

Introducing E-Farmer Management System for Dedicated Economic Centres in Sri Lanka to Reengineer the Current Marketing Process

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Abstract: Dedicated Economic centers are established all around the country. With the long-term objective of Improve and enhance the sustainability of the agriculture sector in Sri Lanka. such as Ensure obtaining reasonable prices for agriculture producers, Farmers for their crops by providing a targeted market for their valuable crops, create an opportunity to distribute area-specific agricultural products among people in all parts of the island. But still, there are some serious problems which are not come up with feasible solutions the major problem in the current system is the lack of coordination between economic centers, farmers, and buyers. So, the main objective of this research paper is to give a feasible solution for those identified problems and enhance the productivity of Sri Lankan agrobusiness. This proposed system will connect farmers, buyers, and economic centers into one platform and provides Information about current production, Price Indexes, and current market condition. This Farming information management system for agricultural dedication centers is developed as a web-based application. The system uses a centralized database system where all the clients (Farmers, agrarian officers, and other users from the economic center) can connect to the system.

Key Words: E- farmer Management System, Agro Economy, Dedicated Economic Centers

Introduction

Sri Lanka had a strong agriculturally based economy. Most Sri Lankans who lived in countryside areas are depending on the

agricultural economy. Also, Sri Lanka had a rich tradition that comes with nation agriculture. when considering the Sri Lankan agricultural industry rice is the main production. paddy is cultivated during two periods of time in a year called Yala and Maha season. and also, tea is another primary form of agriculture in Sri Lanka and the main source of foreign exchange. mainly Tea cultivated in central highlands. other than rice and tea another most important crops are vegetables and fruits. about eighty different varieties of vegetables and fruits are cultivated in three types of agro-climate areas in Sri Lanka. Sri Lanka produces more than eight lack metric tons of vegetables and fruits annually. The agriculture sector of Sri Lanka contributes seven percent to the national GDP (Gross Domestic Product) "After the 1970 's this agricultural economy drastically faced a crisis due to the economic reforms implemented in the country from 1978" To overcome this situation government has done several projects. Dedicated agricultural centers are an example of such a project. In 1999 an initiative was taken to establish a large-scale market center that would change the marketing situation for farmers. According to the Ministry of rural development, the main objectives of Dedication economic centers are, Ensure obtaining reasonable prices for agriculture producers for their crops by providing a targeted market, Provide an opportunity for small scale producers to minimize their transport costs and wastage in transportation, Provide opportunities for wholesale traders to purchase fresh fruits

and vegetables, directly from producers, Encourage the business community by providing a competitive marketing environment for wholesale traders. Create an opportunity to distribute area-specific agricultural products among people in all parts of the island, provide facilities for consumers to purchase food items at cheaper prices. (Development and Unive, 2016)

When analyzing the above objectives still some shortcomings are not solved properly because of some critical issues that have been occurred in the current system. The major problem is lack of communication between farmers and Dedicated economic centers (DEC), Incapability of finding a wide market available nearby agro-ecological zone because of the ultimate interference of intermediate person to the marketing process, lengthiness, and the complexity of traditional market channel. so the ultimate aim of this system is empowering small scale farmers by provide a target market and limit the interference of intermediate persons to the process of crop selling by updating farmers, with the latest market conditions. The establishment of dedicated economic centers was started in 1998 as a means of implementing marketing development strategies to provide marketing facilities to manufacturers in rural areas.

Literature Review

There are different types of existing systems and experiments to take an actual idea about the technologies that other researchers have adjusted to apply the appropriate technologies to this proposed system. this literature review will give an idea of how the previous researchers have come near to their research and how they have implemented their works.

A.The existing e-farmer Management Systems

•(Karunaratne and vidanagama, 2015) Presented paper under the topic of E-farmer

Management System for Agrarian Service Centers in Sri Lanka to provide a web system to advance the existing agrarian services in Sri Lanka. The solution is to be carried out with a powerful mixture of few technology and software's This software is consisting of the following main features SMS based application service to inform the farmers regarding hazardous things, upcoming news, and schedules and remind the important information through messages. While they can review the comments and ideas of other farmers and expertise in this regard. Sell their products through the online shopping cart. With these new features, this management system maximizes the output and improve the following process that happens between the agriculture officer and farmers. Problem diagnosing capability, Decision Making, Accountability, Discussion forums, SMS facility, Alerts and update information, Reporting facility This system maintains a centralized database system where all the clients can connect to the EFMS network. There three separate login interfaces in the system which Farmers can access to the system using their phone as well as the computer while Agrarian officers can log in to the system with their username and password. As well as Coordinators can log in to the system. But the system limited their authority to work with the system. Primarily the coordinators have to concern about the farmers and respond to update each new thing relevant to the farmers and their crops. (Karunaratna and Vidanagama, 2015)

•(O. Noel, N. Fernando, and G. Wikramanayake 2014) Presented paper under the topic of "Web-Based Agriculture Information System" according to authors it is very important to have an information system to assist different kinds of users such as planters, researchers, inventors, and exporters in Sri Lanka. That information system developed for considering the main

corps of Sri Lankan agriculture. This system is available on the internet for various types of users. the system includes details about corps and inter corps, their production, expert details, crop and intercrop diseases, land availability, soil stability, fertilizer, research institutes, and research. The four main research institutes of Sri Lanka such as Rubber, Tea, Coconut and Rice Research Institutes maintain various Currently, the Internet provides so much information about companies that produce main crops like tea, rubber, coconut, and rice but information about crops and inter-crops, their production, crop and inter-crop diseases, land availability, soil suitability, are still not available on the Internet. This web-based information system addresses these issues too. (Noel, Fernando and Wikramanayake, 2014)

•(G. Pramod, S. Bhagat, D. Bhusare, S. Botre, and S. Pate 2016 India) presented paper under the topic of “E-farming” According to authors Farming and agriculture is the prime occupation in India but unfortunately, people who involved in farming are suffering from poverty. The main reason behind this poverty is the lack of awareness about modern high technologies, Automated machines, Availability of facilities. And the worst issue in farming is after all hard work and sacrifices to their production farmers are unable to get a good market for their harvest as they cheated by the agent. According to researchers, This is the main reason behind the poverty of most farmers in India. So “E-Farming “will provide a good market platform for farmers to sell their products across the country. The site will guide the farmers in all the aspects, the current market rate of different products, the total sale and the earned profit for the sold products, access to the new farming techniques through eLearning, and a centralized approach to view different government’s agriculture schemes including the

compensation schemes for farming. Getting availed to the required information related to the markets and different products can be made possible through the SMS facility provided by the system. (Pramod et al., 2016)

•(Tomoko Kashima, Shimpei Matsumoto, and Tatsuo Matsu Tomi 2013) presented paper under the topic of “Effects of Sharing Farmers’ Information Using Content Management System” according to others “In recent years, the number of agricultural-product markets is over the number of convenience stores in Japan. However, many farmers are experiencing a lot of problems nowadays. Farmers are rapidly aging because the young people who get an agricultural job are decreasing in number. Consumers worry about the safety of the food which Farmers produce because of the problem of the quantity of the agricultural chemicals used for agricultural products And, there is also a growing concern that the Trans-Pacific Partnership (TPP) has a negative influence on domestic agriculture. These problems could be a big opportunity to try and change domestic agriculture in Japan by introducing IT. They have already developed a Menu Recommendation System which gathers data on what people like to eat, and with that data, it can make automatic recommendations for an individual (Silva and Ratnadiwakara, no date)This idea can also be applied in developing the Agricultural Information System for urban markets, for the benefit of farmers and the local agriculture in Japan. This system will provide information on what agricultural products are in demand by analyzing consumer consumption and market trends. With this information, the farmers can have a better idea of what crops to prioritize. This can also help stabilize the economic sustainability of farming by improving farm management. With the system at work, it will reduce oversupply and undersupply of certain agricultural products, and the stable supply-

demand relationship will prevent the underpricing of agricultural products and help in stabilizing market prices.”(Eds, Conference and Hutchison, 2013)

- According to leT Research and Development in Africa, 2010 they Sayed The Information and Communication Technology (ICT) revolution has brought about unprecedented new opportunities in agriculture and rural development in developing countries. The use of ICT in agriculture has made significant contributions to improvements in agricultural production, food security, and better access to input and product markets. It has also improved the performance of rural agribusinesses, income-earning opportunities. (‘leT Research and Development in Africa’, 2010)

- Agriculture often appears to be one of the most difficult industries when it comes to trading Agri products are concerned. (faculty of social sciences university of Kelaniya A study about problems that farmers face in trading Agri products to economic centers) With special reference of Dambulla Dedicated Economic Center), 2016)(‘FACULTY OF SOCIAL SCIENCE UNIVERSITY OF KELANIYA A study about problems that farmers face in trading Agri products to economic centers) With special reference of Dambulla Dedicated Economic Center)’, 2016)

- Farm Management Information Systems (FMIS) are of precision and easy to use Fundamental for effective management of farm operations. Nevertheless, many farmers still today do not use FMISs for various reasons, such as lack of awareness and the difficulty of many available FMISs. Appropriate FMISs hardly exist especially for small to medium-sized farms and multifunctional farms(Husemann and Novkovic, 2014) This paper aims for the deduction from a general FMIS of a concrete FMIS. The concrete FMIS will concentrate on the needs of medium and multifunctional

farms. This means the farmer must be empowered to allocate the farm's scant resources. We, therefore, selected a German farm

- Technological importance has been a great support to decision-making in various fields, particularly in agriculture. Agriculture development has been under development for the past few years due to a lack of knowledge of agriculture and changes in the environment. The main objective of this paper is to reach out to farmers in e-Agriculture for their knowledge, usage, and perception. The study utilized the technique of statistical survey design to collect farmers' data for their e-commerce knowledge. The results obtained indicated that the degree of knowledge is less such that e-agriculture is required to help them. E-Agriculture is a platform to promote the commercialization of agricultural products(FAO, 1995)(Nayak, Shenoy and Rajesh, no date)

B. Features of e-Farmer management System

Main Features of the E-farmer management system as follows

- Decision making
- Accountability
- SMS facility
- Alerts and update information
- Reporting facility
- Alert Generating Facility

C. Overview of Existing system in Sri Lanka

Current Process of Agricultural Marketing shown in Figure 9.

Agriculture Industry can be defined as one of the most difficult industries when it comes to trading Agri products. The present study tries to find out the key problem that farmers face in trading Agri products to Dambulla economic center

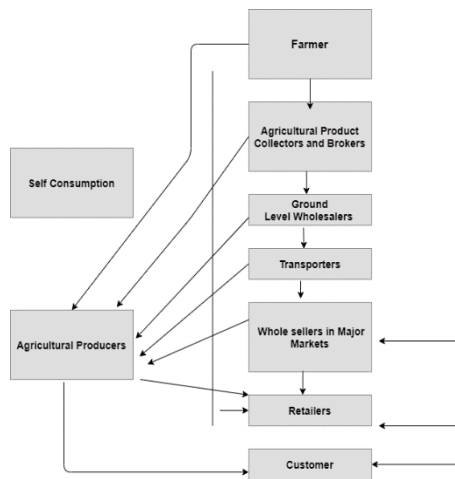


Figure 11. Process of agricultural marketing

According to saliya kumara (2011), 100% of farmers are depending on the nearest Dedicated Economic centers to finding the market for their agro products. But only Dambulla and Thambuththgama Economic canters are facilitating the market requirement to this largest agro-ecological zone like Anuradhapura and Polonnaruwa zone. Therefor huge amount of vegetable production is failed to handle in Dambulla DEC's. As a result of that, a considerable amount of vegetables is wasted in the market floor and also those surpluses dumped into a sensitive environment like forests, reservoirs, and rivers nearby This can be which cause another set of environmental problems the middle man or intermediate person intervention is the most negative part of this process as they always depending on profit in return. Because of this interference and unnecessary chain of Intermediate person at several stages of the business caused to unnecessary price increases in the consumer markets

- Lack of communication between Dedicatoin Economic center and farmers
- The incapability of handling a large number of crops
- Farmers Incapability of dealing with the technology
- The incapability of producing Market

Farmer unawareness of their market conditions

Methodology

Quantitative and qualitative methods are used to correctly identify the information, process, and communication requirements of the users of an EFMS Main spotlight of collecting data are finding data about Dedicated Economic centers and mainly knowledge is acquired using both structured and unstructured interviews with domain experts and from relevant documents by using documents analysis method to find the solution of the problem. All the Details and requirements are given from the head of the department and the staff members of Hector Kobbekaduwa Agrarian and the research center to get a broad idea about the Proposed system. as well as all the other important data were gathered by interviewing local farmers and buyers from the Dambulla area. Apart from that as primary data sources the developer uses books, surfing the internet, Research works, and case studies of the existing systems. A blending of these methods is used to accomplish the gathering of quantitative and qualitative fact This research uses the agile Dynamic System Development Method (DSDM) which is one of the important methodologies which come after the waterfall model. The agile method is based on giving main concern to user participation, from the very beginning of the development cycle. The objective is to keep the user involved at every stage. And most importantly It concerns customer Satisfaction. The Technology stacks which is used in the proposed system is P PHP, HTML, jQuery, AJAX, Bootstrap framework, Google map API, SMS gateway

A. Requirement analysis

This system has three main login interfaces. Administrator, Buyer, and farmers can access to the system using Those three different logins moreover every user have a unique

username and password which is given from the system when they registering to the system There are Main functional requirements of the system

Admin should able to,

- Gathering price Indexes
- Registering As the admin of the system
- Add farmers and buyers to the system with their relevant crop types
- Add Representative
- View Representative
- Remove Representative
- Add crop types and crop ID and quantity
- View crops types and crop ID
- Remove crop
- Sending price Indexes to farmers
- Sending Farmers prices to buyers
- Sending Buyers preferences to selected farmers

End-Users Should Able to

- Send own prices to the system
- Send Availability of crops
- Ask for price Indexes of crops
- Send preferences to the system

Apart from that as a usability requirement, the system's end-user should have little knowledge of how to use normal cell phones.

B. conceptual model

E farmer management system uses a centralized database as shown in figure 2 Hector Kobbekaduwa Institute is deciding the prices of the vegetables, fruits, and rice along with the government. Those price indexes are sent to dedicated economic centers. From this new web-based system those price indexes will cent to the registered

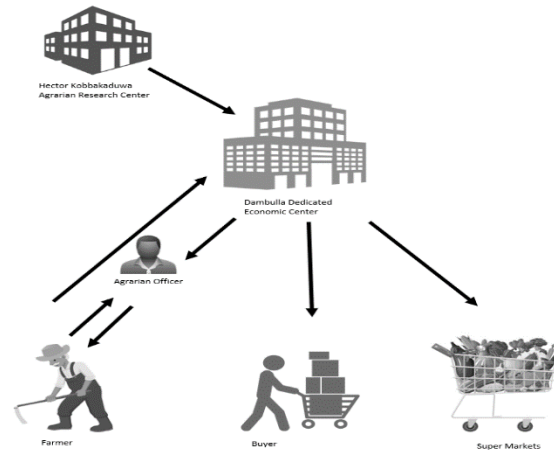


Figure 12. Work Process of Proposed System

farmers according to their relevant crop by simple SMS alert. every morning then farmers can decide their prices and send them back to the economic center. Then only buyers can know about price indexes. with this new system, the developer has reduced the lengthiness and interference of Intermediate persons to the marketing process by connecting Farmer, Byer, and economic center into one platform.

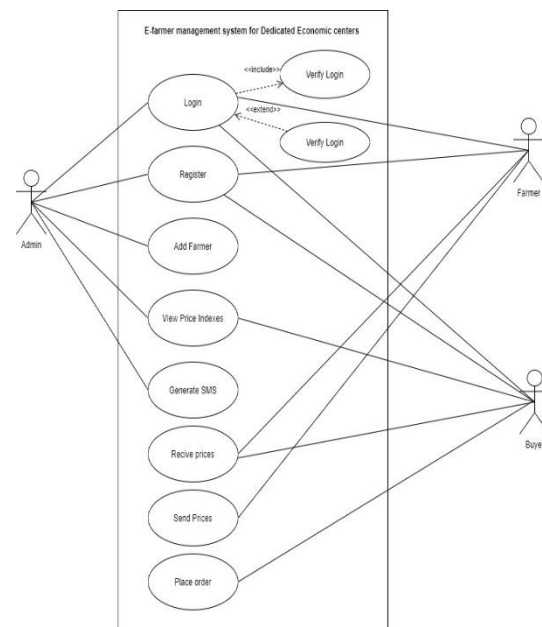


Figure 13. Use Case Diagram

C. Implementation

The E-farmer Management System mainly consists of three main modules

Login Module

Users of the system should be accessed through the login function. Users already should have username passwords to login to the system.

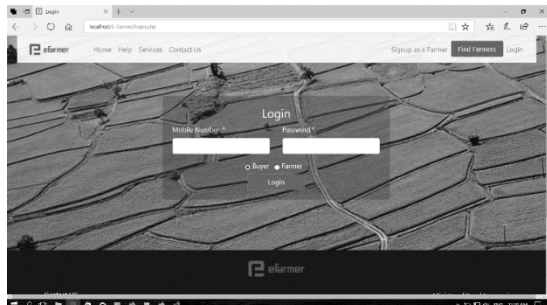


Figure 14. User Login

Administration Module

Every primary user must register through the system by creating a user account. The administrator function is the one of most important features of EFMS. The administrator will add end-users to the system. The administrator has the full authority to change the details and delete the information and add or remove users. Also, the administrator can add price indexes, crop types, the quantity of the relevant crops and remove, update them apart from that administrator can send prices to the farmers and buyers which is the one of main functional requirements of the system. The administrator can add, Remove, update representative to the system.

SMS Module

The system will send the SMS notification to the farmer’s mobile phone the specialty of this system is this alert generating service is support for basic cell phones in all three languages. The system will send daily updates of price indexes of vegetables to the registered farmers. and farmers can send their prices to the system too. then the system will send those prices to buyers. Byers can see all those prices by simply login to the system. the system will show the price of relevant crops with the farmer's details.

byer can order their preferred vegetables from here with this simple step, it reduces the lengthiness of market channels and reduces unnecessary participation of intermediate person to the marketing process, and give full power to farmers to decide the prices of their valuable crops.

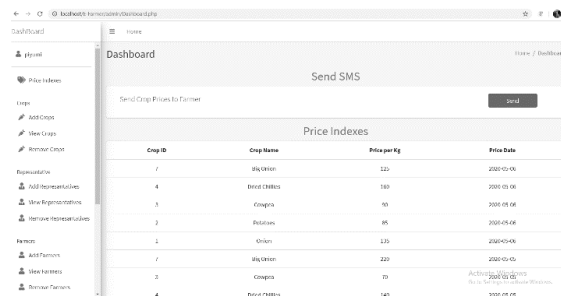


Figure 15. Admin Dashboard

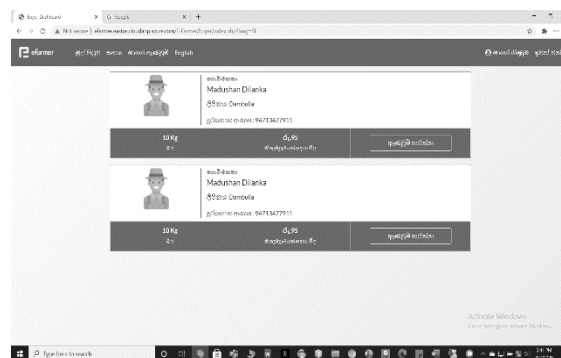


Figure 16. Farmers Prices

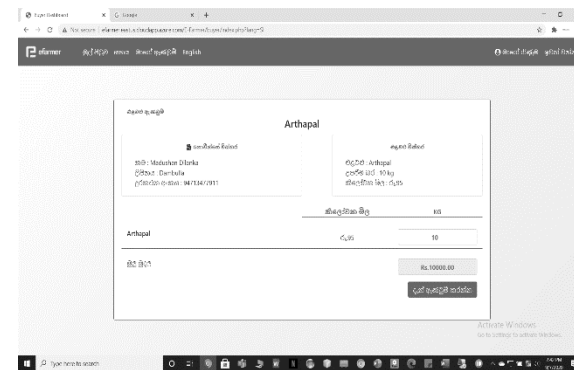


Figure 17. Byers Order Form

Testing and Evaluation

The testing phase enables the established e-farmer management system for dedicated economic centers in Sri Lanka to be methods for data analysis to ensure that the requirements everything was developed to satisfy. At the production of certain modules, the components of the system have been

tested as units and integrated systems. And also the accuracy of the system was tested by participating 50 farmers in the Dambulla area. during the evaluation test sample price indexes send to farmers' cell phones and they are instructed to send reply their prices the same as the message template which sends with price index list.

According to the following pie chart, 38 farmers send correct messages while 12 farmers send incorrect messages. the overall accuracy of the system is 76%.

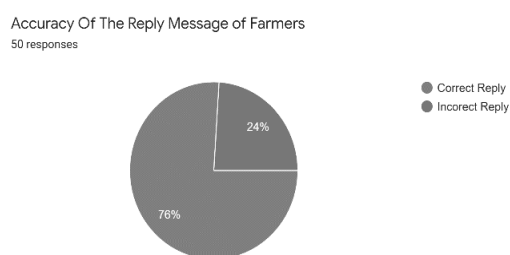


Figure 18. User Accuracy Chart

And the feedback result shows Satisfaction of the farmers about the E- Farmer management System

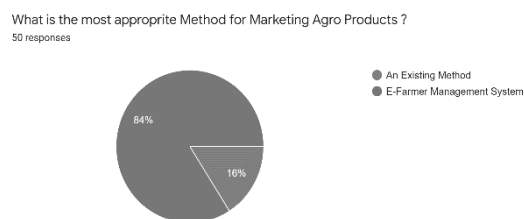


Figure 19. Accuracy pie chart

Conclusion and Discussion

Sri Lanka is an agriculturally based country where adds 0.1% to national GDP. But there are some serious issues in the agriculture marketing industry which need attention from the government and other central bodies. While doing the research, the researcher found some significant issues that directly impact to Sri Lankan small scale farmers. The main challenge of the existing system is the lengthiness of current market channels. and unnecessary participation of

intermediate persons to a marketing process because these farmers are unable to get a reasonable price for their valuable crops. this project provides solutions to these issues by reducing the lengthiness of the marketing process. by connecting Farmers, buyers, and economic centers into one platform. EFMS shows the positive outcomes of the marketing process and it improves the effective efficiency of the Sri Lankan agro-economic sector and the project will provide feasible solutions for those identified problems in the agro-economy sector. And empower small scale farmers Sri Lanka Which is the main objective of the overall research.

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