

# E-farmer Management System for Agrarian Service Centre in Sri Lanka

KNNS Karunarathna<sup>#</sup> and DU Vidanagama

Department of Information Technology, Faculty of Computing,  
General Sir John Kotelawala Defence University, Ratmalana, Sri Lanka

<sup>#</sup>nipuninushi90@gmail.com

**Abstract**— Agrarian service centres are established all around the country with the objective of overall improvement of agriculture sector in Sri Lanka. The major problem of the current system was identified as the lack of communication between the agrarian officers and the farmers. The objective of the research is to give a feasible solution for the identified problems and to enhance the productivity of agrarian service centre. The system provides information to get decisions about current productions, meeting schedules, agri-business, available agrarian technology related information, crop details and forum discussions through the internet in the forms of text and images. The E-farmer Management System (EFMS) would be built with the use of Web based technology with C# language, to provide integration and accessibility for the benefit of the users. The system uses centralized database system where all the clients are able to connect to EFMS network. This research was conducted using quantitative and qualitative methodologies. To expose quantitative values, document reviews were used. To expose qualitative values, interviews, observations and case studies were used. EFMS is the best solution for farmers who face lack of communication and efficiency of the agrarian service centres in Sri Lanka. It will give a new phase to the Sri Lankan agricultural sector.

**Keywords**— E-Farmer Management, Community Groups, Agrarian Service Centres

## I. INTRODUCTION

Farming is the main occupation in the Sri Lanka. Today most of the people are involved in farming. The main purposes of the agrarian service centre are; crop cultivation, water management, fertilizer application, pest management, harvesting, and post-harvest handling, transportation of food and the products. Apart from that all the interested parties of agrarian service industry need information and knowledge to manage the services efficiently. Even though there are problems related with the agrarian service the technological advancements would make all the things automatic which make easier serving as a best solution to all the problems.

The web based E-farmer management system (EFMS) for agrarian service centre in Sri Lanka, may provide vast contribution to the agrarian officers as well as the

farmers. It can broadcast expertise advices to the farmers in a timely and personalized manner by using the available agricultural technologies and the latest information about the crop situation received by the farmers in the forms of text and images.

Technology is getting merged with the workflow of the agrarian office. Farmers can get the new updates and communicate anytime without having several visits to Agrarian Service Centre. Because of the user friendliness of the system, any staff member will be able to handle and work with the system easily. Administrator can support to the SMS based application service to inform the farmers regarding the hazardous things, upcoming news and schedules and remind the important information through messages.

Also the EFMS will provide the blog posting facility. Farmers can upload the images of crop deceases and the post their problems to the blog. While they can review the comments and ideas of other farmers and expertise on this regard. They can easily communicate with agrarian officers and the other group of farmers to sharing their knowledge and other farming related information. Other way round they can sell their products through the online shopping cart. EFMS is a better solution for lack of communication and the time consuming in agrarian service centre. This will be an advanced opportunity for the Sri Lankan agricultural sector to improve their capabilities.

## II. LITERATURE REVIEW

There are different types of knowledge base e-farmer management systems are available in other countries, such as android mobile farm apps, web portals applications and hardware devices. The literature identified how they developed their agricultural sector with the modern technologies.

### A. Existing E-Farmer Management Systems

- India has developed an agricultural information system based on AgriIDS called eSagu. This system provide correct diagnosis capability of the problem, strong database to support decision-making; zooming facility which adds an extra dimension,

accountability to the farmer, capacitating of rural livelihoods and employment generation, documentation of success stories and content development, and feedback which helps to evaluate and improve the performance (Bachu et al., 2006).

- aAQUA is basically an internet-based discussion portal, introduced by the Developmental Informatics Lab at IIT in India. aAQUA works as an open discussion forum. It has different discussion groups such as crop cultivation, animal farming and dairy, market prices and other relevant activities. It provides easy, faster and reliable information, documents and images using different keyword search strategies with the help of questions. The farmer can ask a question on aAQUA and other farmers or experts can answer to the problem. It is available in English, Hindi, Marathi. Additionally farmers or other users can upload text, photographs and videos on the website. Major problem they face on this system is poor internet facility in villages and also illiteracy of farmers. So in this case access to the platform via SMS is an additional service as it is the offline method for use on TVs via an aAqua-box (Panchard et al., 2007).
- Australia Victorian State Government, working closely with a number of Catchment Management Authorities (CMA), has developed a web-based application called e-farmer, which supports the capture, viewing and sharing Natural Resource Management information across farms, landscapes and catchments. E-farmer web based application has been designed for land managers, catchment planners and extension officers to access. E-farmer application using java platform enterprise edition (J2EE)

technologies with the special functionality based on Open GIS standards and open source GIS server software (Brugger, 2011).

- Nigeria has largest employment in Agriculture sector. It is supporting a great deal in job and wealth establishment especially at the rural level where over 65% of Nigerians reside. In view of that, they developed the national e-agricultural portal to collect, enhance and deliver the information among the farmers and other collaborative workers. The best advantage of this portal is it provides technical information related to agricultural inputs, market prices of quality seeds, guide farmers on crop rotation, use of fertilizers and pesticides amongst others, field alerts, reports, updates, & provision of critical IT resources (Adeyemo & Barnabas, 2013).
- Pakissan.com is the first and largest agricultural web portal in Pakistan. It provides the platform for the agro community which can connect with each other, sharing ideas, experience and information. It is available in both English and Urdu. Features of the web portal offer latest news and issues around the world as well as inside the Pakistan. To promote their site they introduced digital mobile van in 2002. The internet-ready van travels around the country to train rural farmers with the use of technology in agricultural sector and improve their success (pakissan.com, 2001).

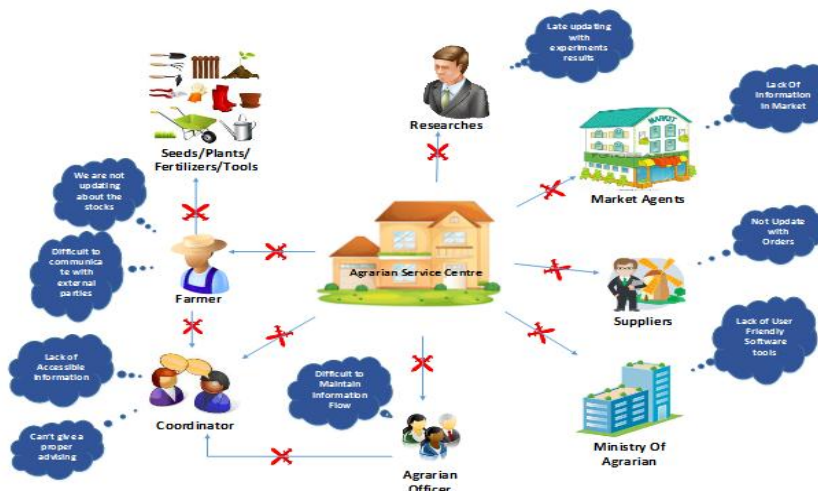


Figure 5: Current work process in Agrarian Service Centre

### B. Features of E-Farmer Management Systems

The features of the existing E-Farmer Management systems can be summarized as follows:

- Problem diagnosing capability
- Decision making
- Accountability
- Discussion forums
- SMS facility
- Alerts and update information
- Reporting facility

### C. Overview of the existing E-Farmer Management System in Sri Lanka

#### 1) Problems of existing system

The current process has many disadvantages over the web based system. Main disadvantage is poor communication and time wasting. Following paragraphs will discuss about the problems that are having with the current system. Fig.1 shows the current work process in Agrarian Service Centre in Sri Lanka.

- Poor communication

Due to the busy schedule of agrarian officers they will not have sufficient time to individually meet every farmer. A farmer needs to buy seeds, fertilizers and other important equipment's so they have to visit the agrarian service centre to buy those things.

Agrarian officer posts letters to farmers to inform them regarding relevant date of meetings, But due to late receiving of letters farmers cannot participate for the meeting regularly. So they missed the meetings.

Also farmers who have to pay their acre tax to the government sometimes forget their payment date, because the agrarian officer couldn't contact the farmers to remind the date.

Another fact is if the two farmers in different locations produce the same products, sometimes it will cause to excessive production of item. So that will result to decrease the price of the excessive production and increase the wastage of products. This is because of the unawareness of what others are cultivating in the given time period. So if the farmers can properly communicate each other, they can cultivate various items accordingly.

- Time consuming

Agrarian officer have to visit each and every farmer's crop and horticulture to solve the problems. Agrarian service centres in the country have limited of office space and the staff. So this would be a timely and complex task at all. Sometimes agrarian officer couldn't attend to the incident because of the long distances, transportations and climate changing problems. In such cases no one in

the office to take the responsibility of the problems arising among farmers.

- Wrong decision

Even though sometimes farmers carried the samples of plants with diseases to the agrarian service centre, agrarian officer cannot identify the diseases because of the colour changes and dryness of the plant and cannot recognize the real disease.

### III. METHODOLOGY

This research uses a mix of quantitative and qualitative methods are used to correctly identify the information, process and communication requirements of the users of an EFMS.

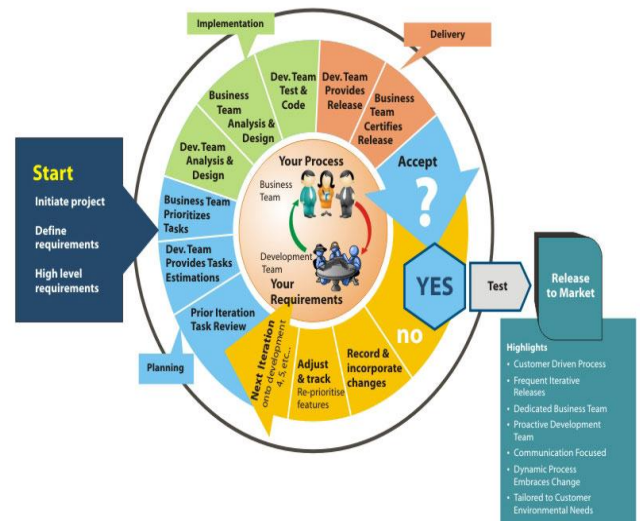


Figure 6: DSDM Methodology  
Source: www.srmtech.com

Primary spotlight of collecting data is the "agrarian service centre". The ideas and the requirements of head of the department and the staff members helped to get a clear picture of the new system further meetings will be helpful to the future improvements and the development of the system. In addition to primary data sources the developer will look forward to some secondary data sources like some selected books, surfing internet, case studying the existing systems as well. Combinations of these methods are used to achieve quantitative and qualitative fact gathering.

This research uses agile Dynamic System Development Method (DSDM) methodology to develop the new system as shown in Fig.2. The agile method is based on giving main concern to the user participation, from the very beginning of the development cycle. The objective is to keep the user involved at every stage so that they have a

product that they are happy with at the end. This method saves the users' money and time because the user tests and approves the product at each step of development.

If there are failings or challenges, then changes can be made during production cycles to fix the issue. Traditional models of project management would not find failings as early because they do not test as often. In traditional methods of production failings that are not revealed at the different stages can find their way into the final product. It can result in increased overhead prices and user dissatisfaction.

#### IV. REQUIREMENT ANALYSIS

There are primarily three separate login interfaces in the proposed system. Farmers can access to system with using their phone as well as the computer. Agrarian officers can log in to the system with their username and password. Coordinators also can login to the system but they have limited authority to work with the system. Mainly the coordinators have to concern about the farmers and response to update each and every new thing relevant to the farmers and their crops.

Farmers should be able to:

- View updated program schedule and service details
- Inform the problems and details via SMS
- Order the seeds, fertilizers, and other equipment's via SMS.
- Communication with market agents
- Get online advancing services
- Enable the reminder message service

Agrarian officers should be able to:

- Enter the registration details to keep records of farmers
- Provide online advising services
- Update and keep records on transactions
- Inform the farmers regarding the new services and available products using via SMS as well as the online
- Generate reports to the government

Agrarian coordinator should be able to:

- Upload the photographs regarding the diseases in relevant farmer crops
- Insert the updated details according to the farmers
- Communicate with farmers

Apart from that buyers can log to the system and do the following.

- View available products

- Order products
- Contact the farmers and view farmer's details

#### V. CONCEPTUAL MODEL

E-farmer management System uses a central database to store details of each and every registration and the relevant information. Each and every detail will be informed the farmer using SMS. Since the system uses a web interface, authorized personals can login to the system from anywhere. User interfaces developed using ASP.NET allows access to SQL database which located on the monitoring centre to retrieve and store information. The overview of the system is as shown in Fig.3.

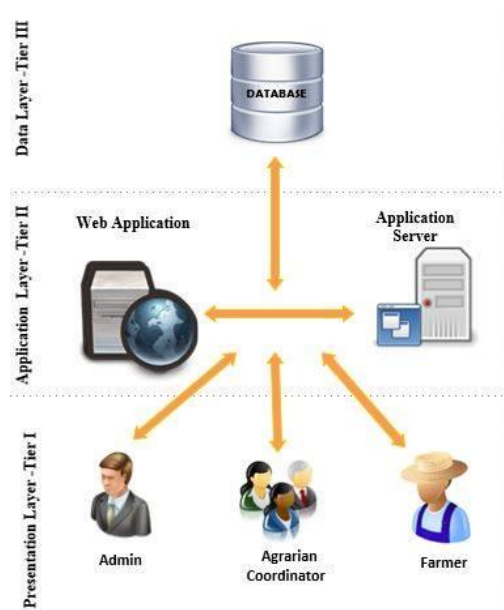


Figure 7: System Overview

The Use case diagram of the main functionalities of the proposed system is as shown in Fig.4.

#### VI. IMPLEMENTATION

The proposed system was developed under the following hardware requirements.

- Hardware Requirements
- 10 GB hard disk space
- 4GB Ram
- 64-bit, 4 cores for small deployments (fewer than 1,000 users)

The following shows some of the modules in EFMS and each interface describe under what they mean.

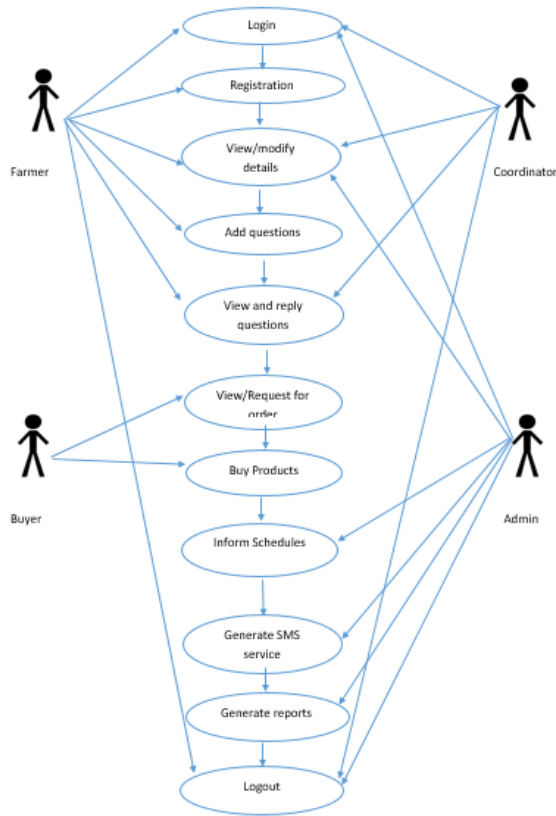


Figure 4: Use case diagram

**A. Login Module**

Users of the system should be accessed through the login function. Users already should have username passwords to login to the system except the buyers (Fig.5).



Figure 5: Login

**B. Administration Module**

Every primary user must register through the system by

creating a user account. Then a user ID will be automatically generated according to the user type through the system.



Figure 6: User Modifications

Administrator function is the most important feature of EFMS. Administrator can change the user type and add users to the system. System preference maintain under the administrator.

Administrators have the full authority to change the details and delete the information's. Also administrator can sort the users according to the user type (Fig.6).

**C. Forum Discussion Module**

Fig.7 shows the interfaces of the discussion forum of the farmers. If the farmers have disease regarding to their crops or plants they can upload their questions and relevant images to the blog. Then get instance feedback

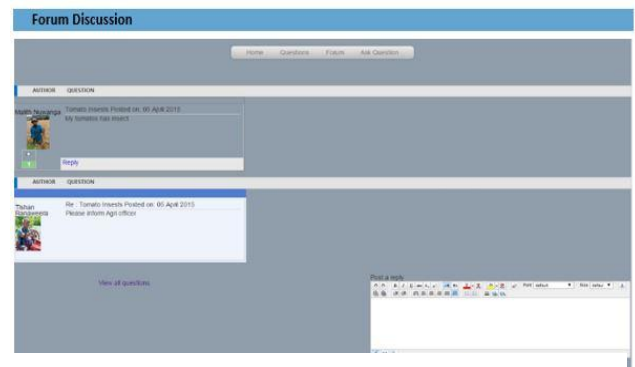


Figure 7: Forum Discussion

from the others. No need visit to the agrarian service center. Agrarian staff and the other farmers can give solution to their problems.

Farmers can review the latest question and answers. Also they can give their comments for others. It is a better method for communicate with farmers and other relevant agrarian staff.

#### D. SMS Module

System will send the SMS alerts to the farmer's mobile phone. Agrarian officers always update the farmers for available services. It is an easy method of communication. Sometimes farmers arrived to the centre but the seeds, plants and fertilizers not available at that time. So time to time farmers can receive updates about the available services in the agrarian service centre. It also supports to remind the farmers about the meeting schedules.

### VI. TESTING AND EVALUATION

Various modules co-operate with the EFMS aligning with the functionalities. Therefore each module was coded separately. Individual functions or modules are the simplest type of components. Each module was tested separately for unit testing. Unit testing was useful to catch the bugs and errors as separate units.

Then the components or modules were tested using integrated testing. The main objective of integrated testing is to find out the bugs that are not identified during the unit testing. With the better testing and evaluation strategies the system will be able to release by accomplishing the requirements of the clients.

The administrators, farmers, agrarian officers and coordinators have involved in the informal testing. It showed that the farmers have different educational background. So the farmers were categorized according to their educational level and further training requirements are identified.

### VII. CONCLUSION

This is a context for the web based solution of e-farmer management system for Agrarian Service Centre.

The framework will form on prevailing IT infrastructure such as access to the Internet, SMS service and web browsing using mobile devices. Explain our approach to web based solution for Agrarian Service Centre by describing current process of work and build up with the problem according to the current situation. There is a uniqueness of the solution with respect to technology and detail about the developed system functions such as functional, technology and interfaces. This would present the overview of the system architecture which shows how the EFMS system will work on the three layers and brief idea about the research design structure. This research will be more supportive for farmers to know more about agrarian services and keep better communication with agrarian staff. Because of this, they

will be always in touch with the agrarian service center and trends of farming. However overall saying this system will be a faster, secure and comfortable solution to the Agrarian sector in Sri Lanka.

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