Information Communication Technology (ICT) – An important tool to increase sugarcane productivity in integrated management

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Abstract-- **Conventional agricultural extension system in India is unable to deliver advice to all the farming community as a result they are facing multitude of problems to increase crop productivity. Integrating information technology can help for better cultivation of sugarcane. The information technology has much more opportunity and role. By providing access to specific site about sugarcane cultivation and functionaries of sugar mills the sugarcane farmers can be benefited with the advice of new and timely disseminated information. Information communication technology (ICT) has been one of the most aspired fields in today's world. The farmers need information for better cultivation of sugarcane, and the information supplied by the various means to the farmers may not be sufficient for better cultivation of sugarcane. Sugarcane farmers be provided the location and language specific site about sugarcane cultivation and functioning of the sugar mills in the country. Information Communication Technology has much opportunity and role with the exemplary success in many programs. With the advent of new and timely dissemination method of Information Technology, the productivity of sugarcane crop can be increased by providing the scientific knowledge of sugarcane in Integrated management.**

Index terms - Information Communication Technology, Sugarcane, Productivity

I. INTRODUCTION

Information communication technology (ICT) has been one of the most aspired fields in today's world. Countries that master the techniques of creating, managing and protecting their knowledge and information products would emerge as the superpowers in the ensuing knowledge era. India is emerging as global ICT superpower. India has capabilities of transforming from inline nation to online nation. But there is need for determination. There exists digital divide between rich and poor for the purpose Information Communication Technology. The poor cannot use computers, smart mobile phone etc. These divides have to be overcome to make Information Communication Technology (ICT) truly relevant to society as whole and to developing countries in particulars.

Sugar industry is the second largest organized agro-based industry in India and India is one of the largest sugar producers in the world. The farmers need information for better cultivation of sugarcane and they are dependent on the information supplied by the various means such as extension personnel, pamphlets, posters, radios, TVs etc which may not be sufficient for better cultivation of sugarcane. To meet all these goals, a better understanding of the interrelationships among objectives in each sugar mill zones needs to be accentuated. Sugarcane farmers should be provided access to the specific site about sugarcane cultivation and functioning of the sugar mills in the country.

In the years to come, the increase in sugarcane production will mainly come from the growth in productivity which will be possible by adopting improved technologies. Agricultural extension will have a key role in ensuring widespread adoption of modern technologies. Farmers are facing severe crisis due to reduced crop output or crop failure. The indiscriminate application of pesticides is harming natural enemy population and other non-target organisms, which is leading to ecological imbalance. So to use all the resources at our disposal to resolve these problems is the need of the current era.

There is a room to reduce the negative effect of several factors that disturb the crop by providing the timely expert information. It is necessary to improve the method of dissemination of advanced scientific advice to the needy farmers in a timely and cost effective manner to make farmers more productive.

On the positive side, India has a large pool of qualified agricultural experts to provide appropriate advice to the farmers. Using the current advances in agricultural technology, the effect of the several factors on the crop growth can be understood and the possible corrective steps can be known in advance.

Indian farming community is facing a multitude of problems to maximize crop productivity. In spite of successful research on new agricultural practices concerning crop cultivation, the majority of farmers are not in position to reduce gap between average and potential yield. One of the reasons is that expert / scientific advice regarding crop cultivation is not reaching farming community in a timely manner. Farmers should be in a position to find the prices of inputs, weather condition and price of his goods from his / her village.

The concept of fully automated villages remained a dream. But the reality has come to true with the rapid growth of information and communication technology in the world scenario. The wired villages and info villages have shown that Information can be disseminated in more useful manner as farmers need. Adoption of ICT in agriculture will play an increasingly important role in crop production and natural resource management.

Now a day's linking two computers from any where in the world is easy thing. The emergence of Internet and email systems has changed the inter-relations of personal contact very fast. The Government of India has realized the importance of the Information Communication Technology and need to adopt in India in all functional areas.

The need is of a coordinated effort through a nodal agency under the central government with full involvement of the sugar industry, state governments/local administration, and agriculture sectors, to provide universal access to ICTs with important services/information integrated, to the rural masses. Recent information technology revolution (mainly the database and Web technology) provides an opportunity to build a cost-effective and scalable agricultural expert advice dissemination system to disseminate a fresh expert agricultural advice to the farmers, both in a timely and personalized manner. The basic idea here is rather than taking agricultural expert to the crop, the crop status is brought to agricultural expert in the form of both text and image information. In this system only information would move, agricultural experts and farmers stay at their respective places. In this way it is possible to build a cost-effective and scalable agricultural information system.

II.   RELATED WORK

Information communication technology applied to agriculture allows control of productive processes through combat of disorders occurred in agricultural crops. It also allows to reduce the indiscriminate use of agrochemicals. The work has the objective to present the development of a non conventional database applications related the agribusiness. The result was development of two systems: the SINDOC – Information System for Sugar Cane Diseases and the SINDAG – Information System for Agricultural Defensives. The SINDAG organizes data inherent to the agricultural defensives and keeps all the necessary information for the use of the most varied types of agrochemicals, for instance: instructions of use, dose, beginning, number and times of application. The SINDOC apply non conventional database for control of sugar cane diseases. The systems can be executed in four architectures: centered, PC, client/server and distributed. They store extensive texts and images to database management, what became the systems user friendly, providing an illustrative environment. The information, either about

control of a sugar cane disease or about a agrochemical for a crop, can be considered as a money maker. This represents the use of the non conventional database technology applied to the agribusiness.

Anupama Katakam in Warana published about the Warana experiment *i.e.* an innovative project in the Warana region of Maharashtra enables sugarcane farmers to interface with a cooperative sugar factory through computers. Under the "Warana wired village project", the villages in this sugarcane-growing region have computers that are linked to a central network that provides farmers access to essential pieces of information such as the ideal time for planting and harvesting sugarcane, the current market rates of their produce, and payments made by the factories. The computer network has put an end to a major reason for anxiety at harvest time. Any delay in harvesting reduces its sugar content and, consequently, weight. Farmers are paid according to the crop's weight. The computer network provides each farmer with a share code. By punching the code into the system, the farmer gets details such as when the crop was planted and when it is due for harvesting. This gives the farmer sufficient time to organise workers to cut and transport the sugarcane. About 22,000 farmers are benefited by this system.

The Warana experiment seems to have succeeded as an attempt to bridge "the digital divide". The sugar industry is important to the socio-political life of Maharashtra. If IT has to empower people, it should cover every category of worker connected with the industry - right down to the sugarcane cutter.

Major initiative of *Agricultural Research Information System (ARIS)* has been taken by Indian Council of Agricultural Research in order to modernize and bring information management culture in National Agricultural Research System (NARS).

In a move to take advantage of information communication technology in delivering its services, India's Department of Agriculture and Cooperation (DAC) Ministry of Agriculture authorized a project called DACNET to be implemented by the National Informatics Centre. This has attained Customer Satisfaction Index of 91.5 per cent The DACNET project has reduced time taken to deliver services while making information available to its citizens over the Internet.

III.   OBJECTIVES AND OVERVIEW

To achieve a 'knowledge society' in the agricultural sector, the Indian state governments must provide:

- ✓ An agriculture information centre in each village.
- ✓ Interactive exchange for farmers with information for planning day-to-day operations.
- ✓ Extension and advisory services available on demand

Under this situation, by exploiting advances in Information communication Technology, efforts can be made to develop an ICT-based personalized agriculture extension system to improve sugarcane productivity by disseminating a fresh expert sugarcane advice to the farmers, both in a timely and personalized manner. It is expected to achieve these objectives by giving timely advice to the farmers in the following areas.

1. Choice of the sugarcane varieties based on soil tests.
2. Scheduling of crop activities.
3. Fertilizer use in terms of dosage and time of application.
4. Pest warning and pest control.
5. Weather information and the cultivation practices by forecasting weather.
6. Strategic planning.
7. Supply of Sugarcane to Sugar Mills.

IV. PERFORMANCE EVALUATION

Functions of the Information Communication Technology Group.

- Establishing farmer's information and advisory center at each sugar mill.
- Creating farmer advisory committees consisting of farmer relating to Sugarcane.
- To prepare strategic search extension plan of each sugar mill zone.
- Supply of information to the farmers for procurement of sugarcane by establishing Computer System using Internet.
- To arrange exposure visit to the Farm Organization / Commodities Association with in each sugar mill zone of India for providing them the validating and refining technology to increase their income.
- Encouragement of Private sector in technology Transfer to the farmer.

Down south in the rich sugarcane belt of Tamil Nadu; the Murugappa Group--one of the largest sugar & sugar products manufacturers of India-- has been using the internet extensively to facilitate the farmers to sell their sugarcane for an attractive price without involving any middle man / distributor directly to the mill. The sugarcane farmers go across to the tele-center set by the Murugappa Group to sell their sugarcane that gets used by their sugar mills. Consequently sugarcane farmers affiliated to the Murugappa group remained very happy.

Precision of sugarcane management

Major difference between conventional sugarcane management and precision sugarcane management is the application of modern information technologies for decision making and operations in the management of sugarcane production.

Sugarcane farmers whose operations have numerous characteristics – different soil types, crops, whether, pest complexes, and supply to sugar mills etc. The high-tech tools of precision sugarcane management incorporate the use of different systems.

Beneficial elements to precision sugarcane management

- Increased Sugarcane production in low yielding areas,
- Reduced Agrochemical cost due to site-specific treatment,
- Reduced Risk of environmental pollution from agrochemicals due to site-specific application,
- Increased Field and management information and accuracy due to high-end technology and equipment.

Weather Information

Weather forecasting, modeling, and research are advancing rapidly with the advent of high performance computing and communications systems. Use of computer-generated model guidance by meteorologists has steadily increased that will help the farmers to take right decision in timely manner.

Market Information

The useful information is essential for sugarcane farmers to increase their farm yields. Information such as price details of seeds, fertilizers, pesticides and availability of these products gives the farmer to take decision in choosing right seed, fertilizer and pesticide required for the better cropping. The vital information, such as fixation of sugarcane procurement price, procurement targets etc are also most important.

Literacy is not a barrier

Using advanced technologies of Information Communication Technology such as multimedia material with full interactivity visuals, with use of touch screens, and with latest developments in language transcripts, the farmer could be able to know the information without any knowledge of education at all. For example, if farmer wants to know pesticide details, with a press of his fingertip on visual, computer speaks on that information. The sugarcane farmer can feel of interactivity as in classroom and learn the things. This reduces the gap between a learner and farmer effectively. The information communication technology can support publishing multimedia based teaching material over Internet. The information can be stored in the form of local languages as much possible which is an easy way to spread the information to the farmers.

Mission at Global Level

It has already been started as **"Better Sugarcane Initiative"** (BSI) with the goal to ensure that sugarcane production is undertaken in an environmentally socially and economically sustainable manner with the following objectives

- ✓ Create and maintain a forum to identify and share information about trends in sugarcane production and primary processing;

- ✓ Challenge assumptions and foster understanding globally;

- ✓ Ensure open and transparent dissemination of information;

- ✓ Agree on key impacts of sugarcane production and primary processing;

- ✓ Agree on principles of "Better Sugarcane";

- ✓ Agree on principles of stakeholder engagement and communications;

- ✓ Establish priorities for solution-oriented research and technological innovation;

- ✓ Create a data base of current information about Better Sugarcane related to key impacts and priorities and support the dissemination of information about the BSI, as well as other sugar initiatives;

- ✓ Obtain funding for un-funded and emerging research priorities;

- ✓ Document and analyse environmental and social BMPs (Better Management Practices) and their cost and benefits to sugarcane producers, primary processors, the environment and society;

- ✓ Agree on performance-based and verifiable standards for Better Sugarcane that includes environmental, social, and financial considerations.

- ✓ Disseminate finding to interested stakeholders;

- ✓ Support and encourage use of better management practices by relevant stakeholders

- ✓ Integrate findings into codes of conduct and certification programs based on better management practices.

In order to increase sugarcane productivity in a cost effective manner, it is important to:

a. Bring vibrancy to the rural economy.

b. Make sugarcane remunerative even to small and marginal farmers by doubling the income of farmer, reducing the cost of cultivation, enhancing yields, and increasing prices receivable by farmers.

c. Double the rate of growth of public and private investment in agriculture.

d. Increase the access of our farmers to markets, to competitive sources of finance, and to knowledge that allows them to compete in a global economy.

e. Increase value addition and reduce wastage at every stage linking the farmer to the sugar mill, so that both benefit.

f. Make all sugar mills and byproduct industries of the country viable

Complete information needs to be developed as an independent portal with the central server and Central computer Hub along with Regional Specific Information centers. Through the specific site all the sugar mills and related industries of the country needs be linked through the computer and the information in regard to the specific cultivation practices including all the parameter i.e weather parameter etc needs to be linked so that at glance picture / information can be seen by the sugarcane farmer. Each sugar mill can have site specific information centers also.

Just on this pattern the country also need to have sugar mill / sugarcane cultivation / Cane manager / sugarcane farmer wired net work.

India needs to have central hub with the Information Communication Technology centre in each sugar mill and each laboratory / institute working on sugarcane / sugar industry subsequently computer booths at nodal points / sugarcane collection centers of each sugar mills. The contents can be each regional language of the country along with the international language i.e English and the software in this regards would also be feasible for development by the advanced computing personnel.

This would play a major role in sugarcane information dissemination in future. The farmers would be happy to get timely information on cultivation technology and quick decision making as per the different parameters. The farmers are ready to learn operating computers and, they would also be ready to contribute whatever marginal amount to be charged for the maintenance and up-keep of the system.

Farmers need information to their situation specific, and aims to increase the crop production, reduce cost of production, marketing information, and eliminate the risk of environmental disasters. To realize the farmer's goals, requires a situation specific approach to disseminate the information using rapid growing in information technology and communication systems. The technologies in crop, pest, and weather models; remote sensing and geographical information systems; and electronic communication mechanism like Internet realizes the farmers needs.

V. CONCLUSION

ICT services for Sugarcane Industry can be provided with different communication methods. A telecommunication net work can either be as wireless, surface connection or as satellite connection. With the advent of digital cellular technology networks, the scenario can be changed. Certain digital cellular standards like DAMPS, GSM, PDC and CDMA have to be adopted for digital mobile communications. Cellular digital networks, in building wireless and portable information system appliances becoming an

important way of providing ICT services to the sugarcane farmers due to their high communication speed, multimedia transmission, better quality and enhanced security. Damages through disasters have minimum effect on the communications unless there is any damage to radio towers, base stations and repeaters. In that case satellite can be used as a method of communication. Apart from the above said techniques, the wearable devices like smart shirts and the electronic gadgets equipped with wireless internet connection will make access to the website easier. On the receiving end generally an output device is a large monitor or TV screen and printer / plotter to get a hard copy of image / data if required. The presence of a group of experts at the receiving site will help in prompt advice in a variety of cases to the sugarcane farmers. The experts on the receiving site get either the real time data or the data i.e. recorded and forwarded. Rapid play back techniques can be used for retrieval of the recorded data effectively. The sugarcane farmers can also be benefited through IVRS system which can be accessed using above communication means. To be more advanced each sugar mill personnel by sitting in their own sugar mill can have video conferencing system with the other sugar mills, expert scientists of the world farmers for providing proper advice to the farmers.

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