

# A Study on Cloud and Mobile Based Sugarcane Cultivation Software Application Developed by M/s Livecrop Solutions Private Limited

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**Abstract:-** A study was conducted during February 2021, to assess the efficacy of cloud and mobile based software application (App) for sugarcane cultivation, considering randomly selected 63 farmers who were using the App under the trial order given by M/s Ponni Sugars, Erode, Tamil Nadu to M/s Livecrop Solutions Private Limited, Bangalore (App developers). The App was used by the farmers since January 2020 to the end of crop harvest. Findings of the study revealed that, vast majority of the App users have felt that, the advance intimation given to them on their mobiles, the customized production practices in a crop cycle was useful in implementing the recommended practices within the time frame specified for each of the practice. More than half of the App users adopted more than 80.00 per cent of the recommended practices and only negligible percentage (6.00 per cent) of users fell under less than 60.00 per cent adoption category. About 75.00 per cent of the App users expressed that their sugarcane yields will increase due to timely adoption of recommended practices. Recognizing the strengths of the App, 76.00 per cent of the users want to continue it in future crop seasons also and the Sugar factory willing to continuing it.

## I. INTRODUCTION

In the recent years, Information and Communication Technology has been playing a significant role in agricultural growth through the use of latest advancements in the IT sector. Recognizing its potential in agricultural development, efforts are being made by many individuals and companies to design methodologies to make farmers self-reliant in accessing and using information relating to improved crop production, weather status and market information. M/s Livecrop Solutions Private Limited, based at Bangalore is one such company established in 2016 with an objective of improving the agricultural productivity using IT and simplifying the live crop monitoring using latest technologies.

M/s Livecrop Solutions Pvt. Ltd., has developed a mobile and cloud based software application for monitoring of live crop cycles (from sowing / planting to harvesting of any crop). While developing the software, two classical adult learning theories : ‘*Conditions of learning*’ by Gagne *et.al* (1988) and ‘*Connectivism*’ theory by Siemens (2005),

formed the base. The essence of conditions of learning theory is, sequencing of events of learning as (a) gaining the learner’s attention, (b) presenting the learning stimulus and guidance, (c) eliciting appropriate performance, (d) providing feedback, and (e) assessing learner performance. Breaking the content in to discrete segments in the form of short strategic bursts of learning in line with the science of micro learning as suggested in *Connectivism theory*, was also considered. Apart from these theories, the outcome of user experience (UX) studies in relevant area also formed the base. Accordingly, the software architecture is built.

The unique features of the software developed by M/s Livecrop Solutions Private Limited are (a) availability of uniform technology packages to all farmers growing a particular crop, (b) each farmer gets timely alerts to adopt technologies prescribed and also to send feedbacks after adoption, (c) prompts extension personnel at different levels to track the status of adoption by farmers, (d) appropriate measures can be taken by field level extension persons if any farmer is found not adopting the required practice within the stipulated time, (e) auto dialer facility for farmers to contact the extension functionaries in the event of a emergent field problem, (f) farmers can send the pest infested photographs through their handsets to server to seek guidance on pest management, (g) can minimize the actual field visits of extension workers restricting to critical operations/ stages, (h) provides authentic and real time data on adoption status by farmers, performance of crop, time of harvest, etc. which are important for the management to ensure good governance, improved productivity and overall efficiency. Thus, the software is beneficial to both farmers and the management by simplifying the crop monitoring live using latest technologies.

The present study was conducted with the objectives of (a) assessing the level of acceptance of the software by the users in sugarcane cultivation and its continuation in future seasons, (b) knowing the extent of farmers adopting the package of practices as given through mobile application and (c) knowing the perception of users in yield improvement.

## II. METHODOLOGY

*About the Software:* M/s Livecrop Solutions Pvt. Ltd; offer SaaS on a B2B basis. Hence, business entities are the customers. The approach followed in providing the services to a customer (example sugar factory) start with the preparation of standardised and optimised crop production practices by the customer organization itself as suitable to their jurisdiction. A specified template was given by M/s Livecrop solutions for casting the package of practices. This is followed by uploading these practices on to the server, on boarding of the required farmers with details on to the server, downloading the mobile app by the registered farmers to their mobiles from Google play store. The system will allocate appropriate crop production practices as suitable to each registered farmer's plot. Then on wards, (i) it will remind the farmer what are the activities that he can do that day and it's start dates and end dates, (ii) it will prompt the farmer to send a Yes / No response once the activity is completed, (iii) farmers can see the history of activities completed and their scores (when the activity is completed the farmer gets the weightage as his score), (iv) farmer can also see all the future activities month wise, (v) farmer can call his officer directly through the mobile app without having to go to the address book.

Considering the relevance of the software in sugarcane cultivation and monitoring, M/s Ponni Sugars, Erode, Tamil Nadu, gave a trial order to M/s Livecrop Solutions private limited for rolling out their software for few farmers to get some of their officers and farmers familiarized with their system. The Cane Department of the sugar factory prepared sugarcane cultivation practices in both English and Tamil (local language of the region).The crop practices were conveyed to farmers in Tamil whereas, English version was used at the backend. The process is ongoing since January 2020 and 70 farmers were using the Livecrop solutions App for adoption of sugarcane cultivation practices in their fields and feedback on adoption.

*Sample:* The study was conducted during February, 2021(when the crop was in the maturity stage),considering 63 randomly selected farmers out of 70 farmers who were using the Livecrop Solutions software app since, January, 2020 as

the sample respondents. These respondents were spread over in 27 villages in Erode district, Tamilnadu, and were cultivating sugarcane under four sugarcane production systems namely (a) plant cane (fresh planting of setts) with flood irrigation-13 farmers, (b) plant cane with drip irrigation-11 farmers, (c) ratoon cane (fresh shoots grow after the harvest of the crop) with flood irrigation-26 farmers, and (d) ratoon cane with drip irrigation-13 farmers. The cultivation practices differed in each system. Plant cane with flood irrigation had 20 practices to be adopted in the entire crop cycle, whereas, plant cane with drip irrigation had 46 practices (more due to fertigation schedule). Similarly, in ratoon flood irrigation it was 18 practices and ratoon drip irrigation it was 44 practices.

*Data collection:* A pre tested schedule was used to elicit response from the sample respondents and the data on adoption of practices by the sample respondents were obtained from the backend of the software.

## III. FINDINGS OF THE STUDY

The results of the study are presented in Table-1 and following are the salient findings.

- The field level officers of the sugar factory had given initial training to farmers on operation and use of the software application. Accordingly, about 40.00 per cent of the farmers (25 out of 63) have downloaded the application from Google play store by themselves and had no difficulties in using it. Whereas, for 60.00 per cent of the farmers were to be assisted by the field level functionaries to download the application and its use. The field functionaries have extended support as per the farmers need even after initial training.
- About 86.00 per cent of the farmers using the application (54 out of 63) were getting alerts on the Livecrop Solutions App icon in their mobiles. On opening of the App, customized production practice with time window for completing the activity in Tamil was appearing. About 14.00 per cent (9 out of 63) were having a problem of not getting alerts on the App icon as alert but on opening of the App, could see the practices to be adopted. This problem was due to the use of older version mobiles by them. To overcome this issue, the App developers have inserted "push notifications" in to the App.

Table-1: Cloud and Mobile Based Software App Users Response on its Utility in Sugarcane Production in Erode District, Tamil Nadu (n=63)

Sl. No.	Item	Answer Options	Response Frequency	Response Percentage
1	Downloading and installing the software application	Farmers by themselves	25	39.68
		Supported by Officers	38	60.32
2	Regularity in getting the alerts	Yes	54	85.71
		No	09	14.29
3	Usefulness of alerts in implementing recommended practices in the field	Useful	57	90.47
		Not Useful	06	09.53
4	Sugarcane yield increase due to use of Livecrop Solutions App	Increase yields	47	74.60
		Cannot say	16	25.40
5	Need for continuing with the Livecrop Solutions App by the Sugar mill in future	Should continue	48	76.19
		Cannot Say	15	23.81

6	Adoption of recommended practices by the farmers using Livecrop Solutions App in M/s Ponni Sugars jurisdiction	Above 90.00 Per cent	18	28.57
		80.00 to 90.00 Per cent	15	23.81
		70.00 to 80.00 Per cent	18	28.57
		60.00 to 70.00 Per cent	08	12.70
		Below 60.00 Per cent	04	06.35

- About 90.00 per cent of the respondents (57 out of 63) have expressed that the advance intimation given to them about the production practice to be implemented by them through mobiles as alerts was very much useful because (a) reminding in advance has helped them to prepare themselves to pool resources and manpower to implement activity on time, (b) apt production practices suitable to their plot were given this avoided confusion, (c) there was scope for correcting the mistakes while implementing sugarcane production practices, and (d) there was an excellent opportunity for self-assessment based on the scores obtained for adoption.
- About 75.00 per cent of the respondents (47 out of 63) have expressed that their sugarcane yields were increased due to timely adoption of recommended practices given by the sugar factory. The farmers knew the production practices they have implemented in their fields leading to better confidence in getting higher yields. It is also an established fact that there is direct correlation between adoption of package of practices and yield improvement.
- About 76.00 per cent of the respondents (48 out of 63) want to continue with this application in the coming seasons also owing to its strengths in providing customized and qualitative information with advanced alerts and intimation. Hence, they expressed their need for its continuance by the Sugar factory for the coming seasons and also to upscale for other farmers also.
- It was very encouraging to note that about 29.00 per cent (18/63) of the respondents have adopted more than 90.00 per cent of the recommended practices, whereas, about 24.00 per cent farmers fell under the category between 80.00 and 90.00 per cent adoption; about 29.00 per cent farmers between 70.00 and 80.00 per cent adoption category; about 13.00 per cent in the category of 60.00 and 70.00 per cent adoption and about 6.00 per cent less than 60.00 percent adoption. Indicating that vast majority of the respondents were in higher adoption / innovators and early adopters' category, which is contrary to innovation adopters' categorization given by Rogers and Shoemaker (1971). According to them, only 2.50 per cent are innovators and 13.50 per cent are expected to be early adopters for a newly introduced technology or approach. The contributing factor for the excellent results in this study could be due to the inbuilt strengths in the software application. Which can be further supported by *Cognitive load theory* of Sweller (1999) which is concerned with techniques for reducing working memory load in order to facilitate the changes in long term memory associated with schema acquisition. And *Constructivist theory* by Bruner (1966) which states that instruction should address four major aspects viz., (a) predisposition towards learning, (b) the ways in which a body of knowledge can

be structured so that it can be most readily grasped by the learner, (c) the most effective sequences in which to present material, and (d) the nature and pacing of rewards and punishments.

#### IV. CONCLUSION

The software application developed by M/s Livecrop Solutions Private Limited, Bengaluru, which is unique in many respects, which provides customised production practices to each farmer, prompt the farmers in advance through inbuilt alert system, captures farmers' feedback on adoption and scope for self-assessment by farmers. These features help the farmers to get increased yields. On the other hand, sugar factory will get real time data on extent of area under sugarcane during different months, maturity and harvest time of each farmers' plot, to take action on deployment of machinery or manpower for harvest, improved recovery and overall better governance. Owing to its strengths M/s Livecrop Solutions Private Limited App has great potential for use by all Sugar factories in the country. Considering the strengths of Livecrop solutions software, the University of Agricultural Sciences, Bengaluru, gave a trial order for live monitoring of farm trials during *Kharif* 2021.

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