

New Technologies have Resulted Diverse Innovations

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Abstract

Agriculture is India's backbone, and most Indians depend on agriculture for their livelihood. However, due to many difficulties related to pests and diseases, pesticides, refining etc., Indian farmers do not earn anticipated agriculture pay. In addressing these issues, ICT (Information and Communication Technology) serves as a relief to farmers. There are many schemes such as e-Krishi, Mahindra Krishi Mitra, IFFCO Agri-portal, etc. have been initiated by the Indian Government and help farmers achieve better yield and income. This paper is an effort to gain insight into the issues that farmers face and the ways in which ICT allows them to solve them. One of the best Solutions for this purpose is e-SAP (Electronic Solutions against Agricultural Pests). It is one of the best options for solving the problems and is discussed here.

Keywords: Productivity, ICT, Interactive demand-based agriculture, Communication Technologies, e-SAP.

Introduction to Indian agriculture

Roughly 60% of 100% of Indians derive their livelihoods from the agricultural sector. Agriculture and allied activities rely on 70 to 80 percent of the rural Indian population. Integrated farming provides farmers a daily income to support them. Indian farmers do not get the yield they expected. More studies on integrated farming by the Indian Government (Dairy, Fishery, horticulture etc.) [9][17]. Every year, India's food grain production has increased, and India is one of the top producers of many crops, like wheat, rice, pulses, sugar cane and cotton. It's is the biggest producer of milk and second largest producer of fruits and vegetables. (FAO) [15] Indian farmers' access to technology, government, capital, markets, institutions and services are the limiting factors in optimizing their farm incomes.

Agriculture and related industries, such as agriculture, forestry and fisheries, accounted for 15.4% of GDP in 2016, with about 41.49% of the workforce in 2020. [10][11][12][13] The agricultural community faces a variety of issues in order to improve crop production. One of the reasons is that the agricultural community is not reached in a timely manner by expert scientific advice on crop production and marketing, etc. From the e-agriculture platform[1], agricultural information and communication technology is extracted. The implementation of Information and Communication Technology (ICT) allows required information to be disseminated at the correct time. This information expertise revolution has made access to information simple and cost-effective.

Reasons for the delay in rural India's agricultural knowledge

The main objective of the extension is to transfer advanced agricultural technologies and studies to the farmer, as well as to provide input to the research system on field problems. In order to accomplish this goal, the latest information and expertise about the subject plays an important role [19]. In India, there is a data delay between farmers and agricultural researchers because:

- Media, Information Processing and ICT are not adequately used.
- Lack of knowledge-based education in agriculture in India.
- Lack of updated agricultural knowledge for farmers and most extension workers.
- Low technical knowledge of farmers and village-level extension workers.
- Economic problems for rural resident

Advantages of ICT

- ICT leads to increasing the market for new approaches.
- It also helps to empower rural people through improved access to natural resources, improved agricultural technology for agriculture, successful development strategies, etc.
- Communication can be interactive, too.
- The data is accessible from every point on the earth.
- Efficient management of resources (development, conservation, allocation and use).

In Agriculture, ICT (Information and Communication Technology)

The use of technology in agriculture is information and communication technology (ICT). It is made up of 3 main technologies. There are:

- Computing Technology
- Technology of Contact
- Technology of knowledge Processing

These technologies are used for data, information and knowledge processing, sharing and management from producers to consumers. E-Agriculture includes the planning, production and implementation of creative ways of using (ICT) technology in rural areas, focusing primarily on agriculture [7][8][16].

These technologies are used for data, information and knowledge processing, sharing and management from producers to consumers. Several cases of agricultural use of ICTs[4] have been reported in the use of ICTs for inclusive value chains and in the success stories of information and communication and rural development.

Farmers have been encouraged through ICT to share their views, experiences and ideas. More exposure has been provided to farmers and encouraged them to use science that looks at agriculture from an integrated perspective [5].

Need for ICT in Indian Agriculture

Agricultural ICT is an emerging field which focuses on improving agricultural production and rural development in India. This includes the use of creative ways of using rural information & communication technologies (ICT).

ICT illiteracy, the availability in their own languages of suitable and localized content, easy and affordable connectivity, and other problems, such as rural people's awareness and willingness, to adopt new technologies are common challenges in the adoption of ICT in rural sectors [18][20].

Three significant roles that ICT can perform are

1. Improving agricultural production in the field of agriculture.
2. Improving access to markets.
3. Building ability and empowerment.

Users of ICT for agriculture development:

1. Government Agriculture department
2. Farmers
3. Agriculture extensionists
4. Fishermen
5. Livestock farms
6. Traders

Many methods and proposals have been introduced in e-Technology in India, the Ministry of Government and Agriculture. The use of wireless communications removes the coaxial cable installation requirement. [14] Agricultural activities and innovations vary worldwide. New agricultural methods, such as computerized farm machinery for sowing, transplantation, irrigation, fertilizers, pesticides, harvesting and post-harvest processes, are being supported by IT. Communication remains, however, its most important role, and the Internet has provided us with the ideal opportunity.

Other benefits of ICT to the agricultural sector

1. Providers Access to Communication Facilities: Telephone, internet, email, fax and mobile phones have become a substitute for market pricing, future pest and locust attacks information, weather information and rain patterns.
2. Supply Interactive Demand Based Agriculture Services: Government Agriculture Programs and Subsidies, Online Application, Online Trade (Coffee, Tea, Rubber Auction), Online Agriculture Extension and Call Centers Supplying Cropping Pattern and Fertilizer Use Information, etc.
3. Business automation of the major agricultural functions: ICT is used for land records digitization, farm management, milk fat measurement, agriculture statistics and databases [3].

Commonly applied Information and communication technologies

1. **Radio &TV-** The role of radios and TV in expansion of agriculture and the connection of farmers with key services is and continues to be important. During respect, Farm Radio International has played a major role and recorded numerous cases of these uses.
2. **Videos-** Videos are also useful to farmers, such as Access Agriculture for example provides an online forum for R&D workers and other stakeholders, including farmer Organizations.
3. **Mobile phones -**Mobile phones use voice, text or images in an extensionist/farmer relationship. The right messages for farmers and for farmers must be formulated to fix analphabetism and to

encourage farmers to use mobile phones. Several companies have been experimenting with wireless technologies in order to reach remote areas [6].

One of the most effective examples for ICT is e-SAP, a singular handheld IT system that offers farmers real-time information on the pest-related issues developed in Raichur by the UAS [2]. The instrument Electronic Solutions to Farm Pests (e-SAP), includes a web-based application system that facilitates the flow of data from the farmer to the farm scientist and back. The concept behind creating e-SAP was to assist the sphere worker, who isn't an expert, collect specimens from the farmer's field and send them to scientists and experts in real time. The idea behind creating an e-SAP was to help the extension worker, who is not an expert.

E-SAP features that help to classify the Pest field workers

This is one of the e-SAP system's most significant characteristics. The architecture for pest identification follows a specific branching model centered on the picture. Intuitively guide users in the identification of pests through high-quality images which characterize pests and symptoms. Audio assistance is given in any phase within the local language; the user should not be told. At each step, the user should only touch the image in question to see what is causing the organism. The content is intended to hide all known pests in order to allow users themselves to recognize problems associated with pests in the field; reliance on external help is minimal. As content is accessed offline, it is typically used anywhere, at any time.

Important Challenges of Indian Agriculture Sector

For the general development of India and the improved welfare of its rural poor, the challenges of the agricultural sector are significant. As mentioned above, the challenges are:

1. By 2050, the globe will have an extra 2 billion, and India need to feed 750 million.
2. India is currently using resources 50% faster than the planet can sustain.
3. India includes a total of 329 million hectares of land, of which around 37 percent (120.40 million hectares) of the country's total geographic region is plagued by various forms of land degradation.
4. The farmers in India, who own only around 2.0 hectares of land, make up 78% of the country's farmers, but only 33% of the land, but still generate 41% of the grain of India.
5. Current agricultural technology costs way more than most farmers can afford.

Thus, policy makers must initiate and include policy actions and public programs to develop this sector and make agricultural sector is much more active, competitive globally and diversified.

Conclusion

Today, ICT is offering a decent forum in India for growing rural areas, with various cultures and languages in India. Significant upliftment and economic growth in rural areas will also occur in the future.

ICTs now function as an agent to enhance access to information and to exchange expertise in order to vary farmers' lives. ICT instruments will alter the ideas, behaviors and knowledge of farmers. Farmers

feel encouraged and, when necessary, can take adequate action. India's agriculture has come a long way and made many production breakthroughs.

Therefore, a forum needs to be developed where all ICT actors in the agriculture sector are able to share and use data and knowledge to help people learn together as initiatives continue and innovate continuously.

References

- [1] Malhotra, C., Chariar, V.M., Das, L.K. and Ilavarasan, P.V., 2007. ICT for rural development: An inclusive framework for e-Governance. Computer Society of India, pp.216-226.
- [2] Niranjana, S., 2018. Development of New Algorithm using Bayesian Network for Decision Support in Tomato Insect Pest Management.
- [3] Book, D., 2007. Indian Agricultural Statistics Research Institute. New Delhi.
- [4] Sylvester, G., 2015. Success stories on information and communication technologies for agriculture and rural development. RAP Publication, (2015/02).
- [5] Lele, U. and Goswami, S., 2017. The fourth industrial revolution, agricultural and rural innovation, and implications for public policy and investments: a case of India. *Agricultural Economics*, 48(S1), pp.87-100.
- [6] Meera, S.N., Jhamtani, A. and Rao, D.U.M., 2004. Information and communication technology in agricultural development: A comparative analysis of three projects from India (p. 14). London: Overseas Development Institute.
- [7] Flor, A.G. and Cisneros, A.J., 2015. e-Agriculture. *The International Encyclopedia of Digital Communication and Society*, 9999(9999), pp.1-6.
- [8] Jouanjean, M.A., 2019. Digital opportunities for trade in the agriculture and food sectors.
- [9] Liang, Y., Lu, X.S., Zhang, D.G., Liang, F. and Ren, Z.B., 2003. Study on the framework system of digital agriculture. *Chinese geographical science*, 13(1), pp.15-19.
- [10] Salam, A., 2019, October. Design of subsurface phased array antennas for digital agriculture applications. In 2019 IEEE International Symposium on Phased Array System & Technology (PAST) (pp. 1-5). IEEE.
- [11] Antle, J.M., 1999. The new economics of agriculture. *American Journal of Agricultural Economics*, 81(5), pp.993-1010.
- [12] Tripathy, S., 2019. Rooting for sustainable agriculture and food security through improved regulatory governance in India. In *Innovation, Economic Development, and Intellectual Property in India and China* (pp. 387-411). Springer, Singapore.
- [13] Lahoti, R. and Swaminathan, H., 2013. Economic development and female labor force participation in India. IIM Bangalore Research Paper, (414).
- [14] Kalra, A., Chechi, R. and Khanna, R., 2010, March. Role of Zigbee Technology in agriculture sector. In National Conf. on Computational Instrumentation NCCI 2010 CSIO (19–20 March 2010 Chandigarh, India) (p. 151).
- [15] Staples, A.L. and Sayward, A.L., 2006. *The birth of development: how the World Bank, Food and Agriculture Organization, and World Health Organization changed the world, 1945-1965* (Vol. 1). Kent State University Press.
- [16] Mangstl, A., 2008. Emerging issues, priorities and commitments in e-Agriculture. *Agricultural Information Worldwide*, 1(1).
- [17] Messner, M. and DiStaso, M.W., 2013. Wikipedia versus Encyclopedia Britannica: A longitudinal analysis to identify the impact of social media on the standards of knowledge. *Mass Communication and Society*, 16(4), pp.465-486.

- [18] Saravanan, R.I., 2011. Information and communication technology for agriculture and rural development/R. Saravanan, C. Kathiresan y T. Indra Devi (No. 338.16 S37.).
- [19] Singh, V., Sankhwar, S. and Pandey, D., 2015. The role of information communication technology (ICT) in agriculture. *Global Journal of Multidisciplinary Studies*, 3(4), pp.2-10.
- [20] Chauhan, N.M., 2010. Expectations of the Farmers from ICT in Agriculture. *Indian Research Journal of Extension Education*, 10(1), pp.42-43.