Agriculture Update
Volume 7 | Issue 1 & 2 | February & May, 2012 | 142-146

A case study

Information technology in agriculture development - Need and scope

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Article Chronicle :
Received :
30.12.2011;
Accepted :
07.01.2012

SUMMARY : The role of information technology to develop agricultural research, education and extension to improve quality of life in rural area is well established. IT can help an average Indian farmer to get relevant information regarding agro-inputs, crop production technologies, agro processing, market support and management of farm agri-business. Information technology (IT) has a major role to play in all facets of Indian agriculture. In addition to facilitating farmers in improving the efficiency and productivity of agriculture and allied activities, the potential of IT lies in bringing about an overall qualitative improvement in life by providing timely and quality information inputs for decision making. The personnel who work for the welfare of Indian farmers, such as extension workers, do not have access to latest information which hinders their ability to serve the farming community effectively. This paper focuses on the requirement of information technology for Agricultural Production, Research, Education and Agribusiness for the socio-economic development of a nation. Hence, it will bring a highly developed agriculture by its worthwhile contributions to the society by narrowing down the enormous gap between the researchers and farmers. Information technology is that it is far more interactive and personalized that can render service particularly the information as per the needs and requirements of the farmers. Such a facility would make a favourable impact on adoption and utilization of the improved and innovative techniques in agriculture.

How to cite this article : Pinjar, Bibishabana S. , Yusuf, Mohammed, Patil, Somanagouda I. and Naik, B.K. (2012). Information technology in agriculture development - Need and scope. *Agric. Update*, **7**(1&2): 142-146.

Key Words :
Information technology, Agriculture, Agribusiness and website

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BACKGROUND AND OBJECTIVES

Agriculture plays a key role in determining the health of rural economic growth and environmental sustainability. Many sectors of economy have benefited by the use of information technology. The same can also happen with agriculture sector. There is now an urgent need to convert agriculture into agri-businesses, which are economically viable and sustainable in future. In this situation, Information technology offers new hopes.

IT generally refers to computer and related technology applications and mechanisms that promote access and utilization of a variety of digitized text and data resources. IT possesses vast potential to improve agricultural research, extension and education by reducing the time and space barriers. IT is potential vehicle through which information about weather, scientific farming practices, market prices, reduce agricultural losses, forecast price and productivity, enhance production with proper vertical integration of the production centers may be shared.

To develop Information Technology based applications for agriculture development, the following issues and factors have to be considered.

– Production in agriculture, as well as consumption of agri-produce involves large numbers. Even the trade channel players also add up to very-very large numbers. Manually and through paper records, it has almost been a nightmare for managers of agri-businesses to manage this data.
– For bulk of the food products, for very long, production and consumption remained local affairs. Only few products, either mass

produced or specialty products were only distributed and consumed across long distances.

- Today with the opening of global economy both physical and time distance between production and consumption is required to be reduced. This requires very-very efficient management of Agri-business Value Chain.
- Most of the regulatory framework has been evolved to either protect the producers or the consumers. This restricted the entry of large private sector players in agri trade.
- Due to lack of interest and investments by private sector, agriculture as agri-businesses has not evolved. Farmers on their own have never been adventurous enough to become entrepreneurs.
- Integrated development initiatives covering entire value chain for agri produce has not been possible/taken up in the past by any Agri-business Enterprise.
- Development initiatives beginning at micro levels have not grown into large initiatives at macro levels, due to many policy and management constraints. Government agencies and NGOs have mostly taken up programs covering either one or few components of Agri-business Value Chain.
- In these programmes also, most of the emphasis has been on increasing the production only. Today this does not necessarily result in better income for the producers. Scaling up of small scale successful models has not been possible, mainly because most of them were not based on sound processes and systems.
- Lack of confidence and trust in the past has always come in the way of public-private partnerships for meaningful agri-business development initiatives.

The farmers still face the problems of inadequate information related to cultivation, marketing of crops, the presence of which could have enhanced the decision making capability of the farmers. Now scientists from all over the world collaborate over the internet, for sharing the information about the research on land fertility, seed hybridization, post harvest processes, reducing the man efforts and making the farming environment less challenging and cost effective.

The effectiveness and efficiency of the information used in agriculture can be increased multifold by the adoption of information technology in agriculture. Information access and improved communication is viewed as having direct implications for the socio-economic development of a nation. And in Indian context we can say that the social and economic development of the Indian agrarian community can be brought in with the effective use of IT. IT seems to be a promising medium through which relevant information can be communicated to help in farming and post harvest processes.

Areas of importance:

The following can be looked upon as the areas of development in IT to leverage information in an effective way to decrease the order and delivery time. It would also help in customer relationship management.

A database for crops can be maintained:

The database repository can include important information about the types of crops and land holding pattern time of harvest and yield. This information can be transmitted via the internet to the database server. The information thus accumulated can play a significant role in the decision making and taking action.

Production techniques and information inquiry system should be created:

This repository should ideally be having the best and innovative techniques developed by R and D institutes or some progressive farmers. Would be a great source of information for the farmers to access and utilize.

System for inquiry about farm machineries:

This system can be developed by the companies operating in the farm machinery sector. This can help the farmers to get information about the best equipments can order the needed item through this system and similarly the companies can promote their farm equipments.

IT for agricultural marketing:

IT can be used as a great facilitator in agricultural marketing by providing connectivity between the market and growers/traders/ exporters, industry consumers, through wide area network of national linkages in order to provide day-to-day information with regard to commodity arrivals and prevailing market rates etc. to provide well informed decisions at all levels.

Among various initiatives required to improve farm productivity, four critical areas are highly congenial for usage of IT. IT can help reach the large number of farmers, which otherwise is not feasible. The areas are farmer education, back up services, commercial information and help in selling produce.

Farmer eduacation:

Extension services of the Govt. have been resource intensive, limited by the extent of actual coverage, competence, motivational and diligence levels of the individuals and their ability to stay updated with latest developments. If an analysis between the farming practices in developed nations like USA and developing countries like India is done, the biggest

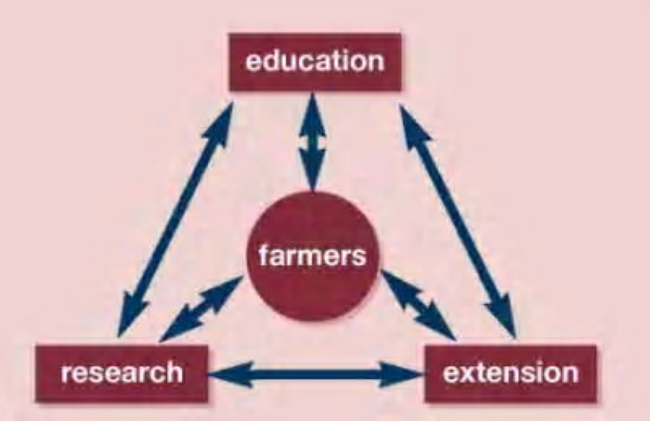

Fig. 1: Farmer eduacation

difference is in availability of information. The chasm between the "information rich" farmers of Punjab and "information poor" farmers of Karnataka can be bridged by IT. IT can play a major role in updating the farming community by ensuring information flow through agri-websites, enabling the industry to take an updated, uniform database on farming practices to the individual villages, with the data customized to individual agro climatic zones. This website can be accessed through Internet at nodes set up in major villages in the local languages.

Backup services:

It is not sufficient to provide the farmer exhaustive information through web-portals, his specific queries have to be replied through on-line chats, he has to be provided with early warnings regarding pest onset and weather forecasts for his local areas using remote sensing. Once the web portals attract large number of farmers, lot of new set of industries interested in providing services like sowing, transportation and mechanized farm operations like pest control or harvesting will be created.

Commercial information:

Real time information on all the agri-inputs like seeds and crop protection chemicals, nearest vendors can be provided. Once the service providers feed farmer with the information, he can intelligently decide to carry out certain operations on his own.

Help in selling produce:

IT will enable farmers to take more precise and informed decisions through the enhanced control that they will have on the information channels. Some of the key concerns that IT can address and help farmers decide better are:

- How and when to market the produce
- How and when to order the agricultural inputs needed for farming

So it seems that the use of information technology will enable the farmers to come up with cost-effective and profitable marketing and distribution strategies. Further it would be possible to trade online thus reducing a lot of post-harvest cost. And it would lead to a collaborative system of information sharing among the various key players in the entire agricultural supply Chain.

However the picture is not that rosy a lot of problems beset the effective implementation and use of IT faces a lot of challenges. When we talk about the use of IT we are talking about users who have very low literacy rate. This would act as a barrier since most of the applications and software are built on English language. Other key issues are:

- The lack of proper communication infrastructure
- Cost of computers
- Small individual farmers' incapability to adapt to IT due to financial and education constraint.
- Low adaptability to new technology due to lack of awareness.

Given these facts it seems difficult to implement IT systems for each individual, but an institutional approach seems to be more promising. In this regard India faces another problem of magnitude. Around 85 percent of farmers in India are small farmers who have less than 2 hectare of land. So to expect them to individually come up with information systems for their farm land would be a impossible proposition. Instead the Government should encourage small farmers to pool resources to form groups and start farming in groups so as to enhance their spending capabilities when it comes to use of IT. This would be beneficial and a commercially viable option for the farmers as it could lead to attainment of efficient trading and marketing practices for the farmers. It would not be an overstatement if we say that agricultural growth would be information driven and IT is going to be the solution for the growing challenges for the farmers which are brought in by rising cost, increasing competition and globalization. Some of the companies like ITC have already realized the business potential that they can generate through effective use of IT. The internet kiosks set up by ITC under their e-Chaupal initiative is a step towards that direction.

The small farmers do not have any interaction with the traders /processors / exporters nor do they know the prices ruling at nearby markets. Majority of them sell their produce to the nearest *mandis or middlemen* where the middlemen have a full control on deciding the price. By making commodity prices and market information on real time basis available on the Internet, the farming community can be provided with choices like www.krishimaratavahini.kar.nic.in and www.raitamitra.kar.nic.in in Karnataka. This will ensure better price realization and stimulate a drive towards better productivity. Farmers who grow cash crop can also be enormously benefited by IT as information on future prices of commodities can be forecast. This will prevent the tendency

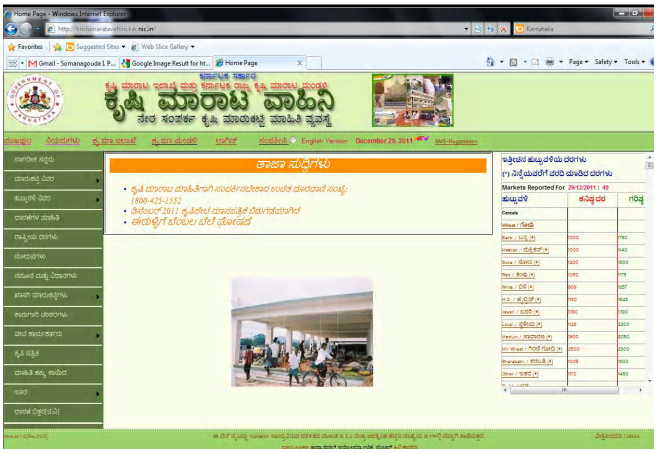

Fig. 2: Commudity prices on the internet

Fig. 3 : Agricultural market information on internet

of farmers to jump into a decision on the basis of ruling price levels and later on discover that the prices have crashed when they are ready to sell their produce at the end of the season.

Future scope:

Promotion of informatization in farm management and marketing for high value:

Added agricultural production:

– Benchmarking system for farm management diagnosis and evaluation
  - Farm diagnosis database of crops and farms
  - Comparison of the management technology applied among farms and crops
– Develop and disseminate agricultural software for farm management
  - Internet farm management software for crops, farms and dairy farming, etc.
  - Farm management and accounting software for crops, farms and dairy farming, etc.
– Support farmer's homepage and electronic commerce of agricultural product
– Efficient agricultural extension service using Information Technology (regional crop allocation map, consulting information system)
– Wholesale price analysis system for decision support on planting and marketing time of agricultural products
  - Price fluctuation analysis for major regional crops
  - Utilize as an educational material for farmers
– Informatization of farm management and marketing
  - Group consulting through a network system among consulting organizations

  Consultant and farm management prescription information database

  History card management

  Farm management benchmarking network service
  - Innovation of farm management by farm decision support system

  Internet farm management software
  - Support electronic commerce for farmer's group

  Encourage demonstration farm using information technology in farm management

  Develop information network for base positions of agricultural product exporting.
  - Construct agricultural product marketing information system

  Develop an integrated information system for producer (farmer's group for a specific crop), customer, company, and extension workers

  Operate agricultural product marketing center supporting production, selection, and packing to fit the needs of customers

Develop cyber dissemination of technology to improve farmer's management:

Technology level:

– Cyber technology dissemination using remote farm consulting system
  - Filed consulting with portable camera, wireless communication device
– Expansion of the system and promotion of the utilization of the system
  - Specialization and systemize the roles of the institutes concerned
– Rural Development Administration: introduction of newly developed technology, state of the art and foreign technology
– Regional extension institutes: consult on region specific technology
  - Use of the Internet conference system for night time education programs
– Cyber farm management course (cyber farmers college)
  - Advanced courses for management and cultivation

technology for farm managers

– Construct infrastructure for regional education program of information technology
  - Education center in the region
  - Support demonstration farm using information technology

– Efficient agricultural technology dissemination
  - Operate e-mailing system for technology dissemination to farmers, extension workers and provide information to individuals and groups.

Conclusion:

Information technology in the agriculture just started to spread its shoots and growing stage in the Indian context. But with its immense potential to standardize and regulate the agricultural processes and solve the problems, it is sure that IT will be one of the most important areas in the near future for agricultural development. It is suggested that the farmers are to be made aware of the utility of the Internet and other related information regarding information technology, since it will bring a highly developed agriculture by its worthwhile contributions to the society by narrowing down the enormous gap between the researchers and farmers.

The biggest advantage of the information technology is that it is far more interactive and personalized that can render service particularly the information as per the needs and requirements of the farmers. Such a facility would make a favourable impact on adoption and utilization of the improved and innovative techniques in agriculture.

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