activities in developing countries. Therefore, majority of the ICT4Ag services in developing countries have been deployed on mobile platforms, making them accessible and usable by a majority of the target users.

This paper provides an assessment of e-Extension platforms used in Kenya by extension officers to advise farmers. The paper provides the background of these services, and their current state of operation.

The paper begins by putting the study into context through an introduction, followed by an overview of ICT for Agriculture services and an overview of e-Extension services. In addition, the paper provides the objectives of the study and the methodology followed while conducting the research. The details on the findings and discussions are made, followed by a conclusion.

#### 1.1 ICT4Ag Services

Agriculture-related ICT services are important in developing countries, because farmers lack access to critical services such as relevant, actionable and timely information needed to improve productivity [3]. Most of the available services are aimed at improving the agriculture value chain and have a wide range of functionalities such as provision of market information, extension services and marketing facilitation [4]. A goal-based typology of classification of mobile agriculture services [5] was used to explore the various ICT services, available for different needs in agriculture among farmers and other stakeholders within the agriculture sector. As shown in Table 1, these services range from platforms to provide education and awareness information, commodity prices and market

information platforms, data collection tools and platforms and disease and pest outbreak warning systems. Typically, these platforms are implemented using available mobile technologies such as SMS, Interactive Voice Response (IVR), downloadable applications, Unstructured Supplementary Service Data (USSD) and mobile web. Most services would be duplicated across different technologies in order to accommodate a larger clientele given the wide array of mobile devices among the target users.

**Table 1:** Goal-based typology of mobile agriculture services

GOAL	METHOD
Education and Awareness	Information provided via mobile phones to farmers extension agents about best practices, crop varieties and pest management.
Commodity Prices and Market Information	Prices in regional markets to inform decision making throughout entire agricultural process
Data Collection	Applications that collect data from large geographic regions
Pest and Disease Outbreak Warning	Send and receive data/warnings on outbreaks

### 1.2 e-Extension Platforms

In Kenya, the government has made efforts to offer agricultural training services through various channels such as Agricultural Training Colleges (ATCs), farmer workshops, county-level agricultural shows and national level agricultural shows. However, continuous provision of agricultural advisory services has proven a challenge, given there is only 1 extension officer to approximately 1500 farmers in Kenya. This is against the Food and Agriculture Organization of the United Nations (FAO) recommended ratio of 1 extension officer to 400 farmers [6]. This has contributed to reduced effectiveness of extension services in Kenya, weak delivery of extension services and unreliable data and information management [7][8]. The shortfall can be met by the implementation of platforms that enable the extension officers to reach out to the farmers in a more effective way. Channels such as radio programs, TV programs have been used in developing countries to offer agriculture advisory services, either in recorded form or on live on-air interactive programs. More recently, the internet and mobile technology have been instrumental in the provision of extension services. Various platforms exist such as discussion blogs, social media pages, downloadable mobile applications, SMS services and also Interactive Voice Services.

The government of Kenya has shortlisted various online and mobile based platforms that its officers use for agriculture extension. These officers were issued with mini-laptops and internet modems, and were trained on how to get content from the platforms and disseminate it to farmers. Four major platforms namely *iKilimo*, National Farmers Information Service (NAFIS), the Infonet-Biovision platform and the Plantwise platforms have been used by extension officers working for the national and county governments in Kenya. On the other hand, private companies have also launched initiatives with are aimed to provide advisory services to farmers at a fee. Such a platform is the *iCow* system, owned by Green Dreams Ltd in Kenya. In this research we focused on the two platforms, *iKilimo* agriculture extension platform, owned and managed by Avallain Ltd and *iCow*. The *iKilimo* platform has been used for a couple of years by government extension officers and directly by farmers to gather agriculture-related information [9]. This platform is available on SMS, web and an Android mobile application. On the other hand, the *iCow* platform is a mobile-based and provides agricultural advisory services on SMS, USSD and IVR [10]. The *iCow* platform has been credited for increased milk production among dairy farmers, as it enables them to track the fertility cycle of their livestock, providing valuable tips for breeding and animal nutrition [11].

## 2. OBJECTIVES AND METHODOLOGY

The objectives of this study were to:-

- a) Identify the existing e-Extension platforms in Kenya.
- b) Discover the impact and challenges in the deployment and usage of the e-Extension platforms
- c) Make recommendations to inform the deployment and management of e-Extension platforms

The study involved 28 e-Extension officers drawn from different 15 counties in Kenya namely Embu, Kajiado, Kakamega, Kiambu, Kitui, Lamu, Machakos, Makueni, Meru, Muranga, Nairobi, Nakuru, Nyeri, Taita Taveta and Turkana. The participants were purposively selected from a group of extension officers deployed to different counties within Kenya, from the Ministry of Agriculture Livestock and Fisheries in Kenya. Data was collected from the officers through a questionnaire. The feedback was later analyzed as will be elaborated in the Findings and Discussion section of this paper.

### 3. FINDINGS AND DISCUSSION

From the e-Extension platforms, farmers were interested in both livestock and crop production advise almost in equal measure. The most frequently used modules on e-Extension platforms were plant production, followed in order by marketing information, animal production, farm equipment, food processing and farm equipment respectively. 32.1% of the users preferred accessing the e-Extension platforms via the web on a computer, 25% preferred accessing the platforms via the web using a mobile phone, while 21.4% preferred using the available SMS service. 17.9% preferred to use an Android application while 3.6% did not have preference for a particular technology. The researchers also sought to find out if the users of e-Extension platforms were involved during the design and development stages for the purposes of collecting feedback for improvement. Only 7.1% reported to have been consulted while 92.9% reported not to have been consulted or requested for feedback on how the platform could be improved. This was a confirmation as made by previous research that failure to consult target users of ICT4Ag platforms has led to poor adoption and usage of these innovations. The kind of content received on the e-Extension platforms is a key determinant in keeping beneficiaries continuously interested. For example, the content published on *iKilimo* was created by a team of agronomists and agriculture experts [9], thus ensuring that farmers are receiving up to date and relevant content. After its inception in 2013, *iKilimo* was able to attract about 5,000 farmers within the first year, and the numbers have continued to grow annually. The platform shows that women have become very active in farming and more so in seeking agricultural advise as there exists 46% of female population on the platform, nearly an equal share to the number of men on the platform.

On the *iCow* platform, the first mode of interaction with the farmer is via a USSD code, through which they perform registration. The agriculture extension module, also known as *Mashauri* (Swahili for advice) costs the farmer approximately USD 0.03 per SMS of advice. The advisory schedule is set such that a farmer receives three SMS tips per week. Previous research that has been done on the impact of the *iCow* platform has shown that farmers using *iCow* increased their yields by 3 liters per animal, resulting to an increased income of USD 318 per year, after having invested only USD 4.9 on the platform [12].

The two platforms have made tremendous contributions to the lives of farmers, practicing both livestock and crop farming. The fact that the two platforms make use of already existing technologies among farmers makes them accessible and usable without much training of the target users. It is also worthy to note that the areas of advise tackled by the two platforms are practiced by majority of farmers in Kenya, thereby making the advise have a social and economic impact. However, the officers operating extension platforms cited a couple of challenges such as technical and detailed language on the platforms, lack of internet bundles to access the online platforms, poor or complete lack of internet access in some regions of the country, poor usability of the e-extension platform, lack of information on some crops and animals farmers are inquiring about, difficulty in following up farmers, illiteracy among some farmers, lack of electric power in remote areas making it difficult for the e-extension officer to frequently access information and poor mobile network coverage in some regions of the country.

Moreover, the growth and expansion of such platforms have been hampered by lack of strong partnerships among the stakeholders, as well as continuous evaluation and monitoring. This has led to complacency by some of the partners, consequently affecting the growth of the project. In some cases, some e-Extension platforms start with donor funding, and only last for the proof of concept and initial deployment stages.

In addition, employing agriculture experts and agronomists who have the indigenous knowledge has made e-Extension platforms more valuable. It is evident that not all that is written in journals, books and manuals is directly applicable on the ground. Having local and indigenous knowledge is very resourceful since farmers are able to relate with the advise and can complement the new knowledge with what they already know through experience and indigenous knowledge sharing platforms. Moreover, the indigenous knowledge can be integrated with professional knowledge and disseminated on the e-Extension platforms.

### 4. CONCLUSIONS

Provision of agriculture extension services in developing countries plays a critical role in the agriculture sector. It is however evident that these services have little impact since they do not reach the majority of farmers who direly need advisory

assistance. This is due to resource constraints, a very low ratio of extension officers per farmer, among other challenges. With the use of ICTs, e-Extension services can be availed to nearly the entire population of farmers in a country, without the need of having a huge pool of extension officers. The fact that most farmers in developing countries have mobile phones is an opportunity to provide mobile-based extension services that address key issues faced by the farmers. In a country like Kenya where mobile penetration is nearly 90% [13], the government and the private sector can provide excellent platforms of extension services that reach nearly the entire population, which is nearly impossible with the face to face visits that characterize traditional provision of extension services. Multiple technologies such as SMS, Voice, installable applications and the web can be combined in order to accommodate farmers with diverse range of mobile devices.

In addition, there is need for strong partnerships between the national government, county governments and other stakeholders in the provision of extension services. Key partnerships need to be put in place to guarantee the success of extension platforms. Technology partners e.g. mobile network operators and software developers, development partners such as development agencies, research and content partners such as agricultural research institutes and content developers all form a crucial role in the long term success of e-Extension services.

Moreover, there is need for continuous monitoring and evaluation of such projects to ensure that farmers are getting value from the platform, and the partners are achieving their objectives. With sustainability being a key ingredient to long term success, appropriate models need to be put in place to enable these platforms to be used in a sustainable way, from inception to widespread adoption across large populations of users.

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