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Harnessing Information through e-Agriculture

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Introduction

India is an agriculture pivoted country with 55-60% of people involved in agriculture. Among them 85% of the farmers are small and marginal farmers. The recommended standard ratio of extension officer to farmers by World Bank for effective technology transfer is 1:200-500. However, in India, this ratio cannot be met due to the country's large number of farmers. During the pandemic, meeting the farmers in person becomes very hard and agitated. The extension workers may not be able to reach all these small farmers of remote areas in person. Most of the small land holders and women farmers are excluded from the extension system. Those farmers are disbarred and kept out from the updated technologies. On the other hand, internet penetration is increasing in rural India. For an instance, the smart phone usage is being increasing in rural markets which indicate that rural people embracing digital technology in surprising speed. At this juncture, e-agriculture will be a promising solution to bridge the information gap in Indian agriculture. e- Agriculture is the shot in arm and it has promising scope on agriculture in coming decades.

Why e-agriculture?

Despite agriculture plays key role in Indian economy, it encounters numerous challenges which hinder its full potential to achieve the higher productivity and food security. Since the challenges are multi-dimensional, handful of problems can be solved through e-Agriculture. Farmers in rural areas often lack adequate information on inputs, markets, credit, improved technologies, modern farming and other aspects of rural development. Farmers need information on updated cropping techniques for pre-harvest, harvest and post-harvest activities in an integrated and comprehensive platform to assist farmers in making decision. e-Agriculture frameworks can provide a platform to address these concerns by incorporating all the stakeholders in agriculture; the core objective of which will be to provide affordable,

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efficient and effective media for the exchange of information and knowledge supported by information and communication technologies (ICTs).

e-Agriculture is an emerging field in the intersection of agricultural informatics, agricultural development and entrepreneurship, referring to agricultural services, technology dissemination, and information delivered or enhanced through the Internet and related technologies. e- Agriculture is to the use of ICT in agriculture to enhance agricultural productivity, improve livelihoods, and attain sustainable agriculture. Facilitation, support of standards and norms, technical support, capacity building, education, and extension are all key components to e-Agriculture.

e-agriculture is a tool to the extension actors through which they can share, access and provide technological information and technical skills with the assistance of digital tools such as expert system, Internet, Information and communication technology, AI, social media, mobile applications, etc., As internet penetration is increasing in rural areas, farmers also started using internet. The possible benefits of farmers using digital accessories are becoming more useful in getting dynamic information such as weather and market information. Digital agriculture is becoming astonished by its constructive technologies to the innovative farmers. It aids in information exchange, decision making, sourcing market information and sharing of ideas to build sustainable agriculture and rural development. It is inevitable to the extension persons to use the digital tools for transfer of technologies to the huge populations of Small and Marginal farmers.

Scope of e- Agriculture

The scope of e-Agriculture is vast. Some of its uses are Knowledge management through technology dissemination through digital platforms, providing up to date market information which helps farmers to make better and timely decision. It can help farmers adopt precision agriculture techniques such as variable-rate application of inputs, crop mapping, and monitoring of soil moisture levels. This can help optimize crop yields, reduce wastage, and improve resource-use efficiency. e- Agriculture would able to provide the precise information about soil type, seed rate, recommended dose of fertilizers, optimum time and level of application of farm inputs, time of maturation and harvest etc., This will absolutely reduce the cost of cultivation and will assist the farmers to achieve the optimum yield of the crop.

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It can be used to achieve financial inclusion of small and marginal farmers and farm women through digital platforms such as mobile banking and online lending. This will increase farmer's access to credit and insurance, reduce financial risks, and improve their overall income and livelihoods. e- Agriculture can help to improve supply chain management by enabling real-time tracking of agricultural goods and inputs, reducing inefficiencies and wastage, and improving the overall quality of agricultural produce.

In current situation, an illusion was fixed among the youth's mind that Agriculture was unprofitable. As the youth population was more accessible to the smart phones, the digital agricultural extension would attract the young population with its precise information about the scope in agriculture. In fact, agriculture was highly risk based because the important factors of agriculture include weather, climate, monsoon are highly dynamic in nature. The yield of a crop does not reach yield plateau in the consecutive seasons. e-Extension would come up with resolution by providing time to time updates of dynamic information such as market price value, weather updates, wind speed, monsoon arrival etc., Hence it will shorten the probability of risk and failure in agriculture.

Application of ICT tools

Use of Information Communication Technology (ICTs) in agriculture is increasing globally. It replaces humans by automation activities for transferring information effectively. ICTs such as mobile communication, internet, and others are extensively used for information dissemination in agriculture in developed countries. It had been asserted that the advent of ICTs like personal computers, the internet, and mobile telephone during last two decades have provided much wider choice in collection, storage, processing, transmission, and presentation of information in multiple formats to meet the diverse requirement and skills of people. At present digital tools like mobile applications, social media and Expert system are in frontline in providing timely information to farmers.

Mobile applications are most favoured by the farmers. Mobile apps are user friendly and it comes handy for assessing timely information. Farmers took initiative to use mobile apps to grasp advanced information. Uzhavan app is released by Tamil Nadu government is widely used by farmers. It provides around twelve services to farmers. From input services, custom hiring, extension officials visit to crop insurance, marketing and value addition. Expert system is another breakthrough in agriculture. It aids farmers by providing timely information and

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facilitates decision making. TNAU has released expert system for Paddy, Sugarcane, Coconut, Banana, Ragi and Animal Husbandry. It has three components namely Information system, Crop Doctor, Decision Support System.

Cluster based approaches becomes more possible with e-agriculture. Cluster development approaches in agriculture and agro based industries means directing funds and resources inclusively to a cluster of small landholdings. It creates horizontal and vertical linkages between local agricultural enterprises thus the farmers gain connections from other stakeholders in the agricultural value chain. Social media is an avenue for knowing technical know-hows, demonstrations and connecting different stakeholders. WhatsApp, Youtube and Facebook become farmers friendly such that many farmers become members in dozens of WhatsApp groups and community pages. These community group helps in cluster based collective approach and free flow of information. Recently Tamil Nadu government has announced in the Agricultural budget 2023-24 that Whats app groups for farmers will be created at block level for transfer of technology. Through these social media farmers could spot and approach the information providers to obtain knowledge and to get advises based on their problems.

Government interventions

Since the inception of Digital India, Government of India promoting digital based approaches in all sector. Numbers of initiatives are being unveiled time to time to reach the grass root level farmers. National Agricultural Market (e-NAM) is a pan-India electronic trading portal which networks the existing APMC mandis to create a unified national market for agricultural commodities. It promotes uniformity in agricultural marketing, real time price discovery based on actual demand and supply, transparent auction process, providing better price to the commodities based on its quality along with timely online payment.

Tamil Nadu government has announced in agriculture budget 2023-24, a new website will be launched for farmer's welfare. Digital agriculture will be extended to 385 Block Agricultural Extension Centers across 37 districts in the state. A new portal GRAINS (Grower Online Registration of Agricultural Input System) will be introduced in TN in which the basic details like bank account, Aadhar number of land owners and cultivators, land details and crop cultivation details will be collected and digitalized. This platform will enable the farmers to avail various benefits from a single source.

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Nilam app is launched by the district administration association to help the district officials to monitor the KAVIADP (Kalaignarin All Village Integrated Agriculture Development Program) project at all the 64 villages. It includes the details of farmers like phone number, land owned, survey number, water source, irrigation type and cultivated crops. e –Adangal web-based application was unveiled by Department of Revenue and Disaster management, Tamil Nadu. Farmers can view their adangal entry freely and able to download at common e-service centers. e -Adangal can be submitted for farm loans. So, similar digital tools can be utilized for monitoring of government initiatives

Limitations of e- Agriculture

Since most of farmers in rural areas are illiterate, they lack digital skills. Lack of belief on modern technology and embedding in the traditional systems restricts the extension system to promote digital agricultural extension. It limits the farmer's habitat without internet access and it does not fulfill the requirement of the farmers with slow internet access. Proper training may be provided to farmers and other stakeholders to bridge this gap. Mobile apps and websites should be designed as user-friendly.

There are numerable possibilities available for Public Private Partnership in e-Agriculture. The private sectors often lack sufficient incentives in creating and transferring information to the farmers because the information was commercial good in their approach as sellers. Farmers act as the buyers of agricultural advice, as information was a non-rival and non-excludable good, farmer could share the particulars with many more at very low cost. Thus, the private companies lack demand and could lose their investment.

Holistic Approach of e-Agriculture

e- Agriculture would have promising scope and importance in upcoming decades. Technological interventions like Information and Communication Technology, Artificial Intelligence, and Internet of Things in agriculture has lot of potential to achieve food security. Government may organize the training programs for extension personals and farmers on digital agricultural extension tools, advancing and nurturing the farmer's friendly mobile applications. With continued investment and development, these technologies can help to improve agricultural productivity, enhance food safety, reduce food loss and waste, and promote sustainable agriculture. In a nutshell, promoting e-agriculture is essential to help farmers to achieve sustainable, efficient, and profitable agriculture that can contribute to global food security and improve livelihoods.