INTERACTIVE WEB-BASED PLATFORM TO BOOST THE AGRICULTURAL SECTOR IN SRI LANKA

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Abstract

The agriculture sector plays a vital role in Sri Lanka's economy. Interestingly, more than 30% of Sri Lankans are involved in the agricultural sector. The vegetable sector is the second most important sub-sector of island's agriculture after rice. However, it is well known that vegetable production should be improved significantly to meet the demand and also satisfy the customer's requirements. Some of the main obstacles facing this sector are the role-play of middlemen and farmers' lack of knowledge about best-growing practices, pest and disease management. This study, discussed the development of MVC (Model–View–Controller) based trilingual (Sinhala, Tamil and English) web based system using the Rapid Application Development (RAD) model, primarily to rectify the vegetable farming-based issues among the users, and also facilitated to get the expert consultation at real time. In addition, users can advertise their products to reach the customers. Moreover, this platform provides its functionality for the farmers, agriculture students, agro-industrial companies, salesmen and any other agriculture-related workforce. It allows to connect the whole vegetable farming community in the country and increases the farmers' knowledge, efficiency of the supply chain and supports economic development.
***Keywords**: Economic Development, Model–View–Controller, Trilingual Web Platform, Vegetable Farming*

1 INTRODUCTION

never before, the world has experienced the importance of agriculture in recent years. Global agriculture production must increase 60–100% to meet the needs of a rapidly growing population [1]. In order to overcome the short supply of agriculture production, it is obvious to shift into the new sensing and driving technologies and improved information and communication technologies (ICT). Thus, today more attention has been paid to e-agriculture where ICT applications dominated. These technologies-based agriculture helps to address the challenges (e.g., climate change, pest and pathogen effect, pollution) as early also optimize the input allocation, thereby improving the agro production at low cost [2], [3].

The uses of new ICT applications are becoming a trend in developed countries, nevertheless vice versa in developing countries. Being a small developing nation, the condition in Sri Lanka is also not much different than many other developing countries as it needs to be implied that more ICT-based

technologies for better agriculture production. In Sri Lankan perspective, many globally available platforms are not effective as many of the leading systems are functioning in English. In the short history of the local ICT sector, Govi Nena and Govi Mithuru the trilingual (Sinhala, Tamil and English) mobile apps have recently been launched, though having a lack of communication facilities to get real-time answers to questions raised by farmers seems to be a downfall of those systems. Another mobile app—Krushi Advisor gave little extended facility to contact to get advice, however, it runs only in one language. On this ground, the current study aimed to propose an adaptive and interactive web-based tool that can be used to improve Sri Lankan agriculture. In this regard, the study mainly focused on the vegetable agro farming system, as a huge number of farmers island-wide have been involved in the year round production process. The tested system is also aimed to bridge the gap between farmers, agricultural instructors, researchers, academia, extension agents and other various market players. It also aimed to facilitate farmers to share the issues that they have faced in the farming system and get advice from experts, also to provide a marketing platform for farmers to sell their products at a demandable price by avoiding middlemen and also purchasing helpful agro instruments and essentials at convenience pricing.

2 METHODOLOGY

Interviews were conducted with thirty-five (35) different stakeholders such as vegetable farmers, agricultural officers, agricultural researchers and agricultural product sellers to understand the real challenge they faced and other background information. The outcome of those interviews was analyzed and decided to construct an interactive web-based tool, which helps to overcome the issues of the farmers. The proposed application was developed using Rapid Application Development (RAD) model. The website was developed using MVC (Model–View–Controller), which is the software architecture that separates domain/application/business logic from the rest of the user interface. This system was designed with the main key features of trilingual—Sinhala, Tamil and English. Figure 1 demonstrates the architectural view of the system. The system was categorized mainly into two sections. The first is to share the issues related to the crop by the farmers and get the experience from other farmers and the suggestion or advice confirmed by the expert/s in their own mother tongue. They can upload audio, video and image as an additional feature to emphasize the issues. The given advice or the suggestion will be confirmed by the expert/s for implementation. The whole system is under the supervision of agricultural experts. If the user's reply is wrong the expert will reject that reply and will post a valid reason for rejection and also upload the correct answer for that question. Also, the admin can only add expert users, thus enhancing trustworthiness. Second, as a media to advertise and create the supply chain to sell the products at a good price. Figure 2 shows the overview of the system. Algorithms were designed for different user logins, verifying and confirming the posts, translating the posts and product advertisements with route navigation. Finally, the developed system was adopted for real-time trial experiments.

3 RESULTS AND DISCUSSIONS

Nowadays, Sri Lanka is also looking forward to ICT applications, particularly with digital governance, and not enough attention is given to the agriculture sector. Thus, this study is timely important and adapted the identified real requirements in the development of the system for Sri Lankan farmers. The user can simply log in by adding their mobile number and convenient password. However, users are required to register first, before creating their own profile. Users can then post their questions in

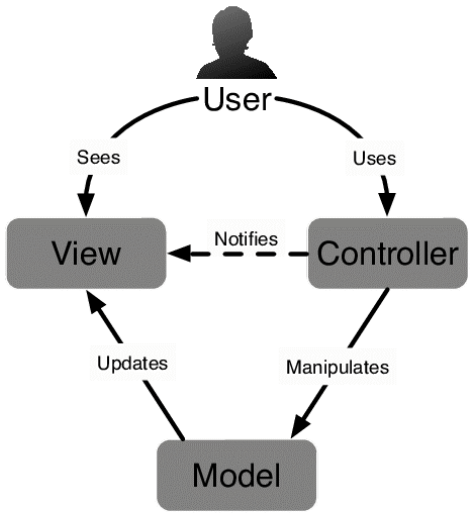


Figure 1. System Architecture

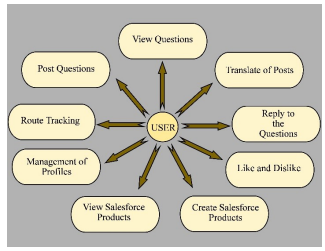


Figure 2. System Overview

a given space and further conversation can be conducted with other users like farmers, agriculture-related persons, or experts. Every post can be translated into their respective mother tongue for understanding. This feature easily interconnects all the users without the language barrier. This feature enthuses the farmer to protect their crops from disease and apply the new technology/techniques in their farming. Figure 3 exhibits the activities of the developed system. Of this, figure 4 shows

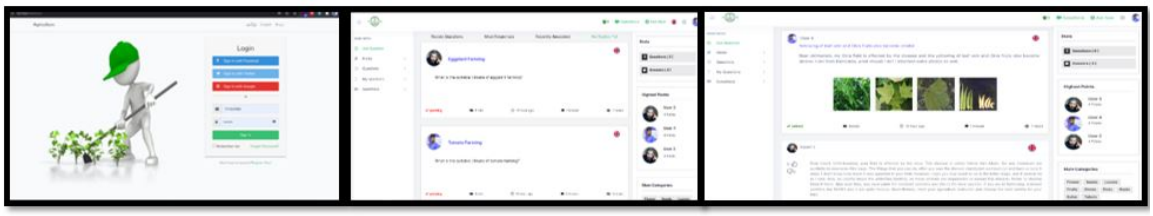
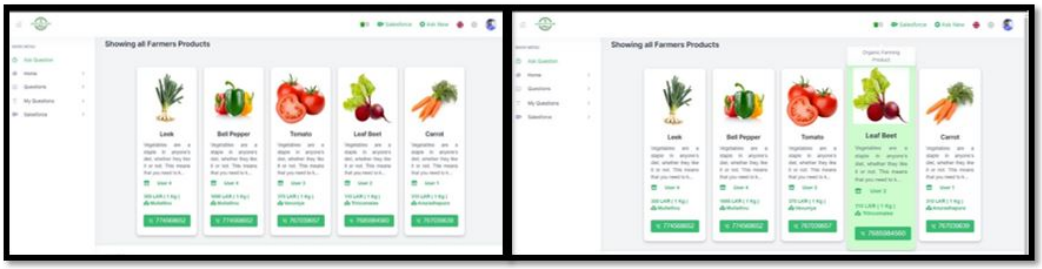


Figure 3. Login and discussion pages of the designed web tool.

the sales-force-product-advertisement page that allows the farmers to sell their products. It is also enhanced with product card colour, which helps to differentiate the organic and non-organic farming products and tooltip text that helps to brief the product information. Buyers can check the product, ex-

pected price and available quantity. This can be confirmed with the farmers via the displayed contact number. Moreover, route navigation helps the buyer to easily identify the location, distance between the farmer and the buyer and the shortest route to reach the location. This feature assists the farmer to sell the product at a market price and yield a better profit from their farming.



(A) (B)

Figure 4. Sales-Force-Product (A). Shows the different vegetable product with other relevant information like price, location and contact details. (B). Product card emphasize the organic farming product upon the selection.

4 Conclusion

This platform brings farmers to interconnect with each other without causing language barriers to solving their problems and also to advertise their products to create more market opportunities. This system allows for the connection of a wide range of farming communities in Sri Lanka and facilitates the farmers to get advice from the expert or other communities easily, finding good marketing opportunities, and income by avoiding middleman involvement. Furthermore, it also helps to improve the efficiency of the supply chain. The system could also motivate farmers to extend their cultivation and thus support overcoming the food shortage scenario. Also as the product quality improved, it can find more export market opportunities to bring foreign exchange. Eventually, this system will support the agricultural development of the country, towards economic growth.

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