



भारतीय कृषि एवं खाद्य परिषद्
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ICT IN AGRICULTURE

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ICT IN AGRICULTURE OVERVIEW



INTRODUCTION

Agricultural practices and advancements differ globally—since plants have their own differences and the location plays a role on their development as well. But through the exchange of knowledge from different agriculturally-involved individuals from all over the world, improvement of techniques can be experienced as well.

It has made an impact on how information is shared, and being able to use this information for the advancement of the agricultural sector gives a great positive impact that is beneficial for everyone. IT has become a bridge for people from all over the world.

Agriculture in India is the core sector for food security, nutritional security, and sustainable development & for poverty alleviation. It contributes approximately 16% of GDP. Milestones in agriculture development in India includes: Green revolution, Evergreen revolution, Blue revolution, White revolution, yellow revolution, Bio technology revolution and the most recent one is Information and communication technology revolution.

Information and communication technologies play a crucial role in disseminating information to farmers enabling them to decide on the cropping pattern, use of high-yielding seeds, fertilizer application, pest management, marketing, etc. Traditionally, Indian farmers have been following indigenous production methods and rely upon friends, relatives, fellow farmers and input dealers to get information regarding agriculture. With advancement of agricultural science

and technology, multiple options to access modern technologies have become available. It is evident from the replacement of indigenous varieties of seeds by high-yielding varieties and traditional equipment and practices by power tillers, tractors and others machines.

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN AGRICULTURE

Information and Communication Technology (ICT) is used as an overarching term incorporating all modes of transmission like electronic devices, networks, mobiles, services and applications which help to disseminate information with the help of technology. In the recent years, ICT has proved to be extremely beneficial for farmers including small land holders, marginalized and poor farmers, and helped them in marketing, precision farming and improved profits.

Through ICT, farmers have been empowered to exchange their opinions, experiences and ideas. It has given farmers more exposure and allowed them to use science that looks at agriculture from an integrated perspective. Also, e-Agriculture is one of the action lines identified in the declaration and plan of action of the World Summit on the Information Society. E-agriculture has the potential to put India on the higher pedestal of 'Second Green Revolution' by making Indian agricultural sector self-sufficient.

Availability of timely information and technology has proved very crucial in areas like disease prevalence and drought management thereby helping the farmers not only in avoiding crop loss but also thwarting economic loss, this raised the demand of planning and making strategies that could equip farmers with various information rights from sowing seeds to harvesting. And, ICT has now become a reliable instrument for improving the quantity and quality of the agricultural production.

The efforts of the Government in the area of ICT have escalated the living standard of Indian farmers and made them ICT-friendly, which has resulted in increased penetration of useful information about crops, soils, climate and cultivation processes. Several measures have been taken for encouraging Indian farmers to be more ICT – friendly, which include e-choupal, e – krishi , e-aid and many more. And, numerous mobile applications have also been launched by the Government of India for the same including Mandi trades, Mpower social, Kisan suvidha, Crop insurance, Agri market and m – Kisan application.

The need of marketing agricultural produce at competitive prices will change the farmers' attitude towards ICT. And, thus this new technology will help and contribute more in sustaining the Indian agriculture.

ADVANTAGES OF ICT IN AGRICULTURE

- ◆ Some of the advantages of Information and Communication technologies in agriculture are as follows:
- ◆ It will initiate new agricultural and rural business like e – commerce, realty business for satellite offices, rural business, and virtual corporation of small – scale farms.
- ◆ It will support political and analysis on optimum farm production, disaster management, agro-environmental resource management etc., exploitation tools like geographic Information systems (GIS).
- ◆ It will improve farm management and farming technologies by economical farm management, risk management, effective data or data transfer etc., realizing competitive and property farming with safe product. As an example, farmer has got

to create essential choices like what to plant? Once to plant? A way to manage pests? Whereas considering off-farm factors like environmental impacts, market access, and trade standards. IT-based call web will certainly facilitate their choices.

- ◆ It will give systems and tools to secure food traceability and dependableness that has been a rising issue regarding farm product since serious contamination like chicken contagious disease was detected.
- ◆ It will facilitate rural activities and supply softer and safe rural life with equivalent services to those within the urban areas, like provision of distance education, telemedicine, remote public services, remote diversion etc.
- ◆ Empowerment of Stakeholders (Government officers, Research, Education & Extension Scientists, farmers and different service suppliers like Community data centers.
- ◆ Development of information Management, call Support and consolatory Systems to strengthen Extension services and additionally used for Farmers Redressal system.
- ◆ Efficient management (Development, Conservation, allocation and utilization) of resources.
- ◆ Improved productivity and profit of farmers through higher consultatory systems



APPLICATION OF ICT IN AGRICULTURE

Digitization of Land Records

Maintenance of land records and the availability of easily accessible land information is one of the most important issues facing governance today. "Land Records" itself is a generic expression and can include records such as, the register of lands, Records of Rights (RoRs), tenancy and crop inspection register, mutation register, disputed cases register, etc. It can also include geological information regarding the shape, size, soil-type of the land; and economic information related to irrigation and crops.

Thus, the Computerization of Land Records (CLR) is necessary with a view to:

- ◆ Ensure efficient, accurate, transparent delivery mechanism and conflict resolution in ownership
- ◆ Provide electronic record of rights (ROR) to land owners at nominal rates
- ◆ Information empowerment of land owners
- ◆ Low cost and easily reproducible data for reliable and durable preservation
- ◆ Value addition and modernization in land administration
- ◆ Integration with other data sets towards comprehensive LIS

Some of the initiatives in various states include, Rajasthan: Apna Khata; Chhattisgarh: Bhuiyan; Haryana: Jamabandi; Himachal Pradesh: HimBhoomi; Karnataka: Bhoomi; Kerala; Madhya

Pradesh; Odisha: Bhulekh; Uttar Pradesh; Uttarakhand: Dev Bhoomi and West Bengal: Banglar Bhumi.

Agricultural Commodity Trading

The Government of India in 2003-04 had initiated major steps towards introduction of futures trading in commodities, which included removal of prohibition on futures trading in all the commodities by issue of a notification and setting up of the National Level Commodity Exchanges, such as National Commodity & Derivatives Exchange Limited (NCDEX), Multi Commodity Exchange of India Limited, National Multi Commodity Exchange of India Limited (NMCE).

Information Dissemination

m – Kisan – SMS Based Farm: m – Kisan, a farmer can get a preferred advisory on his mobile through SMS. Experts can register and send advisory messages to farmers at www.mkisan.gov.in. The messages are sent in the local language.

Kisan Call Centres (KCC): To harness the potential of ICT in Agriculture, Ministry of Agriculture took a new initiative by launching the scheme "Kisan Call Centres (KCCs)" on January 21, 2004 aimed at answering farmers queries on a telephone call in farmers own dialect. These call Centres are working in 14 different locations covering all the States and UTs. This Scheme provides agriculture related information to the farming community through toll free telephone lines. A countrywide common eleven digit number has been allotted for Kisan Call Centre. The number is accessible through all mobile phones and landlines of all telecom networks including private service providers. Replies to the farmers' queries are given in 22 local languages





Farm Advisory through Mobiles – Green SIM: This programme is implemented by IFFCO Kisan Sanchar Limited (IKSL). The features of IKSL services include delivering up to four free voice messages on areas of interest, and have a helpline services managed by experts and organize phone-in programmes and mobile-based quizzes. Farmers' queries are given in 22 local languages.

IKSL is covering 19 states and 108 zones in those states and have a subscriber base of 11 lakh. IKSL provides messages through both push- and pull-based approach. The messages are delivered daily in regional languages and have content in 16 different categories which includes Agriculture, Horticulture, Animal Husbandry, Floriculture, Poultry, Irrigation, Fertilizers, Insurance, Banking, Rural Health, Government Schemes, Market Prices, Sericulture, Employment Opportunities, Human Health and Co-Operatives. To increase the access of information, IKSL have an online portal (voice, text and images) which can be accessed by anyone anytime and even on a mobile app. Users can customize the app as per their needs and receive information in the preferred language.

i – Kisan: A Nagarjuna Group initiative, Ikisan.com is a comprehensive Agri Portal addressing the Information, Knowledge and Business requirements of various players in the Agri arena viz., Farmers, Trade channel partners and Agri Input / Output companies. Leveraging Information Technology and extensive field presence, i – kisan is positioned as an

Information/Knowledge exchange and an e-Marketplace.

eSagu IT Based Personalized Agro Advisory System: e-Sagu is a web-based personalized agro-advisory system, which uses Information Technology (digital photo based) to help farmers adopt better/scientific management practices in agriculture. In eSagu, rather than visiting the crop in person, the agricultural expert delivers the expert advice at regular intervals (once in one or two weeks) to each farm by getting the crop status in the form of digital photographs and other information.

Facebook for Farmers and Extension Workers: The social media platform such as Facebook is being effectively used in Kerala for reaching out to farmers and extension workers. Based on the success of using Facebook by the Vattamkulam Krishi Bhavan (Malappuram District, Kerala), the Government of Kerala has decided to officially include Facebook as an important tool to strengthen the extension activities of the Department of Agriculture. The state agriculture department has urged all the officials under it to extend the activities of the department through the social media to enhance the productivity and profitability of farming.

All the farmers registered with the department will have to maintain a social media account to be in touch with the local Krishi Bhavan. The government has mandated that all agricultural officers should have active Facebook accounts.

asyaSree – a One Stop Telugu portal for Information Dissemination: “SasyaSree – a One Stop Telugu portal for Information Dissemination” was initiated based on the identified need of having locally specific, demand driven knowledge solutions in local language through a web portal. The project caters to eight districts in Andhra Pradesh by documenting the best crop management practices, information related to Government schemes, market price and other information needs of the farming community in local language by means of video, audio, photographs etc. The project also tries to integrate with other public extension initiatives and provide information on other allied sectors such as animal husbandry, poultry etc.

CONCLUSION

India has at least two decade long experience of using ICT in agriculture. ICTs have gone through different stages and many of these will continue to evolve in response to changing technology and business environment in agriculture as well as in response to emerging challenges in agriculture.

Lot of evolution has happened in this sector, the costs of accessing information through ICTs have come down, access have generally improved and many initiatives are combining text, images, audio and

video. There is an increasing shift from stand-alone ICT initiatives to much more integrated ICT initiative that basically works across the value chain.

ICT can play critical role in strengthening the capacities of not only farmers but also for the field level functionaries and intermediaries. Developing the right or relevant content at the appropriate level has always been a challenge and more efforts are needed in this direction.

Content development is not a one-time process and it needs a continuous approach. There is a need to explore the possibility of mandating district level organizations like Krishi Vigyan Kendras (KVKs) in developing locally relevant content.

Policy relevant research is needed to bridge this gap between practice and policy, including evaluation of impact of ICTs in agriculture. As there is no platform to share this data and analysis on a continuous basis, these are not available for analysts and policy makers to make informed decisions. Thus, there is a need to design a platform where all the players in the ICT in agriculture sector are willing to share and use data and experience, so that people can collectively learn while the initiatives are in progress and continuously innovate.



DELIBERATIONS



Information and Communication Technology (ICT) is used as an overarching term incorporating all modes of transmission like electronic devices, networks, mobiles, services and applications which help to disseminate information with the help of technology.

Recognizing the benefits for farmers of ICT in Agriculture, Indian Council of Food and Agriculture constituted a **Working Group on ICT in Agriculture**, which was launched on July 4, 2017 at a National Round Table by **Prof. M.S. Swaminathan**, Father of Indian Green Revolution. The working group is chaired by **Dr. M. Moni**, former DG-NIC. The working group will be a holistic alliance of policymakers, agricultural scientists, extension specialists, industry and progressive farmers to address the magnitude of challenges and in the ICT sector. It mandates to act as a coordinator across stakeholders for a meaningful and impactful intervention. E forum will follow up important recommendations with national and international agencies; Facilitate farmer's sensitization; Promote ICT applications for farmers' empowerment and international collaborations

The brain storming session was chaired by **Dr Ashok Dalwai**, Additional Secretary, Ministry of Agriculture and Farmers Welfare and co – chaired by Dr. M. Moni, former DG-NIC. The event was graced by the presence of **Dr. Anand Bhaskar Rapolu**, Hon'ble Member of Parliament and 65 prominent CEOs, heads of

businesses, national institutions, academicians, researchers, farmer leaders and top experts participated in the conference.

Dr. M.J. Khan, Chairman, ICFA, welcomed all the participants and provided an overview of the working areas of ICFA. He also talked about the importance of information communication and technology in the Indian agricultural sector, with special emphasis on the farmers.

Dr. M. Moni, former DG-NIC, expressed his gratification for the launch of the working group on ICT in Agriculture by ICFA. He briefly stated the objectives of the working group:

- ◆ To promote ICTs in Food & Agricultural System for productivity increase in all production stages;
- ◆ To develop Competency Development Programme for stakeholders for adoption of ICTs appropriately;
- ◆ To undertake steps to operationalize ICT enabled supply-chain and value-chain models facilitating farming communities, especially small and marginal farmers;
- ◆ To promote Digital India Programme;
- ◆ To network with NGOs working in Food and Agricultural Development Programmes;

- ◆ To undertake promotion and impact study of on-going ICT projects (Digital Networks for Farmers) in the Food & Agriculture Sector;
- ◆ To promote SMART Agriculture (Climate Resilient Agriculture) through Agricultural Resources Information System (AgRIS);
- ◆ To undertake Demonstrable Pilot Projects through Sponsorship;
- ◆ To establish National Centre for Information Technology in Agriculture (NCITA) through PPP Model;
- ◆ To strengthen South – South Cooperation through ICT for Agriculture (ICT4Ag) Programme;
- ◆ To promote Agricultural Informatics Research and Education through International Cooperation Programme;
- ◆ To network with Asian Federation of IT in Agriculture (AFITA), European Federation of IT in Agriculture (EFITA), PAN America

Federation of IT in Agriculture (PAN-AFITA), CTA (The Netherlands), CGIAR, FAO (UN), UNIDO, ADB, World Bank, USAID, African-Asia Rural Development Organization (AARDO), Global Forum for Farmers (GFF), European Union (EU), etc.

Apart from laying down the objectives of the WG, he also shared his experience in the field of ICT with respect to Agricultural sector in India along with the emphasizing on the need for the ICT revolution in the Indian agricultural sector. According to him, for this purpose, there is a need for agriculture informatics and capacity building along with the availability of online portals in the local languages of the states and districts so as to reach a larger number of farmers. He also mentioned about the concept of smart villages, which can help in e – bridging the gap between farmers and the information centers. Lastly, he concluded by stating about the integration of rural development and agriculture for the overall development of the farmers.

Prof. M.S. Swaminathan, Founder, MSSRF, talked about the technological empowerment in pro-poor, pro-women and pro-nature manner. He brought to the notice that the number of women may outnumber the men in the agricultural fields in India. Thus, the focus should be to make women technologically competent

in the rural areas. He also emphasized on the eco-technological interventions as that will help in the sustainable agriculture along with the involvement of the youth in the agricultural sector, which has been decreasing over the years. Last but not the least, he pointed out that agriculture is a livelihood activity in India rather than a commercial industry.

Dr. Anand Bhaskar Rapolu, Hon'ble Member of Parliament, drew the attention of the august gathering to the gap prevailing between the expectations and realities of the implemented schemes in various states of India, which needs to be addressed. There is a need for new guidelines and solutions for climate resilient agricultural practices and mandate the schemes from the lower level.

Mr. Ashok Dalwai, Additional Secretary, Ministry of Agriculture and Farmers Welfare, acknowledged the presence of Prof. M.S. Swaminathan along with all the other participants. He mentioned that the mission of doubling farmers' income by 2022 is a time bound exercise, which can be accomplished only by shifting from supply driven approach to demand driven approach, from farming to farmer based, from production to market based approach.

He also stated that agriculture extension and post – production activities have not been given the importance from the very beginning, which needs to be addressed now. For this purpose, the establishment of ICT in the agriculture will help to reach out to the large number of farmers. He brought to the notice that the scheme ATMA is now not in working condition and e – SAP demonstration, which effectively increased the farmers' income by 3 – 4 times as it enabled farmers to detect the diseases and suggested the suitable pesticides and other way outs. Thus, according to him, for being cost effective, there is a need for high penetration rate of telecom services among farmers so as to transfer information to the farmers and vice versa.



He also drew attention towards the need for agricultural portals in the local languages and the need for marketing the same along with the focus on supply chain and value chain. He stated that agriculture can turn into agriculture enterprise and the monopoly of e – NAM should be ended by establishment of such portals by private companies. Lastly, he mentioned about the precision farming, water stress management by geo – special technology instead of using micro – irrigation techniques.



Ms. Alina Gumpert, Director, German Agribusiness Alliance, highlighted the shift to sustainable agriculture with the help of innovative technology from innovative technological agriculture. According to her, IT can optimize agriculture through various forms such as agri – machinery, transferring information to farmers, technology for post – harvest management, horticulture and etc. For this purpose, farmers need to realize the need of technology so that they can adopt it in every phase of their production, supply chain and etc. In fact, she mentioned that Germany can help India with the technology perspective in Agriculture and proposed the establishment of Indo – German Business Council.

Mr. Amit Bhardwaj Convener, Co-founder & CEO, Level A Commodities, drew attention of the participants towards the export – import scenario of the agricultural products. He mentioned that India imports almost every product except for the paddy crops. Thus, there is a need for demand driven strategy rather than supply driven strategy. He also stated that farmer is the biggest risk taker in India as he does not know how the environmental and market conditions will influence his crop. Therefore, he affirmed with Dr. Moni for inclusion and dilution of ICT in the Indian agricultural sector.

Dr. Vivek M Damle, Chairman & MD, SkillNet Solutions India, introduced his company as a retail company and expressed his interest in contributing in the development of ICT in the agricultural sector.

Mr. Prasanto K Roy, Head - Internet, Mobile & E-commerce Council, NASSCOM, threw light on the sustainable business led agriculture in India. According to him, there are numerous market opportunities in the agricultural sector of India, thus many startups have come up in this sector with innovative ideas and projects. He also focused on skilling the humans in the agricultural areas especially, women as their proportion in the agricultural field is more as compared to the men. He also talked about the new technologies such as drones, which can be adopted for optimization of ICT in agriculture sector. However, there is a need of integrated drone policy in India to execute the same. Lastly, he mentioned about smart agriculture initiative taken by NASSCOM.

Dr. Pooja Jain, Assistant Professor, IIIT Kota: Like Medical colleges in India, the curriculum mandate should be reformed so that engineering students graduating from MHRD and private institutions compulsorily undergo their two months training in rural areas, educating/training farmers about new innovations in agriculture. This will help them understand the difficulties faced by farmers to prepare their final year projects on practical solutions that can be implemented for comprehensive development of rural areas. The young generation has a fresh and practical perspective which can be used to overcome the problems faced in the Indian agriculture sector. This will help creating solutions at minimal cost. Agricultural Informatics can also be added as a subject in the third year.

ICT can be applied to various phases of agriculture like crop selection, sowing, preventing crops from diseases, harvesting, packaging, transporting, marketing, selling etc. The government invests a lot of money on top-class engineering institutes like IITs, IIITs and NITs. It is high time that the government uses this huge student resource and these engineers start repaying that debt by serving the nation before joining MNCs or going abroad.

Prof S.D. Samantaray, Professor, G.B. Pant University, drew attention towards the shortage of educated and experienced project handlers in universities for the students' projects to be executed by the government or the concerned agencies.

Thus, he recommended for the appointment of nodal officers for the same as nodal officers know the exact problems of the specific area and limitations in solving the same. Also, he mentioned about the All India Coordinated Research project (AICRP) on IT in Agriculture, which could pave way to engage Engineering Colleges in Agriculture coordinated projects.

Dr. Uma Chauhan, Director – e – Governance, Ministry of EIT, mentioned that Ministry of EIT does not have a dedicated department for agriculture, however, NIC, apex body for digital India has one, which can be used to promote ICT in agriculture. This is because NIC has an established infrastructure, which can help largely in providing cloud services and etc. Although, requests for the same needs to be through the Ministry of Agriculture. This is the standard procedure, which is followed so as to avoid duplicity.

Mr. D.K. Srivastava, CEO, IFFCO e-Bazar Limited, stated about the e-bazar of IFFCO and its achievements. However, he also mentioned about the challenges faced by them in the implementation of the same, such as availability of network and insecurity of farmers for online transactions. He recommended the formation of a platform for Aadhar Card identification so as to avoid spurious activities.

Mr. Gaurav Vats, Head – ICT, M&E, ISAP, threw light on the existence of social media in India. He mentioned that social media has proved to be the most cost effective and widely propagated means of disseminating information in India. He provided a glimpse of ISAP Facebook group, with 1.82 lakh members, which has become a platform for various organizations, individuals and farmers to exchange

information in various languages.

Padma Shree Dr. K.L. Chadha, President, HIS, suggested to make inventory of portals so that information can be accessed for one database. This inventory can be divided on the basis of region or portal orientation such as farmers oriented portals and etc. In fact, he also recommended having a universal statistics division of agriculture as various organizations provide numerous statistics of the same component. Lastly, he asked to prioritize the tasks under the Working Group as there are various objectives with multiple tasks to be carried out.

Dr. S.K. Singh, Project Director DKMA, mentioned that their organization has already started collecting data regarding the agricultural portals.

Dr. M Moni, Former Director General, National Informatics Centre, in his concluding remarks mentioned the importance of multi – lingual portals at all levels of operations such as KVKs, State and central level. He also recommended to integrate IFFCO Sanchar Network and e – Bazar so as to overcome the issues faced by the IFFCO e – bazaar. Regarding the students project, he suggested that students should be given one problem to solve during their programme tenure. Lastly, he invited suggestions and recommendations for the working group along with doubling the farmers' income.

Finally, the formal vote of thanks was presented by **Mr. N.S. Randhawa, Executive Director, ICFA,** who expressed his gratitude to all the participants for active participation and making the discussion worth and expressed his interest in bringing in the portal and newsletter for the WG on ICT in Agriculture.



RECOMMENDATIONS



1. Technological empowerment is essential for evergreen revolution and digital agriculture is one of the best way outs for the same. However, digital agricultural interventions need to be pro-poor i.e. technology should be economical and affordable in adoption and implementation, as 80% farmers are small or marginal and 22% of farmers are below poverty line. Hence, we need to identify the low hanging fruits that bring disruption in the business as usual. It is recommended to identify at national, state and local level the time critical and mission critical agricultural services that impact livelihoods of poor farmers. From time to time, ICFA / the working group on ICTs will recommend appropriate steps to governments and business organizations to undertake activities in this regard.
2. In rural India, the percentage of women who depend on agriculture for their livelihood is as high as 84%. Women make up about 33% of cultivators and about 47% of agricultural labourers, making them an important client for ICT. However, identifying digital dividends for women empowerment is much talked about, but less documented. The factorial contribution of ICT projects on the level of empowerment of women needs to be well documented. It is recommended that appropriate digital strategies need to be designed where Women Self Help Groups (like Jeevika in Bihar) can take advantage of digital strategies. Also, training of women farmers need to be organized to abreast them with the technology and to enhance their competencies for its utilization.
3. Information and Communication technology can be utilized to create value chain for all the agricultural produce to enhance food security as well as alleviation of poverty of the stakeholders in the chain. Online and mobile banking are almost bypassing the physical bank entities and human bank teller, thanks to favourable policy environment in India. Amazon, Flip Kart and Olx have revolutionized the classified advertisements and person-to-person sale of all matter of items, including farm equipment. Big basket has changed the way we buy fresh vegetables and fruits. Blending GOI initiatives like Jandhan Yojana and eNAM will have far reaching positive consequences in Indian agriculture. It is recommended that ICFA may take advantage of this situation and should work on business plans with PPP mode.
4. The real impacts of digital / ICT strategies can be realised only when these services are available, accessible and applicable by the farmers. While computer based ICT projects (first generation ICT4Ag) critically failed to provide vernacular language content to farmers, the situation is changing thanks to mobile technologies especially social media. It is recommended to strengthening the existing initiatives that provide local language knowledge and services.
5. Inventory of all the portals and applications for agricultural services should be created to maintain a



database for future reference. This inventory can be divided on the basis of region or portal orientation such as farmers oriented portals and etc. There is a need to integrate the efforts of various portals with the Farmers Portal of GOI. For this, it is recommended to have an inventory of existing portals. One area where ICFA can take the lead is working on the concepts of Next Generation Transaction (Service + collaborative) Portals that are mobile responsive. A policy dialogue on providing a single gateway (like Pay TM) for Indian farmers can be advocated.

6. Government should introduce and promote the concept of smart villages in the policy making as well as administration in order to make villages more techno-savvy and environmental sustainable. Also the existing smart village should be used as centers for exposure visits and training farmers. Mission mode programme to develop clusters of smart villages may be initiated.
7. Paying due regard to environment and the challenge of producing more from less, sustainability is to be

ensured. Hence, technological innovations and interventions need to be in pro-nature manner so as to save environment and all the resources to make agriculture sustainable. It is recommended to work out policy advocacy on digital infrastructures and strategies in natural resources management with strong multidisciplinary interfaces. ICFA can take the lead in this with Corporate Social Responsibility and also with the International Organizations where funding sources exist.

8. Various start-ups with innovative ICT application have entered the agriculture sector in past few years though sustenance is low due to lesser adoption of technology. Government should look into the matter and should promote ICT adoption by creating awareness among farming community.
9. NIC, apex body for digital India has a dedicated department for agriculture, which can be used to promote ICT in agriculture by providing cloud services and etc. Further, channelizing things through one gateway will also avoid duplicity of efforts.



LIST OF PARTICIPANTS

1. Prof. M.S. Swaminathan, Founder, MSSRF Agriculture
2. Dr. M Moni, Former Director General, National Informatics Centre
3. Padma Shree Dr. K.L. Chadha, President, HIS
4. Mr. Ashok Dalwai, Additional Secretary, Ministry of Agriculture and Farmers Welfare
5. Dr. Anand Bhaskar Rapolu, Hon'ble Member of Parliament
6. Ms. Alina Gumpert, Director, German Agribusiness Alliance
7. Mr. Prasanto K Roy, Head - Internet, Mobile & E-commerce Council, NASSCOM
8. Dr. Pooja Jain, Head Training and Placement, IIT Kota
9. Mr. V.V. Sadamate, Former Adviser Agriculture, Planning Commission
10. Mr. Sunil Kumar, GGM – IT, IRCTC
11. Mr. P.P.S. Pangli, President, Borlaug Farmers Association
12. Ms. Nancy J Anabel, Director Communication, MSSRF
13. Mr. Ravindra W Shevade, COO - NeML, NCDEXSPOT
14. Mr. Niraj Prakash Garg, Group Head, ICT, NDDB
15. Mr. Rajat Vardhan, CEO, AgroNXT
16. Mr. Manoranjan Sahoo, Deputy General Manager, DCM Shriram
17. Mr. Puneet Pachauri, Sr. Manager, DCM Shriram
18. Dr. Ram Prasad Lal, Scientist-E (Administration), India Meteorological Department
19. Dr. Uma Chauhan, Director - E Governance, Ministry of EIT
20. Mr. Asitava Sen, Senior Agribusiness Advisor, IFC South Asia
21. Dr. Ranvir Singh, Senior GM (Organic Farming), International Panacea Limited
22. Mr. Kamlakanth, Manager IT, IFFCO
23. Mr. D.K. Srivastava, CEO, IFFCO e-Bazar Limited
24. Mr. Suhel Bidani, Team ICT Agriculture, Gates Foundation
25. Mr. Syed Anjum Nabi, VP & BU Head, Agri Power Products, Usha International Ltd.
26. Mr. Amit K Srivastava, AGM Marketing, Power Products, Usha International Ltd.
27. Mr. Dattatray More, Managing Director, ISG Hospitality Services
28. Mr. Amit Kalkal, Director, Agri Innovation
29. Mr. Amit Bhardwaj, Convener, Co-founder & CEO, Level A Commodities
30. Dr. Ranjna Nagpal, Head - ICT Agriculture, Nic.in
31. Dr. S.K. Singh, Project Director DKMA, DKMA
32. Dr. Vivek M Damle, Chairman & MD, SkillNet Solutions India
33. Dr. P Raman, Scientist, MSSRF
34. Mr. Mahesh Chandra Goel, Country Head – Aries Fertilizers Group Pte Ltd.
35. Dr. Sudha, Co – Founder and Director, Waternet
36. Dr. Tagore, Founder and Chairman, Waternet Partners
37. Mr. T.P. Singh, Director, Bhaskaracharya Institute for Space Applications and Geo-informatics
38. Dr. Brijendra Pateriya, Director, Punjab Remote Sensing Centre
39. Mr. Pravin Khandelwal, Director, Vega Energies
40. Mr. Ibrahim Ahmad, Group Editor, CyberMedia (I) Ltd.
41. Ms. Eliza Jamal, Program Executive, Vodafone Foundation
42. Prof S.D. Samantaray, Professor, G.B. Pant University
43. Mr. D.K. Manavalan IAS (Rtd.), Executive Director, AFPRO
44. Dr. K.M. Shivakumar, Professor, Tamil Nadu Agricultural University
45. Mr. Gaurav Vats, Head – ICT, M&E, ISAP
46. Mr. G. Ramamohan, Policy & Stakeholder Engagement Lead, Monsanto Holdings Pvt. Ltd
47. Mr. Ashish Gupta, Global Organic Ambassador, Ifoam-OI
48. Mr. Sudhanshu Jain, Operation Manager, CABI
49. Ms. Megha Datta, Industry Manager, Geospatial Media
50. Mr. Mehrban Singh, Senior Director, ERNET India
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55. Mr. Bhagwan D Dubey, Promoter, Jayi Innovative Solutions
56. Mr. Ashok Joshi, Founder, Jaivik Food
57. Mr. Rahul Garg, Founder & CEO, WPC Product Line
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60. Ms. Shweta Gupta, Director, PESTOZ
61. Mr. Abhishek Goyal, Co-Founder, AgroConnect
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63. Mr. N.S. Randhawa, Executive Director, ICFA
64. Ms. Mamta Jain, Director, ICFA
65. Dr. Dinesh Chauhan, CEO, ICFA
66. Mr. Kunal Tewari, Executive Director, CARD
67. Dr. Sucheta Arora, Director, ICFA