Agri Articles
(e-Magazine for Agricultural Articles)
Volume: 02, Issue: 04 (JULY-AUGUST, 2022)
Available online at http://www.agriarticles.com
©Agri Articles, ISSN: 2582-9882

Role of Information and Communication Technology (ICT) in Agriculture and Extension

(*Antima Meghwal, Dr. Vinod Kumar Yadav, Dr. B.L. Dhaka and Suman)
College of Agriculture, Ummedganj, Agriculture University, Kota (Rajasthan), India
*Corresponding Author's email: antimameghwal18@gmail.com

Abstract
Information and communication technology (ICT) aids provide up –to-date information on the market prices of commodities, input and consumer trends which ultimately can provide a farmer's negotiating position and their live hood . Major aspect of ICT is that accurate information should reach the farmer's at the right time to make more sustainable use of on –farm resources. ICTs are emerging as an important tool for the development of societies and act as driving forces in the economics worldwide. ICT is going to play greater role in agriculture extension as well as private sector agribusiness, market and knowledge information .Here this paper review the role of ICT providing awareness and knowledge in agriculture technology and information . ICT is an extended term for information technology which stresses the role of unified communications and the integration of telecommunications.

Keywords: Agricultural, Cyber, ICTs, agribusiness, Impact and extension

ICT Tools and applications in Agricultural Extension
The idea of information and communication technology (ICT) includes the use and transport of all types of information .It is what is causing social change in the twenty-first century. Without it, life would be practically inconceivable because it has an impact on all facets of life as we currently know it .Stevenson invented the term "ICT" in his 1997 report to the government. The term "information communication technologies" is commonly used to refer to a broad range of services, applications, and technologies that make use of different types of hardware and software and frequently operate across telecommunication networks The role that ICTs play in facilitating access to knowledge, information, and communications—aspects that are becoming more and more crucial in today's economic and social interactions—instead of the technology itself, is what gives ICTs their significance. The ICT term includes all technical terms that are used for handling information and facilitating communication, including computers, network hardware, communication lines and all the necessary software. In other words, ICT is comprised of information technology, telephone electronic media, and all types of process and transfer of audio and video signals and all control and managing functions based on network technologies.

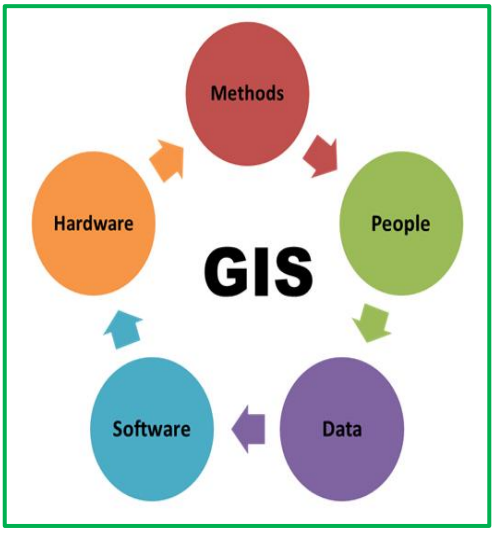
ICT tools and applications in agricultural extension for agricultural development
- Expert Systems
- Geographical Information Systems (GIS)
- Remote Sensing Applications in Agriculture
- Global Positioning System Applications in Agriculture

- e-Extension / cyber Extension
- e-Governance

1. **Expert Systems:** ES is defined as "a computer program designed to model the problem solving ability of a human expert" (Durkin, 1994). It is also defined as "a system that uses human knowledge captured in a computer to solve problems that ordinarily require human expertise". ICT enabled Agricultural Extension 2015 EEI(NE Region).

- It is a computer application that solves complicated problems that would otherwise require extensive human expertise
- The idea behind creating an ES is that it can enable many people to benefit from the knowledge of one person i.e the expert.

2. **Geographical Information Systems (GIS):** A Geographical Information System (GIS) is a system for capturing, storing, analyzing and managing data and associated attributes, which are spatially referenced to the Earth. GIS is a software tool that allows users to create interactive queries, analyze the spatial information, edit data, maps, and present the results of all these operations. GIS technology is becoming essential tool to combine various maps and remote sensing information to generate various models ,which are used in real time environment.



Components of GIS

Functions of GIS:

- **Input**: The important input data for any GIS is digitized maps, images, spatial data and tabular data.
- **Manipulation**: The tabular data associated with spatial data can be manipulated with help of data base management software.
- Management: use a database management system (DBMS) to help store, organize, and manage data.
- **Query**: Depending on the type of user interface, data can be queried
- **Analysis**: to look for patterns and trends, and to undertake "what if" scenarios
- **Visualization**: hardcopy maps, statistical summaries, modeling solutions and graphical display

3. Remote Sensing Applications in Agriculture

- The term "remote sensing" was coined by Evelyn Pruitt in the mid-1950'.
- Remote Sensing (RS) is a technology that provides the means to collect and use geographic data to assist in the development of Agriculture.
- Remote sensing of the environment by geographers is usually done with the help of mechanical devices known as remote sensors. • Remote sensing imagery has many applications in mapping land use and cover, agriculture, soils mapping, forestry, city planning, archaeological investigations, military observation, and geological surveying.

Applications of Remote Sensing and GIS: Remote sensing is an important tool to provide important information on soils, land evaluation, land degradation, crop distribution, crop growth, availability of water resources etc.

- Crop Production Databases
- Crop growth and yield determination
- Crop Monitoring Use of GIS in combination with remote sensing enhances the decision-making in the following ways;

- Monitoring of soils, water, and land degradation processes.

4. Global Positioning System Applications in Agriculture

- The Global Positioning System (GPS) is a satellite-based radio-navigation system established by the U.S. Department of Defence for military positioning applications and as a by-product, has been made available to the civilian community.
- Navigation, surveying and integration with Geographic Information Systems (GIS) are just a few of the fields which have seen the successful application of GPS Technology.
- GPS is a complex system which can be used to achieve positional accuracies ranging from 100 m to a few milli metres depending on the equipment used and procedures followed.

5. e-Extension / cyber Extension.

- Cyber extension means "using the power of online computer networks with the help of communication channels to deliver the content in the form of text, graphics, audio and video either passively or interactively to facilitate dissemination of agricultural technology".
- Cyber Extension is an important mechanism to support he Extension functionaries.
- The cyber extension bridges the communication gap between the four pillars of Extension system- The Research, Extension, Marketing and Farmers.

Cyber extension tools

- E-Mail
- Interactive Expert Systems on Crop Pests and Diseases
- INTERNET browsing for Extension Information • Video Conferencing
- Call Center.
- Discussion Groups and News Groups
- Electronic Monitoring system

6. e-Governance:

- e-governance refers to the use of Information and Communication Technology (ICT), particularly web based applications, to provide access to and deliver information / service to the public, business, other agencies and governmental entities faster, cheaper, easier and more efficiently.
- e-Governance is defined by M. Backus (Backus, M. , 2001), as the "application of electronic means in (a) interaction between government and citizen and between government and businesses as well as (b) in internal government operations to simplify and improve democratic, government and business aspects of governance.

ICTs in Extension Work

Extension Function	Radio	TV & Video	Cell phones	Feature & Smart Devices	Computer & Internet
Identifying farmers' problems and opportunities – What do they need and want?					
Diagnose problems	Some potential if dealing with general problems, or if capacity for interaction and expertise available	Visuals are very helpful as "seeing is believing." Even better if combined with ways to receive feedback.	Some potential if farmers can call or text in and sufficient expertise is available.	Additional potential to a simple cell phone as it enables web or App access to special diagnostic tools.	Good comprehensive diagnostic tools are available

Collect information	Some potential if capacity for interaction		Can use for data collection.	Good for data collection with GPS.	Some potential if internet available.
Promoting behavior change – What is practical and relevant to meet the needs?					
Raise aware of general opportunities or needs ; convince farmers to try something new	Very good especially with persuasive programming	Visuals are usually very helpful as "seeing is believing"	Is an option if users are registered to receive such messages (SMS)	Is an option if users are registered to receive such messages (SMS, email)	Is an option if users are registered to receive such messages (email)
Provide specific information needed for change. What is involved? What are the benefits/ Demonstrate or train?	Some potential – but limited information delivered. Can be enhanced with call in.	Good option as "seeing is believing	Potential if farmers can call or text in and sufficient expertise is available	Additional potential to a simple cell phone as it enables web access and plays videos.	Good option for intermediaries to seek information and videos.
Facilitate access to credit and inputs	Can be used to inform of available services, but one-way communication	Can be used to inform of available services, but one-way communication	Mobile banking and negotiate directly with the suppliers	Mobile banking and negotiate directly with the suppliers	Mobile banking and negotiate directly with the suppliers
Link farmers to markets	Good for providing general price reports		Access to price information (call in, subscription)	Can bring potential buyers and producers together; access prices information	Can bring potential buyers and producers together; price info.
Collect and respond to farmer feedback	Good if producers can call or text and sufficient expertise is available	Good if producers can call or text and sufficient expertise is available	Some potential if farmers can call or text in and sufficient expertise is available	Good option for intermediaries to seek information (if optimized for smart devices)	Good option for intermediaries to seek information
Assist with business planning	Some potential	Some potential		Simple farm management "Apps"; record keeping	farm management tools; record keeping

ICTs for Market Information and Agri-Business

Agmarknet: The project is about empowering farming community with the knowledge of latest commodity prices and arrivals information through innovative usage of ICT by networking agricultural produce wholesale markets in the country. It was initiated with the

objectives of ICT enabled Agricultural Extension 2015 EEI(NE Region), AAU, Networking 2800 major agricultural produce wholesale markets; imparting computer awareness and application usage training to about 5000 market personnel; dissemination of daily commodity prices and arrivals information in major Indian languages. In order to bring the farmers in a better bargaining position and to promote a culture of good agricultural marketing practices in the country, Directorate of Marketing and Inspection (DMI), Ministry of Agriculture, Government of India has embarked upon an ICT Project: NICNET based Agricultural Marketing Information System Network (AGMARKNET) as part of the Central Sector Scheme: "Marketing Research and Information Network."

Telephone/ Mobile Telephony

Farmer Call Centre (Kissan Call Center): The Department of Agriculture & Cooperation , Ministry of Agriculture, Govt. of India launched Farmer Call Centers on January 21, 2004m across the country to deliver extension services to the farming community. The purpose of these call centers is to respond to issues raised by farmers, instantly, in the local language. There are call centers for every state which are expected to handle traffic from any part of the country. Queries related to agriculture and allied sectors are being addressed through these call centers . The Farmer Call Centre is a synthesis of two hitherto separate technologies namely, the Information and Communication Technology (ICT) and the Agricultural Technology. Both have their specialized domains and work cultures. To optimally utilize the strengths of both these systems, it was proposed to take full advantage of professionally managed Call Centre mechanism and dovetail it with the specialized Subject Matter Specialists knowledge of Agricultural Scientists and Extension Officers, so as to facilitate its reach to the farming community .Kissan call center number is 1800 180 1551. The service is also being used as a medium to send information on important trainings and other programmes to the members of the Farmers.

References

1. 1.Aker, J. C. (2010). Dial „A" for Agriculuture: using information and communication technologies for agricultural extension in developing countries. Tuft University, Economics Department and Fletcher School, Medford MA02155.
2. Anandajayasekeram P., Puskur, R., Sindu, W. and Hoekstra, D. (2008). Concepts and practices in agricultural extension in developing countries: A source book." IFPRI (International Food Policy Research Institute), Washington, DC, USA, and ILRI (International Livestock Research Institute), Nairobi, Kenya, Pp. 275.
3. Anderson, J. R., and Feder, G. (2004). Agricultural extension: Good intentions and hard realities. The World Bank Research Observer, 19 (1): 41–60 Balaji, V., Meera S. N., and Dixit, Sreenath (2007). ICT enabled knowledge sharing in support of extension: addressing the agrarian challenges of the developing world threatened by climate change, with a case study from India, SAT eJournal, eJournal.icrisat.org. 4(1).
4. Benson and Todd (2004). Africa's Food and Nutrition Security Situation. The International Food Policy Research Institute, Washington, USA. Celebic, G. and Rendulic, D. I. (2011). ITdesk.info –project of computer e-education with open access. Open Society for Idea Exchange (ODRAZI), Zagreb.
5. Heeks, Richard (2005). Foundations of ICTs in Development: The Information Chain. eDevelopment Briefing No. 3 Development Informatics Group, University of Manchester. Jones, G. E. (1997). The history, development and the future of agricultural extension" in B. E. Swanson, R. P. Bentz and A.J. Sofranko. Improving agricultural extension – A reference manual. Rome: FAO.
6. Kaushik, P. D. and Singh, N. (2004). Information Technology and Broad-Based Development: Preliminary Lessons from North India. World Development, 32: 591-607

Keniston, Kenneth. (2002). IT for the common man: Lessons from India. NIAS Special Publication, sp7-02. Bangalore. National Institute of Advanced Studies, Indian Institute of Science. Kraemer,

7. K. L. and Dedrick, J. (1994). Payoffs from investment in information technology: Lessons from the AsiaPacific region. World Development, 22: 1921-1931 Anil Kumar Rohila et al. / J. Appl. & Nat. Sci. 9 (2): 1097 -1100 (2017) 1099 Mathur, Dhrupad, Piyush Gupta and Sridevi, A. (2009). eGovernance approach in India- The National e-Governance Plan (NeGP), The ICFAI University Press, Hyderabad. Nancy,
8. Hafkin (2002). Gender, ICTs and Agriculture. CTA Observatory Meeting. Patil, V. C., Gelb, Ehud, Yaduraju, N. T., Moni, M. and Patil, Roopa. S. (2009). Web based agriculture in India.www.fao.org/docs/eims/upload/257364/ Patil_presentation pdf Saravanan, R. (2010). ICTs for Agricultural Extension: Global Experiments, Innovations and Experiences. New India Publishing Agency, New Delhi. UN (2005). Global E-government Readiness Report: From E Government to E-Inclusion. UNPAN/2005/14, United.
9. Saravanan, R. and Bhattacharjee, S (2013): Mobile Phone and Social Media for Agricultural Extension: Getting Closer to Hype & Hope? International Conference on Extension Educational Strategies for Sustainable Agricultural Development: A Global Perspective: December 5-8, 2013, University of Agricultural Sciences, Bangalore, India.
10. 9 Jackson,C; Berdou,E; Ngounoue,V; Kreutz C and Clark,L (2009): Use of Social Media To Share Knowledge on Agricultural Impact, Planning, Assessment and Learning (IPAL).