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Review Article

E – SAGU: A WEB BASED AGRICULTURAL EXPERT ADVICE DISSEMINATION SYSTEM FROM INFORMATION AND COMMUNICATION PERSPECTIVE

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ABSTRACT
In the present time, Indian farming is facing lots of problems to maximize crop productivity. On one hand research in agriculture is so successful as day by day certain new innovations are being given to the farmers through extension. On the other hand farmers are not getting upper bound yield due to reasons like environment, pollution, climate change etc. A wide information gap exists in the research and practice and timely information and advice has to be made productive in India in order to reduce this issue to an extent. To Bridge this gap, International Institute of Information Technology (IIIT) Hyderabad built e- Sagu which is an IT based personalized agricultural extension system to improve agricultural productivity by disseminating a fresh agricultural advice to the farmers both timely as well as personally. The e-Sagu system offers a next-generation agro-advisory tool, and supplements and integrates it into the existing agricultural extension system. Hence this paper is framed based on the available literature that will shed some lights upon on of the most successful innovation in extension which is being performed somewhere out there in India which we people in India itself does not know. The paper will deal with the skeleton of E-Sagu, its working objectives, what is the outcome so far and the question of future with E-Sagu in Indian farming conditions

Key Words*: E-Sagu, Objective and Outcome and Future*

INTRODUCTION
Indian farming community is facing a multitude of problems to maximize crop productivity. In spite of successful research on new agricultural practices, the majority of farmers is not getting upper-bound yield due to several reasons. One of the reasons is that expert/scientific advice regarding crop cultivation is not reaching farming community in a timely manner. It is true that India possesses a valuable agricultural knowledge and expert advice. However, a wide information gap exists between the research level and practice. Indian farmers need timely expert advice to make them more productive and competitive.

Implementing Agencies
To bridge the information gap between the agricultural expert and the farmer, International Institute of Information Technology (IIIT), Hyderabad *(Reddy, P.K., K.S. Reddy 2005))* has built the e-Sagu ("Sagu" means cultivation in Telugu language) system *(http://www.esagu.in)*, which is an IT-based personalized agricultural extension system to improve agricultural productivity by disseminating a fresh expert agricultural advice to the farmers, both in a timely and personalized manner *(Reddy and Ankaiah, 2005, Reddy et al.2004)*. In e-Sagu, the agricultural experts generate the expert advice based on the information about the crop situation received in the form of both text and digital photographs. These photographs are sent by some educated and experienced farmers in the village. In 2004, a prototype of 1051 cotton farms was developed and implemented. In the prototype, a team of agricultural experts has stayed at IIIT, Hyderabad (India) and delivered 20,000 pieces of agricultural expert advice to 1051 cotton farms of three villages (Oorugonda, Gudeppad and Oglapur) in Atmakur Mandal of Warangal, in Andhra Pradesh State, India, by looking at digital photographs and other farm information supplied by some educated and experienced farmers (coordinators) in these villages. The project was successfully implemented *(Reddy et al. October 2005, Reddy et al, December 2005)*. *e-Sagu* is a tool for an IT-based personalised agro-

advisory system ('*sagu*' means cultivation in Telugu language). It aims to improve farm productivity by delivering high-quality personalised (farm-specific) agro-expert advice in a timely manner to each farm at the farmer's doorsteps without the farmer asking a question. Advice is provided on a regular basis (typically once a week) on everything from sowing to harvesting, which reduces the cost of cultivation and increases farm productivity as well as quality of agri-commodities. In e-Sagu, developments in IT such as data base, the internet, and digital photography are extended to improve the performance of agricultural extension services. The e-Sagu system offers a next-generation agro-advisory tool, and supplements and integrates it into the existing agricultural extension system.

System Architecture and e – SAGU's Operation

In eSagu, instead of agricultural expert visiting the crop, the crop situation is brought to the agricultural expert using both text and digital photographs. In eSagu the agricultural expert delivers the expert advice by getting the crop status in the form of digital photographs and other information rather than visiting the crop in person. In Figure 1, eSagu components are shown. eSagu contains five parts: (i) Farms, (ii) Coordinators, (iii) Agricultural Experts, (iv) Agricultural Information System and (v) Communication System. The system operates in the following manner (Figure 2). Several farms are assigned to each coordinator (an educated farmer in the village). The farmer of the corresponding farm registers into the system by supplying the relevant information including soil data, water resources, and capital availability through coordinator. The coordinator visits the farm on a weekly basis and sends the crop details in the form of text and digital photographs and feedback of previous week's advice through communication system (Internet or courier). By accessing the soil data, farmer's details, crop database, and the information sent by the coordinators, the agricultural experts prepare the advice. The advice contains the steps that are to be taken up by the farmer to improve crop productivity. English is the main language. The agricultural experts prepare the advice and store it in the system. The coordinators get the advice by accessing the system through Internet. The coordinator then explains the advice to the farmer gets the feedback and sends it to agricultural expert. All the information is maintained in agricultural information system which can be accessed through Internet.

Some of the advantages of the system over existing traditional system of extension are availability of a team of diversified experts at a single place, conservation of time, money and energy , enabling correct diagnosis of the problem, strong database to support decision-making, zooming facility adds an extra dimension, accountability to the farmer, capacitating of rural livelihoods and employment generation, documentation of success stories and content development, feedback helps to evaluate and improve the performance etc. We now clarify the components of the software system. Each farmer receives unique identifier (Figure 3). The farmers' background and the soil details are collected and stored in the system. For each farm, the history is also maintained (Figure 4). The history of the farm is a sequence of advices received by that farm and corresponding observation photographs. Figure 5 shows the case of crop observation photographs sent by the coordinator for one farm. Figure 6 shows the photographs of a filled-in feedback farm. Figure 7 shows an advice prepared by the agricultural expert. The results show that it is possible for the agriculture experts to deliver the advice by seeing the crop information in the form of digital photographs and text information. The agricultural expert can more effectively deliver the expert advice as compared to the advice provided by visiting the crop in person. Because, in the proposed system, several agricultural experts discuss the problem and prepare the appropriate advice. Also, the expert advice has helped the farmers to improve input efficiency by encouraging Integrated Pest Management (IPM) methods, judicious use of pesticides and fertilizers. System has worked during the Kharif 2004. Each farm has received expert advice once in a week. In this paper, evaluation has been made to see the compliance rate by analyzing 51 registered farmers. Other aspects like e-sagu analysis, results evaluation, and farmers' responses were included in the file attached as a supporting document entitled "The Application of ICT in Indian Agriculture – The case of eSagu Model of Web-based Agricultural Expert Advice Dissemination System".

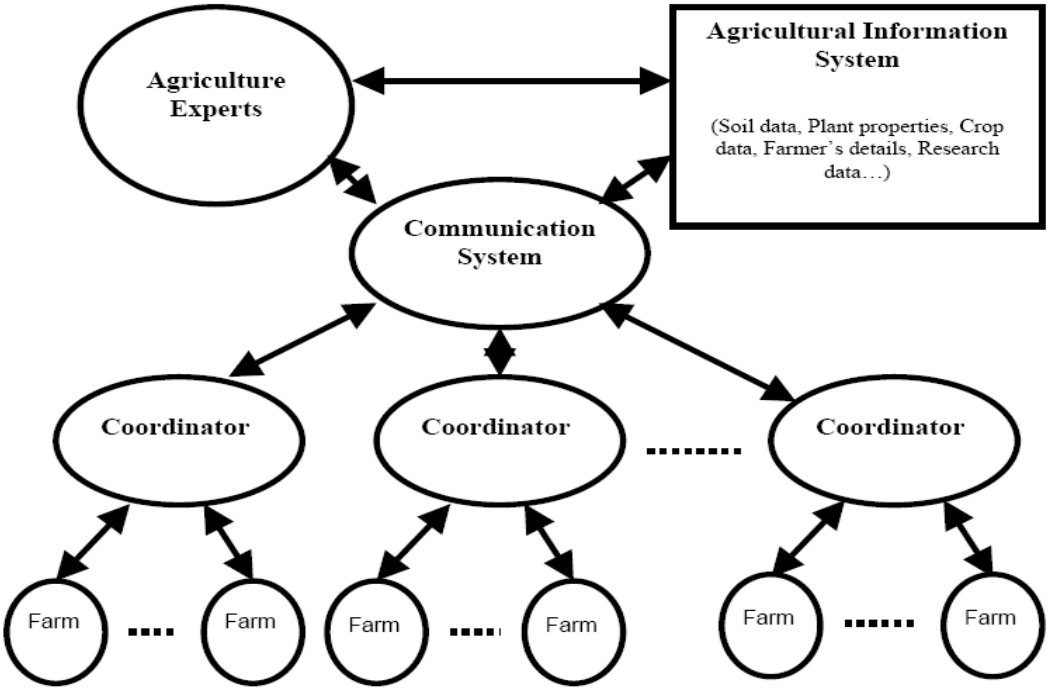

Figure 1. *Components of eSagu system. In this, a double arrow indicates information flow.*

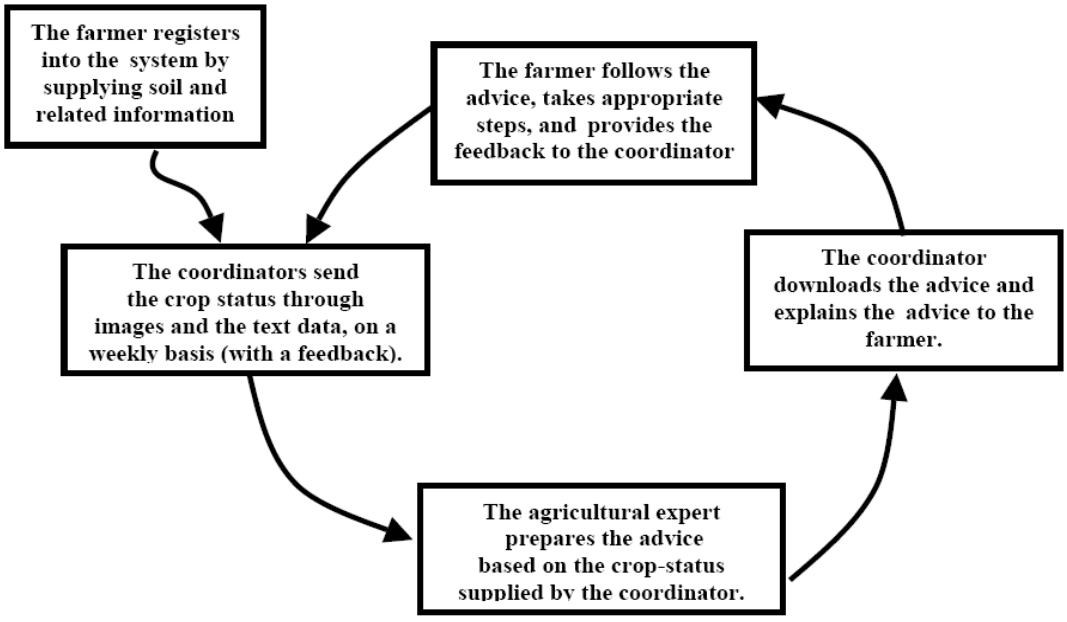

Figure 2*. Depiction of eSagu operation*

Source: (Reddy P.K 2005)

e- SEVA Working Objectives

To bridge the information gap between the agricultural expert and the farmer
To provide a quality personalized agro-advice to the farmers starting from pre-sowing operations to post-harvest precautions.
To enable quick deployment of services during the time of crisis
To deliver cost effective services and make the farmers self sustainable

Innovation of the Project

Improvement in the performance of agricultural extension services
Integrating the next generation agro advisory tools and supplements in the present extension system
Improve the input efficiency by encouraging integrated pest management methods, judicious use of pesticides and fertilizers by avoiding their indiscriminate usage.

Benefits of e – SAGU

It provides a quality personalised agro-advice to farmers.
It is a query-less system and provides agro-advice even without the farmer asking a question by following a proactive approach. It averts problematic situations.
It provides accountable advice with two-way communication. The advice is comprehensive, complete and regular in terms of diagnosis, analysis, advice delivery, follow-up and feedback.
It is a scalable system.
It can be developed on the available infrastructure even without bandwidth.
It is a cost-effective system. It can be made self-sustainable with a nominal service charge.
It enables farmers (marginal and poor) to cultivate with the same efficiency as agricultural experts.
It provides a strong data base to support decision making and documents success stories and new problems.
It enables quick deployment of services during times of crisis.
It capacitates rural livelihoods and generates rural employment.
It helps in validation of agriculture technology.
It aids in successful implementation of crop insurance schemes by making the farm as a unit of insurance.
It significantly reduces the lag period between research efforts and field application.
It shows great promise in the era of globalisation, as it can provide the expert advice that is crucial to the Indian farmer to harvest different kinds of crops based on the demand in the world market with quality and assurance.

Major Outcomes

The farmers are happy with the expert advice as it is helping them improve input efficiency by encouraging integrated pest management (IPM) methods, judicious use of pesticides and fertilisers by avoiding their indiscriminate usage.
The details of benefits accrued to farmers are as follows:
For 2004 experiment: Rs. 3,820 per acre with cost–benefit ratio = 1:3
For 2005 experiment: Rs 3,874 per acre with cost–benefit ratio = 1:4.1.

(*Source:* Impact Analysis by Social Scientists)

Fish farmers have realized significant benefits. e-Sagu advisories provided to 162 farms covering 1027.85 acres has resulted in per acre gain to the order of Rs. 14816 in a cross-section analysis.The relative contribution of yield enhancement is about two-thirds and is followed by saving in feed, which is around one-fourth .

Scalability

e – Sagu is a scalable system. Compliance rate was seen for the farmers from their field observation sheet which was stored in the individual farm history.

The project has the advantage of having farm history which includes the advice delivered and corresponding feedback regarding steps taken.
While evaluating the rate of follow-up some scores have been developed to see the rate of compliance and to make comparison between the farmers.
Scores were allocated for each practice to capture the degree of the advice follow-up.

Two Kinds of Scores

Factors with high yield but low input were given +ve score
Factors with low yield but high input were given –ve score

Future

Continued experiments to bring down the cost of e-Sagu services.
Investigating the development of agri-business model by providing multiple services under one roof. The services will include e-Sagu, input (fertiliser and pesticide), banking, warehousing, insurance and marketing.
Scaling-up of operations in Andhra Pradesh and extending the concept and services to other states in a phased manner.
Standardization of the e-Sagu system
International standards certification for the e-Sagu system
Certification for the e-Sagu farmers' produce under international standards to enable them to compete in export markets
Expanding e-Sagu to horticulture, aquaculture and animal husbandry.
Recognition and Awards
e-Sagu has been recognized worldwide as one of the latest novel internet applications in the Innovative Application Case study 2006 of the Institute for Information Industry, Ministry of Economic Affairs, Taiwan.
e-Sagu has been awarded the CSI Nihilent e-Governance Award for the year 2005–2006.

CONCLUSION

Imaginative use of Information and Communication Technology is endless to catalyze rural India and those dependent on agriculture. The digital flow of information helps a farmer take critical decisions faster drawing from the expertise the country has invested enormously in agricultural colleges and research institutes. The eSagu system enables farmers, even those who are marginal and poor, to cultivate with the knowledge on par with that of an agricultural expert. It demonstrates that even the illiterate farmer could be helped to raise his income and standard of living through delivery of appropriate information at the right time. The system also aids in successful implementation of crop insurance scheme by making farm as a unit of insurance. The system also offers third generation agro-advisory tool, supplements and integrates it into the existing agricultural extension system. It is one of the most successful innovations in Information and Communication Technology (ICT) which is being performed only in this part of the country (Andhra Pradesh). The same must be adopted in the other and neighboring states of India in order to facilitate smooth communication of timely information to the farmers involved in what we call the back bone of our country Agriculture.. E-Sagu has influence in building the farming knowledge of cotton farmers. Unnecessary sprays, using high cost chemicals for low cost, repeated use of the same chemical were some of the unwanted practices which could be stopped among farmers if proper and timely information this Expert system is given to them.

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