Use of Information Technology in Agriculture

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ABSTRACT

For each and every country agricultural sector plays a very important and vital role as it completes the basic needs of every country. The main aim of this research paper is to increase in the food productivity with the help of latest technologies available in IT industry. If IT used in a convenient manner, would prove to be favorable in increasing productivity and profitability as well. Usage of technology would further improve the livelihood opportunities for the farmers. We can use here various sensors for temperature, humidity etc and GIS (Geographic Information System) components as well. We can make our farmers acquaint with the latest technologies such as IoT Sensors in Equipment, Drones and Crop Monitoring, Farming and Robotics, RFID Sensors and Tracking, Machine Learning and Analytics etc so that they can make use of them in their farming purpose.

Keywords: Technology, Agricultural Sector, Production, Sustainable Farming Systems, Information Technology.

1. INTRODUCTION

For each and every country agriculture plays as a primary role in rural areas. It is very important to adopt the new upcoming techniques and technologies in the agricultural sector to feed the increasing population. New technologies are required to encourage the yield frontiers to an advanced stage, make use of the inputs resourcefully and diversify to a more sustainable and higher value cropping patterns. These are all knowledge intensive technologies that require both a strong research and enlargement system and skilled farmers. In addition, it also requires an empower interface, where emphasis is put on communal exchange of information, bringing advantages to all. Making use of resources in an impressive manner is stated as the driving force behind the use of agricultural technologies. Various resource conservation technologies are, green manure, crop rotations etc.

Technology needs to be effectively utilized to accelerate production and exploitable of individuals. The main purpose of this research paper is to understand, how to make effective use of technologies in the agricultural sector and to improve yield. There are various types of technologies that are made use of to enhance productivity. The main areas that have been taken into account are, factors relating to adoption of technologies, types of technologies, technologies used in the agricultural sector, advanced agricultural technologies used in the current paper, areas of information technology and role of information technology in agricultural education management.

For well-organized growth and development of the agricultural sector, there is a need to familiarize with new technologies, like biotechnology, nanotechnology, high-tech protected cultivation and modern irrigation methods to accelerate production. These technologies, when utilized in a proper manner, would prove to be beneficial in improving productivity and profitability. Usage of technology would enhance in supporting livelihood opportunities for the farmers.

1. Role of IT in agriculture

Precision farming, is quite popular in developed countries, and broadly uses IT to make direct contribution to agricultural productivity. The techniques of remote sensing using satellite technologies, GIS, agronomy and soil sciences are used to increase the agricultural output. This approach is capital intensive and useful where large tracts of land are implicated. The meandering benefits of IT in empowering Indian farmer are significant and remain to be exploited. The Indian farmer urgently requirestimely and reliable sources of information inputs for taking decisions as well as for increasing yield. At present, the farmer depends on the conventional sources which are slow and undependable. The changing environment faced by Indian farmers makes information not just useful, but necessary to remain competitive.

2. Factors relating to Adoption of Technologies

Demands of the farmers have led to be enlarging in the adoption of technologies. Farmers have always looked to new technologies as a way to reduce the costs. In addition, higher incomes, enhanced knowledge and improved channels of communication are most important consumers to demand low cost food of high quality, gradually

produced through organic methods in many countries, with more variety, consistency and constant availability. At the same time, consumers are increasingly making a demand that their food be created, utilizing the techniques that safeguard natural resources, limit environmental pressure and pay greater attention to rural reasonableness and animal welfare.

Research efforts, farmer's education and guidance, advice and information are transferring towards balancing economic competence with environmental and social sustainability. The main center of attention of research and suggestions was to lead to an increase in profits, and productivity. Emphasis is put on achieving those objectives in a sustainable method which implies usage of technologies and changing farming practices. The technologies that are made use of in the agricultural sector are not always understandable regarding profitability. Research has been conducted to agree on the technology that would be beneficial to increasing production. These priorities contain biological pest control, biotechnology, information technology, bioremediation, precision farming, integrated and organic farming systems.

Some agricultural strategies are positive towards the development of agriculture on environmentally fragile land, over-exploiting natural resources and not requiring farmers to take report of environmental spill-over's into other sectors. Variety of sustenance policies get capitalized into the value of land, inspiring a greater intensity of production and persuading the kinds of technologies employed. Some agricultural policies impose environmental restraints on farmers as a condition for getting support, but at levels higher than otherwise to refund for environmental damage, caused by other agricultural policies. In some countries, the environmental benefits provided by the farmers are salaried, in others they are not.

The farmers need to possess suitable education and information to make use of technologies and farm practices. The farmers will make investments, when they are confident, they will generate profitability. Agricultural policies can change the prices that farmers are in front of for inputs and outputs, which in turn will manipulate their decisions on investment and can lead to unmanageable farming practices. Where the environmental profit from employing sustainable technologies are not expected to accumulate to farmers, but to people outside the agricultural sector, and where there are no markets for the benefits, levels of acceptance could be sub-optimal from a societal perspective. Equally, where the costs of environmental effects of in attendance farming activities are paid by other sectors, farmers will have no motivation to implement environmentally sustainable technologies.

3. Technologies for agriculture sector in present existence

3.1. Tractors on Autopilot: GPS tractors, combines, sprayers and more can correctly drive themselves through the field. After the user has told the committed computer system how wide a pathway a given piece of equipment will cover, he will drive a short distance setting A and B points to make a line. Then the GPS system will have a track to go behind and it extrapolates that line into parallel lines set individually by the width of the tool in use. These systems are able of tracking curved lines as well. The tractor system is tied to the steering, assisting in keeping it on the track.

3.2. Swath Control and Variable Rate Technology: Building on GPS technology is swath manage and Variable Rate Technology (VRT). This is where way really begins to show a return on investment. The farmer is controlling the range of the swath, a given piece of equipment takes through the field. This point is a visual representation of how swath manages works. The savings come from utilizing smaller amount of inputs like seeds, fertilizers, insecticides, pesticides, herbicides, etc. Since the range and shapes of fields are asymmetric.

3.3. Crop Production: In order to enlarge crop production, there are amount of areas that need to be taken into consideration. The farmers need to make sure the seeds, equipment and further materials that are made use of are of good quality, the tasks and functions are performed in a suitable manner and they possess the required skills and abilities. They need to possess sufficient knowledge and awareness to utilize technology in an appropriate manner. Weather change is a technique that is necessary to create a suitable climate for crops. When perfect climate for crops is produced, it leads to an increase in production. For this technology to succeed, it needs to be practical for a long term.

3.4. Biotechnology: Biotech or genetic engineering (GE) is not a new technique, but it is an important tool with much more potential, yet to be unleashed. The form of GE mainly people have possibly heard of is herbicide resistance. The other would possibly be insect resistant traits. The use of insecticides and pesticides are made use of to control pests that may damage the crops. In most cases, biotechnology toxins are made use ofthat is the same toxin found in some organic pesticides. Insecticides and pesticides should be of good quality that crops can easily adapt to and help in augmenting productivity.

4. Areas of Information Technology

The use of information technology in the agricultural division is making existing online services for information, education and training, monitoring and consultation, diagnosis and monitoring, and transaction and processing. E-commerce is primarily used for straight connections between local producers, traders, retailers and suppliers.

Current information requirements to be supplied to the farmers early, about subjects such as, packages of practices, market information, climate forecasting, input supplies, credit availability and so forth. Databases should be formed with the details of the resources of the local villagers, site-specific information systems, expert systems and so forth
.Provision of the before time warning systems about the diseases, pest problems, information regarding the rural development programs, crop insurances, post- harvest technology and so forth. It is very important for the farmers to facilitate the land records and online registration systems. Recording of information is measured essential even in the long term, to identify the improvements that have taken place in various areas. Recording information about productivity in the earlier period and then recording information making use of information technology, enables individuals to find out its benefits. Rearing of livestock, producing milk and milk products is regarded crucial to generate a source of income in rural areas. Persons are involved in the marketing of milk and milk products. Services given that information to the farmers regarding farm business and management.

Increased proficiency and output of co-operative societies through the computer communication network and database technology. Tele-education for farmers, websites created by the agricultural research the newest institutes, making the newest information available to the extension knowledge workers and obtaining their feedback have rendered an important contribution in the development of the agricultural sector. There have been a few initiatives in India, making use of ICT in the agricultural sector. Despite the vast potential to attach ICT for agricultural growth, only a few projects have been initiated in India and a few in other parts of the world.Stimulatingly, numerous of these projects were started by the non-government organizations, private organizations, co-operative bodies and governmental organizations other than agricultural departments. This shows the indifference of agricultural development departments towards incorporating ICT into their daily functions. To frame an approach for complete agricultural development, the remote ICT projects need to be researched upon and the familiarities formed must be recognized to form instructions for the future.

5. Latest technologies that can be used in the future for agriculture

5.1. Earth Sense

Earth Sense has developed an autonomous robot, TerraSentia that contains a variety of sensors to collect data for plants' health, physiology, and some stress response. Earth Sense uses machine vision and machine learning to seamlessly convert field data to specific, actionable information about plant-traits.

5.2. Biome Makers

Biome Makers has developed the first machine learning system integrating micro biome information. They use DNA Sequencing and proprietary Intelligent Computing systems to explain the impact of microorganisms in soil and how they affect different crops.

5.3. Verdical

Verdical is an automated indoor gardening system that allows everyone to grow greens and herbs with the touch of a button. Restaurants can eliminate their supply chain and can also connect consumers directly to their ingredients for an enhanced experience. Verdical transforms indoor areas into artistic, life- sustaining spaces and enables the urban areas to grow their own local food.

5.4. Kray Technologies

Kray Technologies created the world's first digital - and, fully unmanned - drone crop-sprayer that delivers on-demand fertilizers, pesticides to farmers'fields in a proper amount. It requires less fuel, less maintenance, and less staff compared to current alternative methods, cutting down costs significantly for farmers.

5.5. Motorleaf

Motorleaf uses artificial intelligence and machine learning techniques to provide precise and automated harvest yield forecasts for hydroponic, commercial greenhouses. This tool equips growers with software tools to gain better capacities to monitor, control, and also predict the future yields of their harvests.

.1. mOasis

mOasis manufactures BountiGel, which allows growers to optimize the usage of water in agricultural soil. It has been proven to reduce the water usage on a wide variety of crops and transplants, which in turn helps to improve the yields. BountiGel utilizes a non• toxic, next-generation soil additive called Aquamer.

5.6. Trapview

Trapview is an automated pest monitoring and forecasting platform that enables the reliable collection of pest monitoring data. It provides near real-time indications of pest occurrences, it allows growers to successfully respond to situations in the field.

5.7 Kakaxi

Kakaxi is a solar powered farm monitoring device; it is the ultimate tool for farm-to-table transparency. Kakaxi uses sensor technology to capture and to broadcast accurate as well, hyper-local weather data. It helps to create a time-lapse video of food growth showcasing the story of food.

5.8 Vibe Imaging Analytics

Vibe Imaging Analytics has developed Vibe QM, an inspection instrument used for the post harvest grain and seed market. This technology uses machine vision and learning to measure, count, and classifies grain size, shape, and color. Vibe's solution digitizes and streamlines the commercial grading, quality, and yield enhancement process while ensuring compliance with government and with the customer standards as well.

6. Conclusion

Awareness should be generated among young and a middle aged farmer about the availability of ICT services is the first step to be considered to increase farmers' participation in ICT initiatives. Older farmers should be added into the chain of ICT networks at a later stage. To resolve the computer illiteracy at village level some initiatives should be taken for farmers so that their problems related to agriculture may be resolved. User-friendly software, graphic interfaces and pictorial information would encourage the farmers more to IT use. It is considered that in drought-prone and less endowed areas, future ICT initiatives provide information services such as facilitation of access to land records, question-and- answer services, information on rural development programmes, weather forecasting, marketing information, best package of practices for different type of land agriculture, information on crop insurance and post- harvest technology. There are many farmers who are aware and registered themselves, in the iKisan area, for them ICT services should provide early warning of disease and pest problems, question-and-answer services, information on cropping systems and patterns, best and latest packages of practices for crops, weather forecasting, soil testing and sampling, post-harvest technology, input prices/ availability, farm business information and crop insurance.

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