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Development of a Mobile Phone Messaging System for Livestock Farmers in Nigeria

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Abstract
This work aims to provide SMS-based service through which livestock farmers can obtain up-to-date information tailored to their needs and interests. The mobile phone messaging system was created using sublime text 2 code editor for the code writing. Pre Hypertext Processor Scripting language (PHP) was used in leveraging the codeigniter web framework. MySQL database was used to store field date generated because of its open source nature, while PHPMyAdmin database administrator application was used for the management of the database. The interface (visual platform) of the telagri web portal was created using Hyper Text Markup Language (HTML), Cascading Style Sheet (CSS), and Javascript language.Information delivered to the farmers were topical and useful for day to day farming activities. For example, a short message such as "Clean the brooding pen 2 weeks before the arrival of new chicks" is aimed at improving the capacity of poultry farmers to prevent disease spread in their farms. The Telagri portal shows that agricultural mobile phone messaging system is possible and could serve as a veritable tool for disseminating topical and timely information that could aid improved agricultural production.

Keywords: Mobile phone, messaging systems, SMS-based service, livestock farmers

Introduction

We live in a modern world and an information age, where much is guided by not just information, but by current information such as weather forecast data, crop prices, farm input prices, planting and harvesting periods, best practice, demand indicators, and logistical information (Mittal andTripathi, 2010). Therefore farmers are highly in need of information to be able to improve their production and make more profits. African farmers, who are basically poor, lack access to the internet, possess feature phones, have little or no access to information; require information that will help improve their farming activities (Mittal and Mehar, 2012). Major access to such information currently come from extension agents, newspaper and radio broadcasts which have limitations. The radio broadcasts cannot receive feedbacks from the farmers and also cannot deliver targeted information to farmers based on their needs and interests at a consistent pace. These have resulted in farmers showing the willingness to access other sources of information to solve their problems and achieve more.

Farmers in countries like India, Kenya, Ghana, etc., unlike the Nigerian farmers have for a long time been reaping the benefits of targeted agricultural information delivered to them through SMS-based services (Gakuru *et al.,* 2008). In Nigeria however, SMS-based services for agricultural information are not common among farmers. Farmers know little or nothing about their existence and benefits. Hence, there is a need for them to be introduced to such servicesin order to help boost their productivity and livelihood.

This work aims to provide an SMS-based service through which farmers can obtain up to date information tailored to their needs and interests.

Materials and Methods

The study area of the work is Imo state. Imo State is one of the 36 states of Nigeria and lies in the south eastern of Nigeria with Owerri as its capital and largest city. The study population includes all the farmers in Imo state, Nigeria. Both urban and semi-urban farmers were used. One hundred and fifty (150) farmers were selected for the study. A multistage purposive random sampling technique was used to select farmers for the study.

Data used in the study were tips/messages to be sent to the farmers which were sourced from academic experts in various relevant fields in a tertiary institutions. These data were be collected using structured questionnaires. The tools used for development, management and maintenance of the messaging system include; Pre Hypertext Processor scripting language (PHP); Codeigniter web framework; MySQL database (Structured Query Language); PHPMy Admin database management application; Hyper Text Mark-up Language (HTML); Cascading Style Sheet(CSS); JavaScript language; Domain name (telagri.com); Shared web hosting service (for hosting the messaging system); and SMS gateway service for message broadcasting

The mobile phone messaging system was created using sublime text 2 code editor for the code writing. Pre Hypertext Processor Scripting language (PHP) was used in leveraging the codeigniter web framework. MySQL database was used to store field date generated because of its open source nature, while PHPMyAdmin database administrator application was used for the management of the database. The interface (visual platform) of the telagri web portal was created using Hyper Text Markup Language (HTML), Cascading Style Sheet (CSS), and Javascript language.

A domain name, Telagri.com was chosen for the messaging system because the name relates to the subject matter and is simple to recall and pronounce. This was used to make the developed messaging system portal, "Telagri" accessible on the internet. Telagri.com is hosted on a shared web hosting service, GLOBALHOSTING247.COM that has a physical location in Lagos, Nigeria. The hosting service was paid up to July 2016 in the interim.

Information generated from the field survey data collection such as farmers mobile phone numbers and tips/messages from academic experts across different agricultural disciplines were fed into the Telagri portal. The portal was programmed to randomly select and broadcast the expert tips/messages at specified intervals (three times a week) to the mobile phones of the farmers subscribed to the Telagri portal. These messages were simplified to ensure that they meet the 160 character limit of SMS and also to enable for ease of reading and comprehension by the farmers. The messaging portal was also developed to broadcast to all local networks subscribed by the farmers.

Results and Discussion

Telagri logic and interface source code: A Samples of the Telagri messaging logic source code and interface source code that enabled the messaging processes and their visualisations are shown in figures I. This Telagri portal contains an estimated 23,000 lines of code (LoC) written and deployed to execute the Telagri portal processes, which are to randomly select expert tips/messages stored in the database and to broadcast the tips/messages to the subscribed mobile phones at the programmed interval of three messages per week. The Telagri portal is managed by a trained agricultural extension administrator who has access to the portal interface through a username and password login.

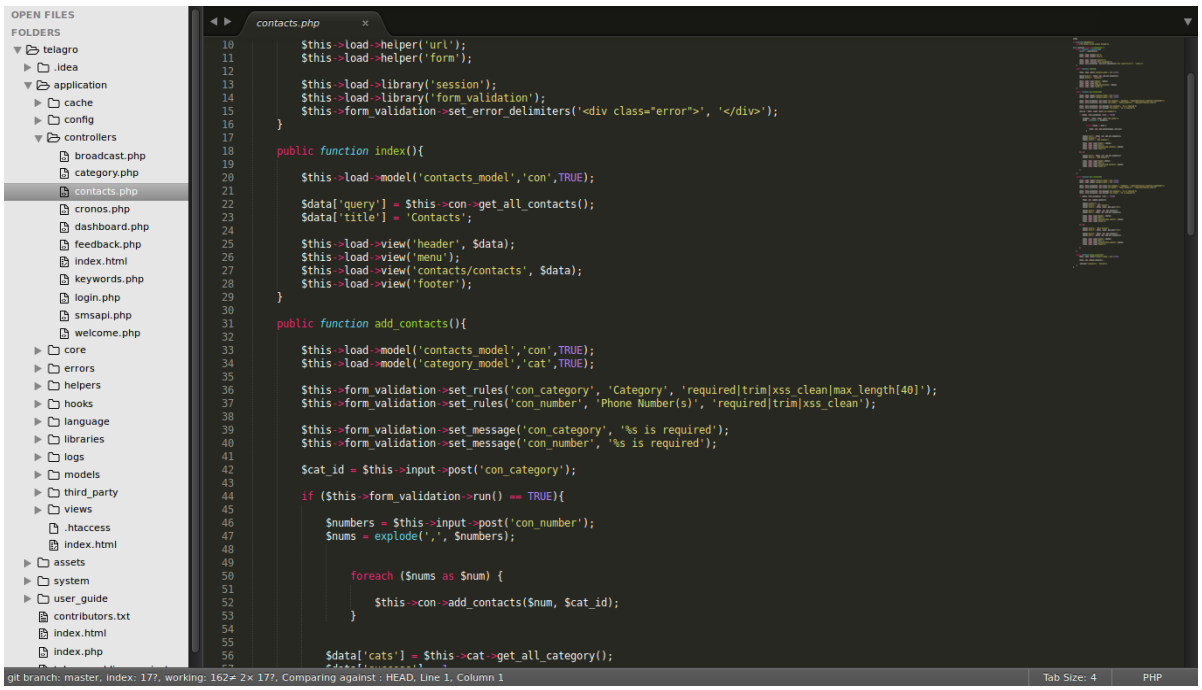

Fig. I: Sample logice source code of the messaging system

Figure II shows the interface of farmer's categorization on the Telagri messaging portal. The interface has a menu section that contains clickable components ranging from DASHBOARD to SMS API on the left side. The category section contained four columns such as title, description, date created and action. There was also a search section and pagination function. The action function contained the edit (blue) and deletes (red) buttons.

Figure III shows the interface of the list of farmer mobile phone numbers subscribed to the Telagri

portal. Again, on the left side was the Menu section ranging from DASHBOARD to SMS API. The Add Contact section contained three columns such as contact phone, category of farmer date added and action. There were also search and pagination sections. The action function contains the edit (blue) and deletes (red) buttons.

Figure IV shows the list of pending tips/messages broadcast to farmers on the Telagri portal interface. The broadcast section contained five columns such as message, broadcast status, farmer category, date created and action. The interface also shared other similar characteristics with the ones previously described.

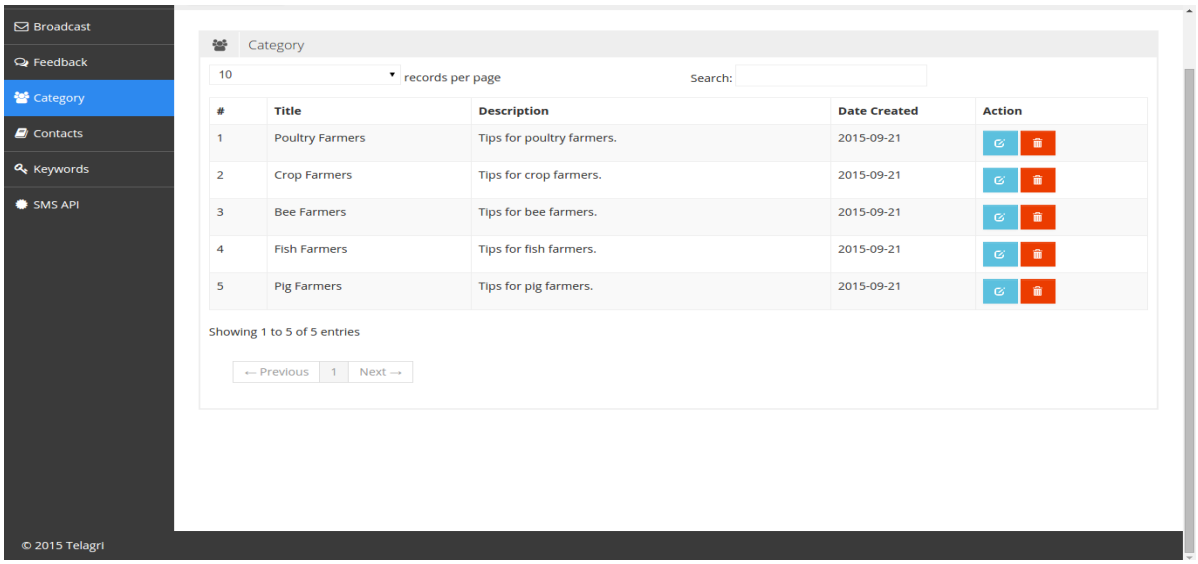

Fig. II: Categorization of Farmers on the Messaging System Portal

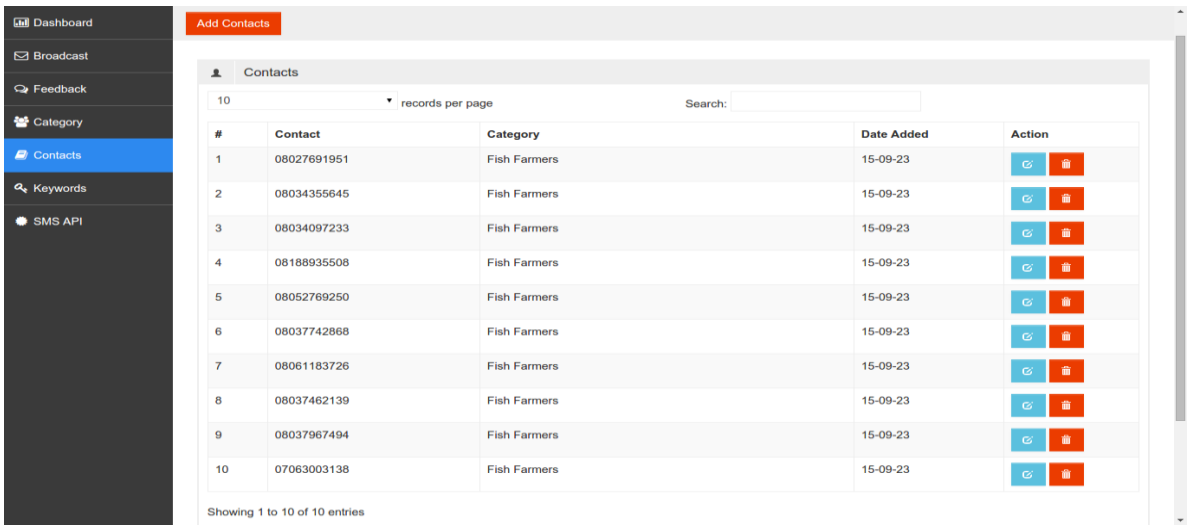

Fig. III: List of Farmers Mobile Phone Numbers on the Messaging System Portal

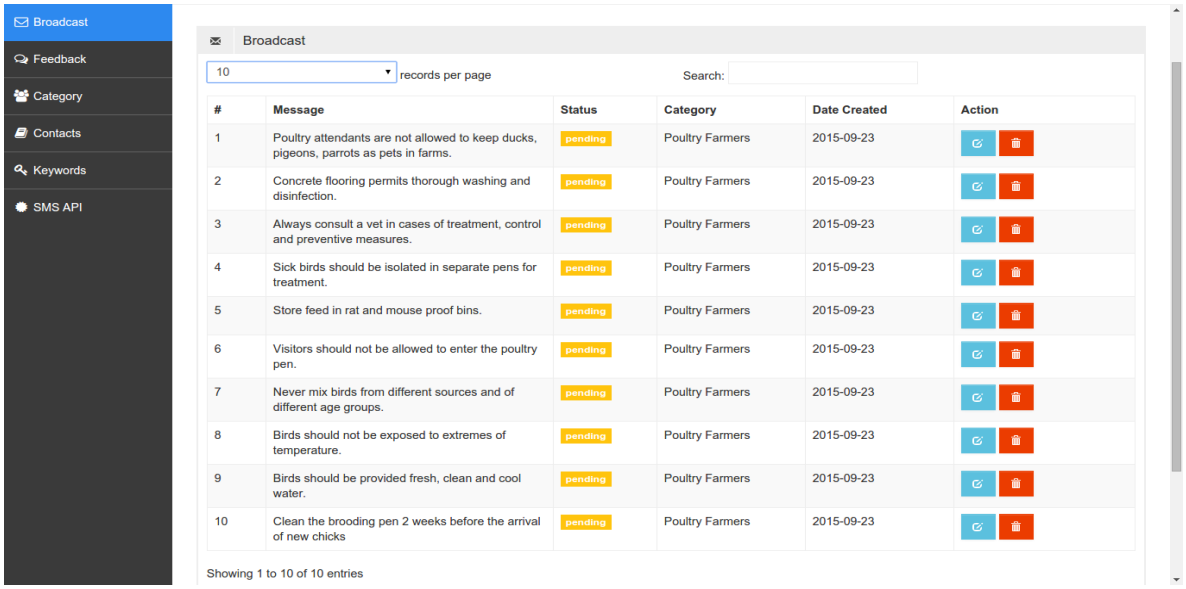

Fig. IV: List of messages/tips pending broadcast on Telagri Portal

Message reception by farmers: Figure V shows the formats of message reception by the farmers on a Nokia feature (Nokia torchlight) phone and a Tecno smart mobile phone (Tecno Phantom). The messages were received with the Telagri signature as clearly shown on the screens of the phones. The Nokia feature phone which is very common with the farmers and an example of a none-smart phone used by farmers could only show a single message at a time, while the Tecno smart phone running on Android operating system not popular with farmers could show the messages in a thread containing earlier and current messages. These findings highlight the benefit of smart phone usage and the need for farmers to upgrade.

The information delivered to the farmers were topical and useful for day to day agricultural activities. For example, short messages such as “Clean the brooding pen 2 weeks before the arrival of new chicks” and “Poultry attendants are not allowed to keep ducks, pigeons, and parrots as pets in the farm” are topical and aimed at improving the capacity of poultry farmers to prevent disease spread in their farms thereby optimising their productivity and income. The Telagri portal has a message sent archival feature, and has the capacity for farmer response and query data management which the portal could use to generate info- graphics of such data. Such features could be used to determine future farmer needs needed for the development of new user demand driven tips/messages. The Telagri portal is novel in that existing similar agricultural messaging systems are focused mainly on commodity prices, pricing and climate information (Mittal andMehar, 2012; Mittal andTripathi, 2009). It is the first such of such system in Nigeria.

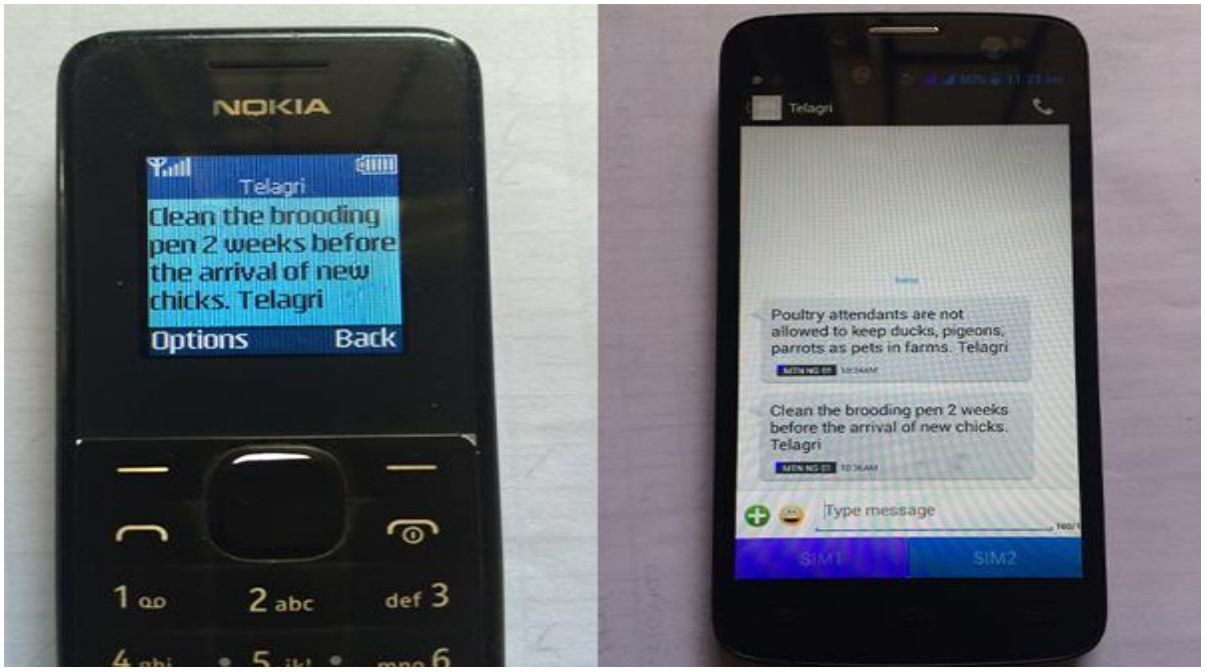

Fig V: Messages from the developed messaging system on farmers mobile phones

Conclusion

The development of Telagri portal showed that such an agricultural mobile phone messaging system is possible and could serve as a veritable tool for disseminating topical and timely information that could aid improved agricultural production. The Telagri portal also presents a veritable electronic multi-stakeholder platform from which valuable information generated by researchers are delivered to end users (farmers) under the management of an extortionist portal administrator.

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