

# A Study on Impact of Information Technology In Agriculture Development

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## Abstract

Agriculture is the science or practice of farming, including cultivation of the soil for growing of crops and rearing of animals to provide food, wool, and other products. Agriculture plays a vital role in India economy. More than 50 percent of rural households depend on agriculture as their principal means of livelihood. India ranks 2<sup>nd</sup> worldwide on farm output. The economic contribution of agriculture to India's GDP is steadily declining with the country's broad-based economic growth. Still, agriculture is demographically the broadest economic sector and plays a significant role in the overall socio-economic fabric of India. Modern farming technology, one needs to acknowledge the role of ICT as a decision support system for farmers. Through the assistance of ICT, farmers are able to study updated with all recent information. This is inclusive of data about weather, agriculture, and newer and more advanced ways of enhancing crop quality and production. ICTs have largely revolutionized the way people, governments, and businesses both large and small, function in the modern world. This paper also examines the present trends and a study on impact of information technology on agriculture development.

**Keywords:** Agriculture, Information Technology, Economic development, uses of contribution.

## Introduction:

The information technology revolution in India, which already has penetrated through villages, is playing a vital role in facilitating the rural youth to explore the world in the quest to find new ways to enrich their cultivation practices; but this is just a start. By 2021, the Smartphone penetration in India was 35.4 percent as against 66 percent in china and 82.2 percent in US. A report by Deloitte-2022 Global TMT (Technology, Media and Entertainment, Telecom) has predicted the total number of Smartphone users in India to increase by 30 percent to reach 1 billion by 2026 from 750 million in 2021. Moreover, the internet usage in India is being driven by rural India as the number of internet users has grown to 351 million in 2021, compared with 341 million in urban India, states a report by the internet and Mobile Association of India (IAMAI)-kantar, based on ICUBE 2021. This speaks about the potential of internet and Smartphone based business in Agriculture in rural India.

India has shown a steady average nationwide annual increase in the kilograms produced per hectare for some agriculture items, over the last 60 years. These gains have come mainly from India's green revolution, improving road, and power generation infrastructure, knowledge of gains and reforms. Technology also has played a big role in developing the agricultural industry. Computer technology has great potential for improving decision making in agriculture and helps in reducing cost and gaining more profit in agriculture activities. Internet and related applications play a primary role in supplying information to farmers and other people involved in agricultural concern. Technology is at the core of most new-age innovations that are enabling access of high-

quality inputs to farmers, farmers' linkages to the market, reduction of post-harvest losses and addition of the extra dose of nutrition in the food we eat.

There are different stages in agriculture. They are

- Crop selection
- Land preparation
- Seed selection
- Seed sowing
- Irrigation
- Crop growth
- Fertilizing
- Harvesting

In all these stages computer technology can be used to enhance the capability of farming.

### **Importance of Agriculture**

Agriculture remains one of the key sectors of the Indian economy, accounting for around 18-20 percent share in the gross domestic product. Approximately, 70 percent of the rural population depends on agriculture and allied sectors for their livelihood. Relatively poorer infrastructural facility is one of the key push factors, while better job opportunities in urban areas is one of the important pull factors contributing to the growing rural-urban migration.

Government of India, through various policies and programmes, is promoting Agripreneurship on a large scale. Our lead article AatmaNirbharta through Agripreneurship provides a brief description of such policies and programmes. It states that a convergence of approaches of various Ministries/Departments of the central Government, along with those of the state governments would go a long way in making the agripreneurs self-reliant and through them make the country AatmaNirbhar.

This sector has invited interest of youth from rural as well as urban areas as evident from the rising number of agri-startups. These agri start-ups are very different in their nature of business when compared to the mammoth business entities that have been serving so far. They don't only provide goods and services to the farmers but also create a bonding with them. This is the new business model that the agri start-ups have introduced. Extension services are part and parcel of their business strategy. They not only sell their goods and services to farmers but create value for them by making the farmers partners in their business, says the article Agri Start-ups: Transforming Agripreneurship.

### **The different computer technologies used in agriculture field -**

#### **eNAM system**

The other characteristics of the agricultural produce marketing in India is that these produces arrive in huge bulk in the market in a very short span of time, many a time, beyond and the management capacity of the existing market infrastructure and the system. The price discovery in the markets of APMCs except for those which are under e-National Agriculture Market (eNAM) has been opaque and heavily monopolistic, in the hands of select aggregators and commission agents.

## Weather forecast system

Agriculture in India is heavily dependent on monsoon. Division of Agriculture Meteorology under the umbrella of India Meteorological Department (IMD) provides the Farmers with location specific and quantified weather forecast to plan the day-to-day work schedule. IMD issues quantitative district level weather forecasts –for rainfall, maximum and minimum temperatures, wind speed and direction, relative humidity and cloudiness-with up to 5 days advance warning and a weekly cumulative rainfall forecast details. These forecasts and advisories for farmers are issued through SMS and Email channels.

Effective weather and climate information and advisory services can inform the decision-making of farmers and improve their management of related agricultural risks. Such services can help develop sustainable and economically viable agricultural systems, improve production and quality, reduce losses and risks, decrease costs, increase efficiency in the use of water, labour and energy, conserve natural resources, and decrease pollution by agricultural chemicals or other agents that contribute to the degradation of the environment.

## The Gps and Gis System

With the combination of the Global Positioning System (GPS) and Geographic Information System (GIS) it is possible to collect real-time data with accurate position information, leading to the efficient manipulation and analysis of large amounts of geospatial data. These data can be used in farm planning, soil sampling, tractor guidance and yield mapping. Farmers can create farm maps with precise acreage for field area, road locations and distances between points of interest. Pest problem areas in crops can be pinpointed and mapped for future management.

## Computer Controlled Automated Irrigation System

Indian institute for management of irrigation has developed the Computer Controlled Automated Irrigation System. This automated Irrigation System is an integrated circuit consisting of – (a) Soil moisture sensor (b) Hardware to interface soil moisture sensor with personal computer and to control water application (c) User friendly GUI application and device driver to control the system.

User can set the upper and lower limits of the soil moisture content. The software checks the soil moisture status at pre-decided time intervals, which is set by the user. Irrigation system automatically starts irrigation when the read soil moisture content is lower than the set lower limit of soil moisture content, and stops when the soil moisture content reaches the set upper limit of soil moisture content. This Irrigation System can be used for drip and sprinkler irrigation methods.

- **Drip irrigation method** is a method of irrigation where it is possible to keep plants and nurseries properly irrigated by gently distributing a low, steady volume of water directly to the roots of plant. Small amount of water delivered through pressurized pipes and drippers without creating problems that might otherwise arise from lack of moisture in the root zone.
- **Sprinkler irrigation method** is a method of applying irrigation water which is similar to natural rainfall. Water is distributed through a system of pipes by pumping the water into pipes. It is then sprayed into the air through sprinklers so that it breaks up into small water drops and spray water over crops and plants.

## Agricultural Drones

Relatively cheap drones with advances sensors and imaging capability are giving farmers new ways to increase yields and reduce crop damage.

- ❖ **Drones for pest control:** The farmers spray pesticides uniformly over their crop to protect them from fungal attention. But if they use drones, farmers can selectively spray pesticides only on plants that need attention, thus minimizing environmental damage and saving money.
- ❖ **Drones are fitted with payloads such as cameras:** Enable farmers to get a bird's eye-view of their crop by flying at low altitudes. Using Infra-red imaging, drones can also detect which plants are sick and which ones are healthy. Healthy plants reflect more infrared radiation, as opposed to plants which have fungal infections. With this information farmers can selectively spray pesticides only on plants that need attention.
- ❖ **Drones for monitoring plant growth:** Drones are used to get higher quality and higher precision images in real time as they can fly below the clouds. These images are translated to useful comprehensible information with the help of image processing software. The information that are generated with these images are, crop height, density, leaf area, anomaly detection, plant count, plant size, plant height, water needs of damage/drown out crops etc. so, drones ensure a permanent monitoring of the crop in the field from planting to harvest.

### **Automation Solar Powered Seed Sowing Machine**

The Automated Seed Sowing Machine automatically sows the seeds in the agriculture field based on the pitch value entered by the farmer. Seed sowing mechanism is responsible for sowing the seeds at a particular pitch. It consists of hopper in which seeds are added and a small plough which digs the field. The machine is programmed to stop at regular interval of distance and at particular pitch to sow the seed from the hopper into the field. The machine runs using battery which is charged through solar energy.

### **Automated Fertigation system**

Fertigation is the process of delivering plants nutrients and water to produce a quality crop with higher yields. Automated fertigation system helps farms to make informed decisions on the usage of water and nutrients thus reducing the disease in plants. Fertilizers are premixed at the final feed strength concentration for the crop and stored in a tank or reservoir until used. Automated Sensors attached to the system measure the moisture in the soil, if it gets too dry, the crop is automatically irrigated. Fertigation system can be directly attached to existing sprinkler and drip irrigation system. Timely fertigation system is integrated with the facility's environmental control system where it can be monitored and managed from a centralized user interface.

### **Automation in Aquaculture**

Eruvaka Technologies is an organization based in Vijayawada, Andhra Pradesh helps farmers to monitor aquaculture ponds, develops solar-powered floating buoys that measure different water parameters, such as oxygen levels, temperature and pH range which is crucial for the growth and survival of fish and shrimp. The collected information is uploaded on the cloud and transmitted to individual customers through an Android app, SMS, voice call or the internet. Based on this information the farmers can take up necessary decisions in fishing.

### **Conclusion**

In India, the farmers are still following traditional way of agriculture, which has disadvantage of increased use of water, fertilizer, and pesticides, which in turn keeps food price down and lowers crop productivity. There is a demand in increase in agricultural production, as the population is increasing every year; the demand for food is expected to increasing. With the traditional way of agriculture this demand for food cannot be fulfilled. So, it is a necessary to adapt to the technology in agriculture as it improves decision making in agriculture. The efforts of the farmers can be reduced with the help of modern machines. Effective weather and climate information and advisory

services given by the weather forecast system, benefit the farmer in making decision in agricultural activities. Global Positioning System (GPS) combined with Geographic Information System (GIS) gives real-time data of farming field which can be used in farm planning, soil sampling, tractor guidance and yield mapping. Agricultural drones with advanced sensor and imaging capabilities helps farmers in pest control and monitoring the plant growth. Computer Controlled Automated Irrigation System can be combined with drip or sprinkler method. So, usage of computer technology in different stage of agriculture allow farmers to be more profitable, efficient, safer, and more environmentally friendly.

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