Development of an Information System on Agricultural Products using Decision Support System

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ABSTRACT

Relevant information is a key player in the development of any economy. The various sectors of the economy ranging from agricultural to political sector require adequate information to enhance her growth and development. This study focuses on development of a web-based agricultural market information system that will help farmers and traders make decisions based on farm products. The proposed application contains informative and insightful agricultural tutelages to enhance market information and engage audience in an interactive and relevant manner through any mobile device. The approach involves stimulating the farmer's and trader's behavior in selecting farming products given relevant constraint. Decision Support System was applied on the agricultural and market information to help both farmers and traders to trade effectively. The application uses SMS Technology to disseminate market information to registered traders on the system immediately farm products are available for sale. Farmers can access trader information just at a click of the mouse and a press of the mobile phone and vice versa traders can access farmers. In conclusion, this study has been able to reduce travelling cost required to transact farm products to middleman which increases transaction costs and reduces market efficiency.

Keywords: Decision Support System, SMS, Agricultural Products, agriculture market information and analysis.

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1. INTRODUCTION

Many management decisions in modern farming require up-to-date and local information, most especially market information and analysis. There existed varieties of opportunities for small scale farmers to be converted into medium scale agricultural production. Amidst various approaches, availing decision support systems for enhancing transparency in agricultural information and sharing of agricultural insights including market information which is vital for eradicating information asymmetry to small scale farmers and traders. Furthermore, Market information is essential for agricultural development and to improve food security, particularly for small scale producers and traders, who typically have limited access to, and understanding of market information and analysis (Bamba and Barnes, 2007). The past decade has witnessed a revolution in the use of ICT in Developing countries. SMS Technology can be adequately used for expert advice, agriculture assistance and veterinarian consulting for identification and management of livestock illnesses, crops and diseases or pest control, appropriate seed, pesticides, timely planting or harvesting techniques relating to weather predictions.

Other usage include financial transactions (consulting with lenders or financial loans), agriculture training, up-to-date price information for agricultural commodities, as well as contact details for interested buyers for rural farmers.
Dissemination of market information and sharing of agricultural information in agriculture can be aided by application of opportunities in Information and Communication Technologies (ICT). Existing dissemination methods include radio, television, face to face, and electronic mail. Furthermore, web-based system has been developed and used to disseminate agricultural information. The lack of market information represents a significant impediment to market access, especially for smallholder poor farmers in rural areas; it substantially increases transaction costs and reduces market efficiency. Hence, the use of web and mobile technologies have been inadequately explored in order to enhance agricultural market productivity and transparency (Battiato, Farinella, Giuffrida, Sismeiro, and Tribulato, 2009).

The SMS Based Agriculture Market Information System is one of the most significant and resource intensive project in which proposed system the customer need not go to meet middle men to make enquiry about market analysis and research. This create a level ground to provide timely and reliable market information to allow supply chain participants to take appropriate production, marketing and related decisions between traders and farmers to increase their negotiation power to get the right price and to understand and effectively use this information to make better decisions that will support agricultural growth and development (Bamba and Barnes, 2007).

2. RELATED WORKS:

According to Watson, Pitt, Berthon and Zinkhan, (2002), Marketing management is the process of planning and executing the conception, pricing, promotion and distribution of goods, services, and ideas to create exchange that satisfy individual and organizational goals". The American Marketing Association suggests sequential marketing stages as well as temporal and spatial separation of buyers and sellers. Mobile devices blur these boundaries and distinctions by extending traditional marketing's time-space paradigm. Text messaging in UK or short message service (SMS) in other European countries, the US and Australia, lets user send and receive text message via cell phones. According to Global system for mobile management, users send more than 10 billion SMS messages each month. This makes SMS the most popular mobile data application. In 2002, 580.2 million mobile messaging users sent 430.8 billion. Current technologies limit each message to a maximum of 160 characters.

2.1 Mobile phone (SMS) systems transforming African agriculture

Throughout Africa, ICTs have become increasingly integrated into the dissemination of information to farmers. For decades "traditional" forms of ICTs have become more prevalent in advisory service provision. Radio and TV programmes feature agricultural information. Rural telecentres provide information on education, agricultural and health issues and equip rural citizens with skills on how to use computers and provide basic literacy. Currently, most farmers' information is provided either by extension workers, through libraries or via websites. Most other initiatives are web based such as INFONET www.infonet_biovision.org, a web based service promoting organic farming which is supplemented by The Organic Farmer publication. They also do not offer detailed information such as pictorial illustrations as in web solutions.

Seeking information from these and other platforms becomes an onerous task for the farmers as it entails ploughing through many publications or surfing a large number of web pages. Furthermore, for the illiterate farmer this becomes impossible right from the onset. Web based solutions also bring challenges because Internet infrastructure in Africa is still very sparse. Nevertheless, these are very useful resources and all that is needed is to provide an easy way for the farmers to navigate them. With the widespread use of mobile phones, voice and SMS solutions should find more use as they offer easy accessibility.

2.2 Use of Short Codes Application

Short codes(also known as short numbers) are special telephone numbers, significantly shorter than full telephone numbers that can be used to address SMS and MMS messages from certain service provider's mobile phones or fixed phones. There are two types of short codes: dialing and messaging. Short codes are designed to be easier to read and remember than normal telephone numbers. Like telephone numbers, short codes are unique to each operator at the technological level. In some countries, such as the United States, some classes of numbers are inter-operator (U.S. inter-operator numbers are called common short codes)

3. METHODOLOGY

3.1 Approach

In this study, a system development life cycle approach was used, figure(1) gives a description of the methodology, data on available products, market and prices of farm produce and the demand was captured using primary sources of data. The primary data were derived using interview and questionnaire. The system uses an integrated Short Message System (SMS) API-SMS, in form of a short code which enables information relating to goods description to disseminate to the registered farmers and traders mobile number. In Addition, a graphics user interface (GUI) was designed using HTML, CSS and Java Script to interact with administrator and respective users.

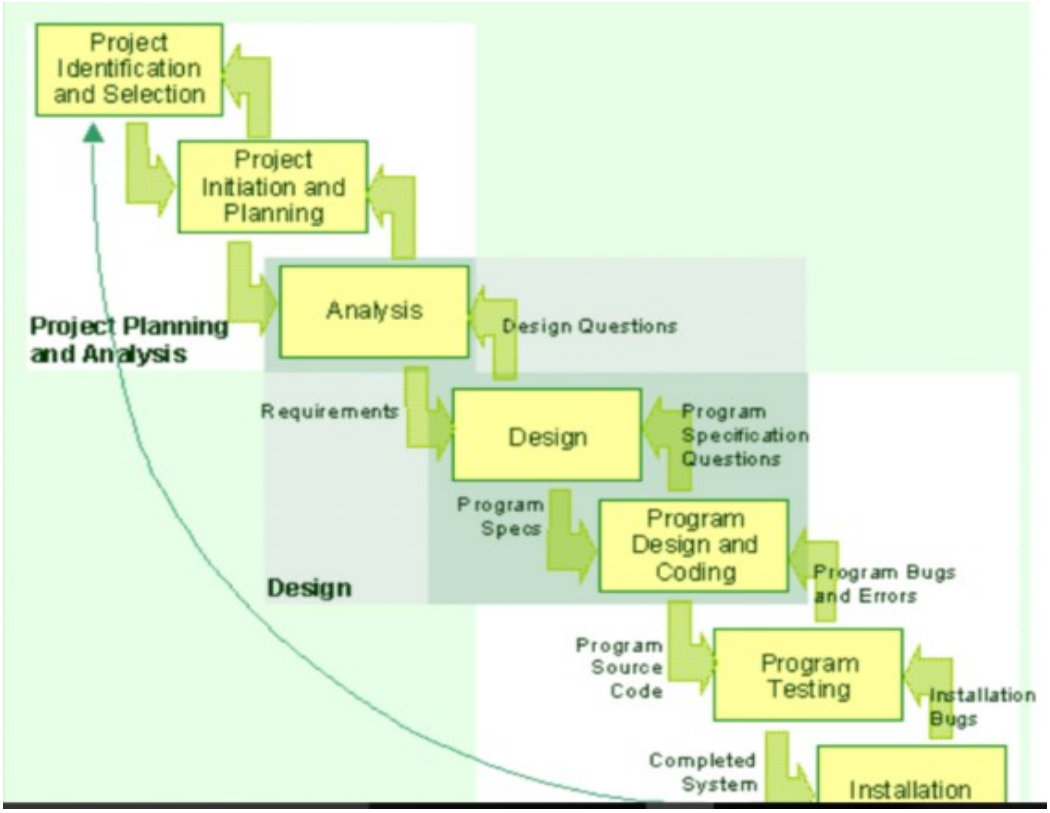

Figure 1: System Development Life Cycle

3.2 System Description

The system description involves creating a database, which comprises of records of entities such as:

- Farmer's Table: This store all the necessary details pertaining to the farmer profile e.g. Name, age, address etc.
- Traders' Table: This store all the necessary details pertaining to the trader profile e.g. Name, age, address etc.
- Admin Database: This store all the necessary information about the administration of the application e.g. name, and password etc.
- Traders Product Table: This store all the necessary details pertaining to the trader demand for goods and farm produce for e.g. Name, products name, description etc.
- Farmer Product Table: This stores all the necessary details pertaining to the farmer's product and prices of these items that are available for sales.

Below is a flowchart of the system design

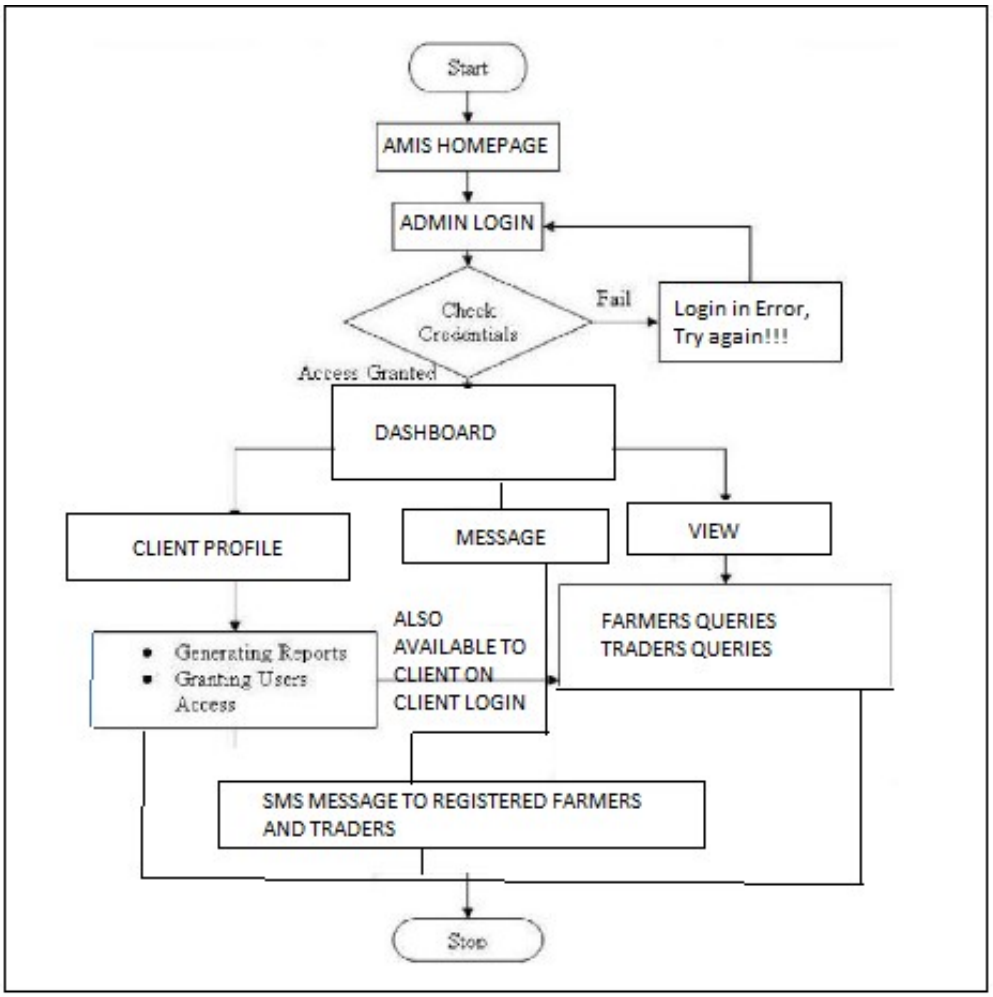

Fig 2: flowchart of the system design

4. RESULTS AND DISCUSSION

System implementation is the process of defining the user requirements and designing a system to meet them. In this study, PHP and MySql tools were employed in the design and implementation.

4.1 Login Page

Provides security features that allow administrator to gain access into the Agriculture market information system dashboard

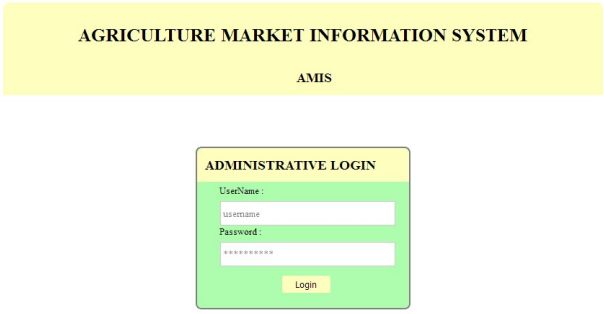

Figure 3: Administrator Log in Page

4.2 Client Login Page

Provides security features that allow administrator to gain access into the Agriculture market information system dashboard

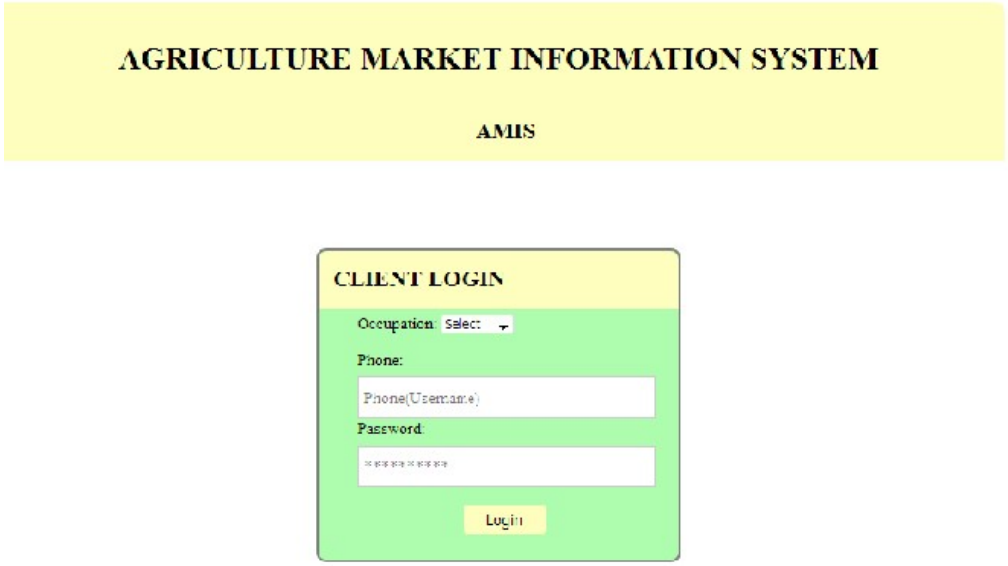

Figure 4: Client Log in Page

4.3 Management Home Page

This module allows users access to the dashboard of the management and authentication details have been verified. This is where registered farmers and traders details are managed as seen in the diagram below;

Figure 5: Home Page of the Information System

4.4 New Farmer / Trader Registration

This module that allows the user to store a new farmer and traders record in a database. These records help in creating queries for market information and analysis by registered clients. Also it is from this records stored that the reports can be generated.

Figure 6: User's Registration Page

4.5 View Registered Members

This module allows a user to view registered farmers and traders queries that are stored in the database. The Farmer details consist of the goods description, the contact details, the quantity of product available for purchase. Traders that requires the description will be contacted through the SMS service.

Figure 7: Screenshot of a database of Registered Users

4.6 Generated Short Codes

Short codes are generated by the SMS-Application Programming Interface SMS-API, after querying the database based on the Trader and Farmer request, this short code is forwarded to the respective farmer and trader. The www.betasms.com SMS service provider was employed in the implementation.

5. CONCLUSION

The developed web-based data management system allows farmers and traders across the country to exchange and access prices of selected agricultural commodities sold in major markets through their mobile phones. Furthermore, traders and farmers will be able to increase their negotiation power to get the right price and to understand and effectively use this information to make better decisions that will support agricultural growth and development.

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