Frontiers in Crop Improvement, Vol. 8 (2) : 132-136 (2020)
Print ISSN : 2393-8234, Online ISSN : 2454-6011
ASTHA FOUNDATION
Meerut (U.P.) INDIA

INFORMATION TECHNOLOGY IN AGRICULTURE : BOON IN DOUBLING FARMERS' INCOME

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ABSTRACT

Agriculture is the largest livelihood provider in rural India. In the agricultural sector, constant application of latest innovative ideas and better technologies is essential to enhance the socio-economic well being of the farmers'. The problem of Indian agriculture is not lack of technology, R&D efforts but inadequacy and inefficiencies in the timely dissemination of the information to the farmers'. Therefore, Information Technology in agriculture can act as a driving force in the development process. Information technology is playing a vital role in agricultural production and marketing. Information & communication technologies (ICT) allow farmers' to save time on orders and delivery and getting feedback. The database of the crops grown along with the farmers' details can be easily managed. The data base includes the kinds of crops, the size of cultivated area, expected time of harvest and yield. Farmers of the extension personnel transmit those data to the data base server via internet. Crops information service system should be created. This system analyzes the crop data to create statistical tables or graphical representations that can be easily understood by the end users. Farmers can access these statistical data by browsing the home page and make their crop production plan. Production technology and information inquiry system should be created. Production equipment inquiry service system should be created for the farmers'. This system gathers information from the company of seeds and crop production equipment to build the production equipments inquiry service system. Mobile based apps are really helpful in providing the weather based data, market rate of produce and other agronomy based information to the farmers and ultimately in the decision making process. State Agricultural Marketing Boards (SAMB), AGMARKNET, Kisan Call Centre, Community Radio stations, call centre at KVKs, call centre at ATIC are the important agencies of the Agricultural Marketing Information Network.

***Key words** : Agriculture, information technology, farmers income, mobile app*

In India, 68 per cent of population is in rural areas, out of which agriculture is the main source of livelihood for 58 per cent of that population. Agricultural sector plays a pivotal role in economies of developing countries. Agriculture, being the single main determinant of the incomes and welfare of the rural households is the key to the socio-economic development in rural areas. Besides this livestock sector, an integral component of India's agricultural economy, has been growing at much faster rate (over 4 per cent) compared to other components of the agriculture sector. It has emerged as an important source of income to the farmers. Livestock sector contributes 31.6 per cent to the national agricultural gross domestic product (GDP) and the demand for animal food products is growing much faster. Usually agricultural infrastructure and man power are considered as the two vital factors for agricultural improvement. But the most vital tool that provides growth and expansion is "Information" using the recent technology. Information & Communication Technologies (ICT) is a medium that can help by providing non-stop flow of information for enlargement in manufacture and extension. ICT has a key role to take part in all areas of Indian agriculture. In addition to facilitate farmers in civilizing the effectiveness and efficiency of agriculture, the prospective of ICT lies in bring on an overall qualitative development in life by given that excellence information input appropriate for decision making. It involves applications of innovative ways to use ICT in rural domain (1). The vast store of information on agriculture has been built up in the world over many years with the ultimate aim of increasing agricultural production (2). Therefore, improved information flow within the agricultural sector is a prerequisite for effective agricultural development. The major drawback of Indian agriculture is inadequacy and inefficiencies in the dissemination of information to the farmers. Therefore, Information Technology in agriculture can act as a driving force in the development process. ICT in Indian agriculture have gained far more importance after Government of India has launched "Digital India" on July 1, 2015 to create digital infrastructure for empowering rural communities, enabling digital delivery of services and promoting digital literacy (3). Digital agriculture has become an important part of this initiative which can be defined as ICT and data ecosystems to support the development and delivery of timely, localized and appropriate information and services to make farming profitable and sustainable (socially, economically and environmentally) while delivering safe, nutritious and affordable food for all. The advancement in ICT provides accurate, timely, relevant information and services to the farmers and facilitates an environment for more remunerative agriculture. The ambitious vision of the Government of India to achieve the target of doubling the

farmers' income by 2022 is impossible without the use of ICT in agriculture.

"*My dream is to see farmers double their income by 2022 when the country completes 75 years of its Independence*." - Shri Narendra Modi, Hon'ble Prime Minister of India while addressing a farmers' rally in Bareilly, UP on 28th Feb, 2016 (4).

What is the need for doubling farmers' income?

The contribution of agriculture to the GVA (Gross Value Added) has decreased from 18.2% in 2014-15 to 16.5% in 2019-20. The decline was mainly due to a decrease in share of GVA of crops from 11.2% in 2014-15 to 10% in 2017-18 (Economic Survey 2019-20). Earlier strategies for development of the agriculture sector in India have focused primarily on raising agricultural output and improving food security which resulted 45 per cent increase in per person food production and made India not only food self-sufficient at aggregate level, but also food exporting country. This strategy did not recognize the need to increase farmers' income and did not mention any direct measure to promote farmers welfare, resulting in low farmers' income, evident from the incidence of poverty among farm households. Low level of absolute income as well as large and deteriorating disparity between income of a farmer and non-agricultural worker constitute an important reason for the emergence of agrarian distress in the country during 1990s, which turned quite serious in next year. A sharp increase in the number of farmers suicides during 1995 to 2004 losses from farming, shocks in farm income and low farm income are identified as the important factors for this. The low and highly fluctuating farm income is causing detrimental effect on the interest in farming and farm investments, and is also forcing more and more cultivators, particularly younger age group, to leave farming. This can cause serious adverse effect on the future of agriculture in the country. It is apparent that income earned by a farmer from agriculture is crucial to address agrarian distress and promote farmers welfare. In this background, need has arose to double farmers' income to promote farmers welfare, reduce agrarian distress and bring parity between income of farmers and those working in nonagricultural professions.

Sources of Growth in Farmers' Income

The major sources of growth operating within agriculture sector are :

Improvement in productivity,

Resource use efficiency or saving in cost of production,

Increase in cropping intensity, and

Diversification towards high value crops.

The sources outside agriculture include :

Shifting cultivators from farm to non-farm occupations, and

Improvement in terms of trade for farmers or real prices received by farmers.

Role and Road map using ICT : A farmer performs following major steps in agriculture :

Weather forecasting

Crop Selection

Land Preparation

Seed Selection

Seed Sowing

Irrigation

Crop Growth

Fertilizing

Harvesting

Marketing of the produce

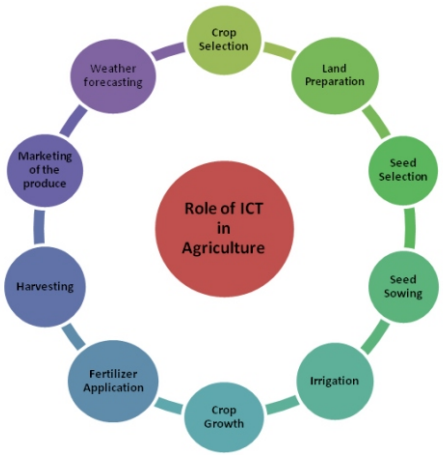

Fig. : Road map using ICT.

The first step is to check the future weather conditions to decide what to grow, how to grow and when to grow as the forecasting of the rainfall intensity and its pattern, temperature, wind speed etc. helps in determining the growing season and increasing productivity. E-mausamhau Krishi Mausam Seva app is developed by CCS Haryana Agricultural University, Hisar to convey the weather related information to farmers for easy and appropriate execution of various field operations like field preparation, sowing, spraying, etc. This app also provides information about package practices of the crops and agricultural news also. Information about weather can also be sought out by using apps like Weather Underground.

The second step to increase productivity starts from selection of crop. In India, many of farmers are not aware of practices which yield maximum. So, to make them aware about crop selection practices, informing them

which crop should be selected and which would result maximum output as well as increase productivity in terms of their income is very important. This work can be made possible by adopting various beneficial apps which are available such as krishi gyan.

Krishi Gyan : This application enables Indian farmers to connect with experts and answer their questions related to farming within the application through notifications.

Kisan Suvidha : This app assists farmers with relevant information on the weather of the current day and next five days, market prices, dealers, agro advisories, and plant protection. It also has extreme weather alerts and market prices of the commodity in the nearest area and the maximum price in the state, as well as India.

After this, the third step deals with the preparation of land for this we must have knowledge about the soil, its quality and how to improve it. For this government has taken a good initiative by introducing Soil Health Card (Ministry of Agriculture and Farmers Welfare Government of India).

The fourth factor is effective use of inputs, which means increasing production through improved seeds, planting materials, and other schemes. In this information and advisory services, new technologies such as space technology and online and telecom facilities can be a major breakthrough also. Nowadays, it is done by use of Kisan Call Centres and Kisan Suvidha App which provide localized solutions to farmers.

SNAP : This app is used to determine the optimum fertiliser inputs for the crop. It works on the principle of hyper spectral imaging of plant leaves. Spectral lines are like fingerprints that indicate presence or absence of a chemical by studying the light reflected by the leaf. When sunlight falls on leaf, the reflected visible light and the near-infrared rays contain specific signals tell about its chemical constituents. Water content, amount of macronutrients such as nitrogen (N), phosphorus (P), potassium (K), magnesium (Mg), calcium (Ca), as well as micronutrients such as sulphur (S), sodium (Na), iron (Fe), manganese (Mn), boron (B), copper (Cu), and zinc (Zn) and so on can be effectively measured using this technology. This app uses mobile phone camera as the imaging device and can be used in the field by the farmers.

The fifth step is to increase productivity is by means focusing on irrigation. India has 159.7 million hectares agriculture land, out of which only 48% is under institutional irrigation which indicates that the rest is rainfed and still remain unirrigated, although government has released schemes such as Pradhan Mantri Krishi Sinchai Yojana but effectiveness can be achieved when farmers get to know when to irrigate and how much to irrigate done by using ICT for scheduling irrigation.

The next critical factor is reducing post-harvest losses. One of the biggest problems of farmers is storage after harvesting; as a result of which they go under distress sale and sell their produce at a lower cost. Harvest Time & Expense Tracker application is a good solution to tackle the problem. For preventing losses, now the focus has been shifted towards storage facilities and integrated cold chains in rural areas to increase the value of the produce. Application related to Cold Chain can be invented to provide information to farmers about nearby cold store which is in working condition and helps them to reduce losses due to transportation and prevent the agricultural produce from getting rotten.

AgriNet : Agriculture Network Information Centre has been formed for providing internet access to quality, authoritative agriculture information, and specialized reference services. In this, use of technologies like satellite remote sensing (SRS) helps in mapping and monitoring features and processes on earth's surface while Geographical Information System (GIS) stores, retrieves, analyses and displays spatial and non-spatial attribute data in a computer to support decision-making. Seamless integration of these technologies holds the key for effective utilization of spatial technologies for solving agricultural problem (5).

In agriculture marketing, e-marketing can be launched like one as electronic-National Agriculture Market (e-NAM) in which mandis are linked for online trading facilities. Addition to it a model like APMC Act must be passed, which includes private market yards and direct marketing. This helps farmer achieving economy of scale and increase bargaining power.

Other than above mentioned factors, few other initiatives can be done such as implementing ambitious Agribusiness Hubs Model, operating on a national platform and establishing multi-functional Agribusiness hubs in all the Gram Panchayats of the country. This will revolutionize the farm economy and create jobs ultimately improving farm incomes. Along with it linking of production with processing can be done. It will benefit farmers a lot and making their backbone strong.

Digital Green is a global development organization that empowers smallholder farmers to reduce poverty by harnessing the collective power of technology and grassroots-level partnerships which uses participatory videos and also explains farmers about best management practices to be adopted. This type of approach can be more cost effective than traditional extension services such as farmers trusting other farmers' advice who are building a livelihood under similar circumstances. It can be helpful in capacity building and skill development also.

In India, paper money is expensive and risky to rural

consumers whereas mobile money is considered to be more safe, especially for women, and costs less to transfer. Government of India has initiated direct cash transfer to farmers' Jan Dhan accounts which allows rural consumers to build poor infrastructure to support savings and access credit facilities to them.

E-Krishi Samvad enables farmers to directly approach ICAR (Indian Council of Agricultural Research) with their problems for effective solutions.

CHC Farm Machinery : Minister of State for Agriculture and Farmers Welfare (MoA&FW), GOI launched a multilingual mobile application for farmers in Punjab, Haryana, Uttar Pradesh, and Delhi at the National Conference on Crop Residue Management in New Delhi. Crop residue burning problem causes health issues and contributes to global warming. The app will allow farmers to connect and avail the services of the customer hiring centres (CHCs) within 50 km of their area. It will connect local farmers from states across the country to CHCs and hi-tech hubs, established under the MoA&FW, without a computer support system and provide their agricultural machinery and equipment on rent – basis to increase their farm income. Earlier, the Indian government created a central sector scheme to support the Punjab, Haryana, and Uttar Pradesh state governments, and to subsidise machinery required for the in-situ management of crop residue through agriculture mechanization.

Bhuvan : It is an Indian Geo-platform of ISRO, involving geospatial spatial technologies for gathering data useful for plantation, pest surveillance and weather predictions. The use of obtained data and information from such resources can be optimized by digitalizing the farm and the farmer. With the COVID-19 situation and the social-distancing protocol, affecting the labour and agricultural inputs availability, smart agricultural technologies like precision agriculture and UAVs can be used effectively to manage agricultural fields.

Kisan Rath Mobile App was launched by Ministry of Agriculture and Farmers Welfare, GOI and developed by the National Informatics Centre, to facilitate farmers and traders to identify suitable transport facilities for the movement of farm produce during COVID-19 lockdown. It will allow help in transportation of farm produce from farm to mandi and further to another mandis. It will ensure seamless supply linkages between farmers, FPOs, APMC mandis and intra-state and inter-state buyers. This app will also reduce wastage and contribute to better pricing of perishable commodities. This app will also facilitate farmers and traders in obtaining transport vehicles for primary and secondary transportation. Here, primary transportation includes movement from farm to nearby mandis and warehouses while secondary transportation would include transport from mandis to intra-state and inter-state mandis, processing units, railway station, warehouses and wholesalers.

Kisan Sabha : Central Road Research Institute (CRRI), a CSIR lab, developed an app called Kisan Sabha to resolve the problems related to the agricultural supply chain. The App was remotely launched by Director General, Indian Council of Agricultural Research (ICAR) and Secretary, Department of Agricultural Research and Education (DARE), Dr. Trilochan Mohapatra in the situation of COVID-19 with the primary objective to connect farmers to supply chain and transportation management system. It acts as a single stop for every entity related to agriculture and provide better price for the crops to farmers and connect to more farmers. It aims to provide the most economical and timely logistics support to the farmers and increase their profit margins by minimizing the interference of middlemen. It will also help in providing the best market rates for crops by comparing the prices in the nearest mandis, booking of freight vehicle at the cheapest cost, thereby giving maximum benefit to the farmers.

Connecting to agricultural universities : Farmer can constantly communicate with researchers and experts in agricultural universities to help them with their problems, enabling them to get solution faster and easier. ATIC, Kisan help lines and Kisan Call Centres can be used for this.

Financing of agriculture : Information about public welfare schemes, MSP prices, insurance schemes, subsidies and compensations help the farmers to access government benefits easily through online system.

KVK activities, namely frontline demonstrations and capacity building programmes, built farmers' confidence to shift from traditional cropping system towards more profitable and sustainable. The team of scientist of KVK collected the baseline information about the village through participatory rural appraisal (PRA) for getting first hand information about the village. On the basis of which, KVKs formulated the strategy to start the activities with capacity building programmes for the farmers and farm women. KVKs adopted the cluster approach and trained farmers for demonstration of recommended technologies. KVKs also worked on crop diversification and other allied activities to help the farmers in realizing more returns from the same piece of land (6).

Price information : ICT can be used effectively to communicate about daily prices to farmers and helps them to decide when, where and how much to sell the produce. Even weekly trends also can be communicated to him via SMSs, newspapers, etc. Satellite technology and drones can be used to constantly monitor farms for pest attacks and other diseases. This information can be communicated to farmers soon to tackle the trouble in the beginning itself and prevent crop losses. Cultivation of

crops can be improved by implementing technologies such as automation, decision support system and agriculture robots.

Pashu Poshan : National Dairy Development Board (NDDB) launched a mobile application for recommending a balanced diet for cows and buffaloes to boost dairy farmers' income by raising milk yield. The application can be accessed by registering on the INAPH portal. This application will benefit dairy farmers across the country. They will get information about balanced ration for their cows and buffaloes through this application," Singh said, adding that the use of this application will boost milk output and income of dairy farmers.

To use this application, the farmer needs to provide complete animal profile, including breed, age, milk production, fat content in milk apart from food items being currently fed to the animal along with the cost in order to formulate the balanced ration formula.

e-Gopala app launched by Prime Minister Shri Narendra Modi, as an online digital medium that help the farmers to choose better quality livestock and provide freedom from middlemen. This app will give all the information related to cattle care, from productivity to its health and diet. This app will give all the information related to that animal easily by inserting the animal Aadhaar number in the app. This will make it easier for cattle owners to buy and sell animals.

PM Matsya Sampada Yojana : This scheme provides new infrastructure, modern equipment and access to new markets to the fish producers, along with increased opportunities for fish farming which facilitates fishermen and colleagues related to fish farming and sale.

mKRISHI@AFisheries : An app developed by Central Marine Fisheries Research Institute (CMFRI) to aid fishermen to increase their catch and reduce the cost of operations. It is mobile advisory service providing information related to the sea, making fishing activities less expensive and environment friendly. The app provides information on Potential Fishing Zone (PFZ), sea surface temperature, weather and the presence of phytoplankton. This app consolidates the information and provides advisories in local languages, with easy to use icons on Java and Android mobile phones. It has been developed by the Mumbai Research Centre of the CMFRI and materialized by Indian National Centre for Ocean Information Services (INCOIS) and the Tata Consultancy Service (TCS) under the National Agriculture Innovation Project (NAIP). Information on the presence of potential fishing zone helped fishers to reduce unnecessary trips and the associated cost of diesel, ice and labour. This app also helps the fishermen to get to know about the wind speed and direction, wave heights in a colour coded band helping them to identify the unsafe regions in sea.

CONCLUSION

The use of modern tools of ICT have lots of potential to help each and every aspect of work including in the area of agriculture which needs to be capitalized so that growth of nation occur along with doubling of farmers income. The main positive impact of doubling of farmers' income will be reflected in the induction of rural youth in agriculture, employment generation and strengthening of purchase power of farmers.

REFERENCES

1. Singh V., Sankhwar S. and Pandey D. (2015). The role of information communication technology (ICT) in agriculture. *Global Journal of Multidisciplinary Studies*, *3(4):* 225-230.
2. Kaaya J. (1999). Role of information technology in agriculture.*In Proceedings of FoA conference*, *4:* 315-328.
3. Kamani K.C., Ghodasara Y.R. and Parsania P.S. (2018). Role of ICT in extension strategies to facilitate doubling of farmers income. *Gujarat Journal of Extension Edu*cation, Special Issue on National Seminar: 1-6.
4. CMFRI, Kochi (2020). State Specific Strategies for Doubling Farmers Income - 2022. Technical Report. Indian Council of Agricultural Research.
5. Mahant M., Shukla A., Dixit S. and Patel D. (2012). Uses of ICT in Agriculture. *International Journal of Advanced Computer Research, 2(1):* 46-49.
6. Sharma R., Choudhary P. and Tandon V. (2019). Initiatives of Krishi Vigyan Kendra (KVK) in Doubling of Farmers Income: A Case Study of Village Sagoon, Jammu. *Journal of Community Mobilization and Sustainable Development*, *14(3):* 379-383.

Received : July-2019 Revised : July-2019 Accepted : July-2020