

# MOBILE BASED SOLUTION FOR HARVEST SELLING SYSTEM IN SRI LANKA

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**Abstract**— Paddy cultivating is one of the major sectors in Sri Lankan agriculture platform. Many farmers engaged in this field facing number of difficulties during phase of selling their harvest due to lack of store facilities and not meeting the expected paddy quality as required by government authorities. It is revealed that information and communication technology (ICT) based solution will be able to overcome these issues as it is practiced in agriculture sectors in developed countries. The Paddy Marketing Board of Sri Lanka has launched a website as an ICT based initiative in order to up lift the status of paddy farmers. However, the initiated ICT based action is not very popular among farmers due to lack of user-friendliness, infrastructure facilities and illiteracy of information technology. Considering the penetration of mobile phone usage in the country, we aim to address this lacking by providing a mobile phone based solution for harvest selling process in Sri Lanka. The aim of this research is to apply the mobile technology to assist the farmers in making decisions such as when to cultivate, what are best seeds and what is the best time to collect the harvest etc. The outcome of this study assists farmers to collect their harvest and sell it correct time, which increases the farmer's profits in a positive manner.

**Keywords**— Harvest Selling System, Paddy Marketing Board, Agriculture

## I. INTRODUCTION

Agriculture is one of the main sectors, which provide employment and self-sustained income to the Sri Lankan economy since ancient age. Surveys and researches revealed that percentage of 32.7% from total employment are from agriculture sector (Central Bank 2010). However, during past few years, it noticed that agriculture sector is facing number of issues such as lack of fertilizers, less knowledge about seeds and fertilizers, lack of storing facilities, lack of milling facilities etc. It is further adverse in paddy farming sectors. Because of these issues, paddy farmers are facing enormous difficulties during collection and selling of their harvest. Further, it is noted that younger generation of Sri Lanka is not willing to engage in paddy farming activities since it is no more a profit making employment (de Silva et al 2012).

Many researchers have been identified that Information and communication technology (ICT) can be used as a tool to overcome many issues facing by farmers. Most of the paddy farmers in Sri Lanka are cultivating their paddies as per old traditional systems, which are, not pay more attention to modern communication technologies. Therefore, farmers had to face unexpected situations such as sudden weather changes, non-availability of store spaces while selling harvest, non-availability of substitute seeds and fertilizers in an emergency like floods and natural disasters etc. These situations heads for zero or minimum profit at final phase of selling their harvest. Further it leads to increasing the bank debts and instability of house hold economies of Sri Lankan paddy farmers.

Many developed countries in the world (including India and African reign countries) using ICT in mass scale to develop their agriculture sector. In early stages those countries use ICT measure through broadcasting Medias and it is gradually developed up to using of internet/online applications and mobile phones to enhance communication between farmers and relevant authorities from the government, research and development, weather department etc. Due to improving above ICT interventions in agriculture fields, farmers tend to make correct decisions such as when to cultivate, what are best seeds and what is the best time to collect the harvest etc. Once good ICT practice intervene to the agriculture system, farmers are always updated with weather forecast, types of seeds and fertilizers, availability of storing facilities etc. Therefore farmers are able collect their harvest and sell it correct time, which increases the farmer's profits in a positive manner.

In Sri Lankan context, the Paddy Marketing Board and Department of Agriculture has introduced two ICT initiatives such as [www.pmb.lk](http://www.pmb.lk) and [www.goviya.lk](http://www.goviya.lk). Out of that [www.pmb.gov.lk](http://www.pmb.gov.lk) is an interaction type of G2C service and [www.goviya.lk](http://www.goviya.lk) is a presence type of G2C service.

The aim of this research is to apply the mobile technology to assist the farmers in making decisions such as when to cultivate, what are best seeds and what the best time to collect the harvest etc. The outcome of this study assists

farmers to collect their harvest and sell it correct time, which increases the farmer's profits in a positive manner.

Rest of the paper arranged as follows. Section II describes existing harvest selling systems. Section III gives the drawbacks in existing harvest selling system. Section IV describes the proposed mobile phone based harvest selling system. Section V describes the conceptual framework of proposed system. Section VI gives the benefits gain from proposed mobile phone based harvest selling system. Finally concludes the paper with a note on further works.

## II. REVIEW OF LITERATURE

### A. Existing ICT based Systems Related to Agricultural Industry

During the study it is revealed that several attempts have been initiated to introduce ICT based systems in order to improve the efficiency of agriculture cycle. The Department of Agriculture has introduced 'Govi Ghana' system in collaboration of Information and communication Technology Agency (ICTA) at Dambulla Dedicated Economic Zone (DDEZ) as an ICT based information System, in order to view agricultural prices. The aim of this system is to view correct agricultural price information by farmers. It uses a hand held device to obtain spot prices from respective traders. Thereafter these prices are displayed on the screens at DDEZ. The adverse effect of this system is farmers are able to know about the prices after they came to the DDEZ. Therefore, farmers are compelled to sell their harvest at displayed prices. There is no assurance that farmers are gaining profit by this system. Instead of viewing the prices at the end point of the Agriculture cycle, if farmers are facilitate to know these prices before plucking their harvest, the farmers will be more beneficial.(De Silva et al.2011)

At present, there are number of web sites available as informational services to farmers. However during the researchers it is revealed that such systems are not very popular among farmers due to lack of infrastructure facilities and poor IT literacy (Pavitrani et al 2011). Therefore selecting of an appropriate technology is highly affecting to information dissemination among farmers. There are few mobile based applications introduced by Dialog and Mobitel, such as *Dialog Trade Net* and *Agri Price Index*. However it is revealed that these systems are also not popular among farmers, since they provide only price related information. Farmers are not bothered find prices after plucking harvest because they had to sell those at any

cost. (De Silva et al.2011). Therefore integrated informational system in mobile interface is essential to disseminate required information among farmers.

Since the mobile penetration increasing rapidly in rural areas (international telecommunication union ITU, 2010) suitable mobile application or system can develop Agriculture sector rapidly. "mAgriculture is a subset of eAgriculture, referring to the delivery of agriculture-related services via mobile communications technology. Mobile communication technology includes all kinds of portable devices like basic mobile phones, smartphones, PDAs or tablet devices (e.g. iPad). mAgriculture can also involve gathering relevant data through mobile technologies like automated weather stations (AWS) or systems and sensors for location-based collection." (Mobile Applications in Agriculture, Syngenta Foundation, Basel, Switzerland, 2011).

Increasing smallholder productivity and incomes, Making agricultural markets more efficient and transparent, Linking poor farmers to urban, regional and global markets, Improving services and governance for the rural poorfarmers, Promoting and including smallholders inagricultural innovation, Helping farmers manage a range of risks, Improving land and natural resource management and addressing environmental pressures, Helping poor farmers participate in higher-value agriculture, Supporting the emergence of a more diverse rural economy and supporting rural families 'decisions about their mix of productive activities are benefits could be achieved by implementing a mobile based systems in Agriculture sector (Mobile Applications in Agriculture ,Syngenta Foundation, Basel, Switzerland , 2011)

### B. Existing Mobile Applications Related to Agricultural Industry

Details pertaining to some of the existing mobile applications related to agriculture industry are as follows (ICT sector unit World Bank. Qiang et al 2012)

*Nokia life* is a software suite embedded in certain Nokia phones to provide agricultural, educational and entertainment services to developing country markets. The target users are general public and farmers. China, India and Indonesia are using this system currently.

*Reuters Market Light* provides localized and personalized information via SMS text messages on weather, market prices, local and international agriculture and commodity news, and crop advisory tips enabling farmers to make informed decisions, reduce waste and maximize their

profits. The target users are farmers and agricultural based associations. At present this system is actively using in India. The *DatAgro* project is taking advantage of the high penetration rate of mobile phones in Latin America to allow rural farming cooperatives to define the types of information most critical to their lives and livelihoods and receive it through text messages. The target group is farming cooperatives. At present this system is using in Chile and Latin American Countries.

*e-Diary* system is introduced for small dairy farmers in sending SMS utilizing their mobiles / CDMA / Touch button screen and the internet to obtain their animal health, veterinary and other related just in time dairy extension services. This system also provided training & development activities as Computer usage for the youth of farmer's families / Livestock development officers / Veterinary surgeons. Developed database backed, SMS enabled dairy farmer / service provider tracking / messaging software and touch screen software. This system is actively using in Sri Lanka. The target group is small Dairy farmers.

The *mKRISHI* application enables farmers to send queries, comprising of text, voice and pictures, specific to their land and crop to agricultural experts, using their mobile phones. The *mKRISHI* ecosystem provides an integrated view of the farmers profile, farming history, and the required farm parameters on a console at a remote location to an expert. Farmers can also send pictures of their crops and pests captured with mobile phone cameras; sensors provide farm specific soil and crop data, weather stations provide microclimate details and voice based querying system gives freedom to the farmers to ask any query in their local (natural) language. After analysis of the available information, the expert's advice on the farmer's query is provided on the farmer's mobile phone. The target group is Indian farmers and system is active at present.

*LIRNEasia* is for Gherkin farmers in Sri Lanka were given mobile phones with a Sinhala menu-based application that allows farmers to send and receive information related their crop. This system is no longer active.

### III. WEAKNESS IN EXISTING SYSTEM

During the study, following drawbacks have been identified from [www.pmb.gov.lk](http://www.pmb.gov.lk) website.

The web site has not provided any details about new seeds, fertilizers and research and development details with respect to paddy farming, the weather forecast, which is an

essential fact for agriculture activities, details are not available with respect to financial facilities (bank loans, leasing etc.), details of private sector vendors who are ready to buy paddy from farmers, online register forms are promulgated only in English language which is not convenient with most of the paddy farmers and details are not available regarding pest and disease attacks.

In addition to above mentioned draw backs major issues such as lack of infrastructure facilities, lack of computer literacy, Digital divide and lack of user friendliness is directly affecting to unpopularity of online based activities among paddy farmers.

To address the aforementioned challenges in the existing harvest selling process, we proposed to develop a mobile phone based harvest selling system. In this paper, we will highlight the benefits gained from this mobile based solution.

### IV. MOBILE BASED HARVEST SELLING SYSTEM

The web interface provided by Paddy Marketing Board is a Government to Citizen (G2C) based e – governance initiative. Availability of infrastructure facilities, Computer/IT literacy of citizens, Digital Divide and User friendliness of web interface are the essential requirements to be fulfilled by any e – service in order to function it in successful manner.

During the study, it is revealed that most of the rural areas of Sri Lanka are not equipped with required infrastructure facilities such as computers, internet servers etc., IT literacy is also not acceptable level among farmers, Digital divide also in higher position at rural areas of Sri Lanka. Due to these facts user friendliness of any web based System became lower.

Many ICT based studies revealed mobile penetration is much higher than normal PCs, laptops and tabs among rural areas. Therefore introducing an mobile based application will be benefitted for Sri Lankan Paddy farmers in order to effective paddy selling and improve the paddy cultivation.

### V. CONCEPTUAL FRAMEWORK

Since the mobile penetration is higher than normal PCs in rural areas, it is decided to introduce a mobile based solution for Sri Lankan paddy farmer's issues. During the study, it is noted that lack information regarding availability of stores, weather forecast, knowledge on seeds and paddy

prices are main facts affecting for improper paddy cultivations and less profit of paddy farmers. In order to avoid these issues following design steps are forwarded with respect to mobile phone based application.

#### VI. DESIGN

The design is similar to mobile connections help desk. The authority of this mobile based system should be given to Paddy Marketing Board. This facility should be provided to farmers through SMS media since smart phone applications may not be familiar with elder/ rural based farmers. The reference languages are to be Sinhala and Tamil since most of the farmers may not be familiar with English language.

Mobile phone connection can be selected after proper tender procedure considering SMS cost, availability of signal strength in rural areas and mobile bill payment facilities.

Design Steps:

1. Paddy Marketing Board should maintain a Comprehensive updated Data base which is consisting with following data.
  - i. Locations of paddy stores
  - ii. Availability of spaces at respective paddy stores
  - iii. Distance between paddy stores
  - iv. Current day weather forecast
  - v. Seed selling prices for respective seeds
  - vi. Market prices of Fertilizers
  - vii. Details of approved fertilizer types
  - viii. Free distribution fertilizers and locations
  - ix. Current market prices of paddy harvest.
  - x. Types of new seeds and details of R&D products.
  - xi. Details on existing agricultural diseases.
2. The database has to be link with mobile connection service providers and they should provide help desk number like 1717,6666 etc.
3. Once registered farmer dial above number he/she should get a language selection option.
4. After appropriate language is selected, the next step is to select desired facility by selecting/pressing/dialling appropriate index number. Serial numbers used for above mentioned data types may use as an index numbers (I to xi). For an example, if any farmer needs to obtain details w.r.t current day weather forecast through

mobile application he/she should dial no (iv) by his/her mobile phone dialler. Thereafter a SMS is to be send to farmer's mobile phone containing all details relevant to his/her query.

#### VII. IMPLEMENTATION AND EVALUATION

The proposed system can be implemented as pilot project in high-density areas of paddy farming. Thereafter results should obtain from farmers by interviews and to be record for evaluation. Based on the conclusions, the project may implement in other areas.

#### VIII. BENEFITS GAIN FROM MOBILE BASED HARVEST SELLING SYSTEM

There are number of advantages mentioned below with respect to proposed mobile phone based system during the cultivation, processing, harvesting and paddy selling.

##### A. Advantages during Beginning of Paddy Cultivation

By using the proposed system, the farmer can decide the appropriate period for cultivation considering the weather forecast. Also the farmer can cultivate new type of seeds which is having good market value and can use effective fertilizers since beginning.

##### B. Advantages during Progress of Paddy Cultivation

By using this mobile phone based system, ability to avoid pests and diseases and use of good /effective fertilizers to increase the growth of paddy.

##### C. Advantages during Paddy Harvesting and Selling

With the proposed mobile system, ability of decide best period to collect harvest considering weather conditions, knowing of current paddy purchasing prices, knowledge on store facilities and availability of spaces, knowledge of required quality of paddy (e.g. - moisture content, wastage percentage etc.) and knowledge of private paddy buying vendors and stores.

#### IX. CONCLUSION AND FURTHER WORKS

In order to success the above mentioned system, implementing of new public management is an essential fact. The authorities must think in such a way those farmers are valuable asset to the country and they are customers of PMB. Soft skills must be implemented during process. The paddy farmer community is to be kept in happy mode during the entire process.

Conducting of awareness programmers among farmer community is an essential prior to implement the new mobile based application. This can be achieved through

agriculture officials and public media. Pilot project is to be to launch in selected area and results should be evaluate properly, prior implement it in to entire country. Further integration of databases through department of Agriculture, Weather Department, Research and Development Authorities and private market vendors is necessary to maintain updated database.

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