The Pharma Innovation Journal 2022; SP-11(1): 961-963

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(1): 961-963

www.thepharmajournal.com
Received: 01-11-2021
Accepted: 03-12-2021

Rahul Singh Chowhan
M.B.M Engineering College, J.N.V. University, Jodhpur, Rajasthan, India

Purva Dayya
Extension Education, Mayurakshi College, Jodhpur, Rajasthan, India

Corresponding Author
Rahul Singh Chowhan
M.B.M Engineering College, J.N.V. University, Jodhpur, Rajasthan, India

E-agriculture based methods & tools for agricultural sustainability

Rahul Singh Chowhan and Purva Dayya

Abstract
The Indian economy is based on agriculture. Despite the fact that agriculture accounts for around a sixth of our national GDP and employs 58 percent of our people resources, it has a significant impact on our economy. A computer is an electronic device that may store information such as budget data, farm equipment inventory, and animal health forms. Farmers, like many other small company owners, employ simple computer applications. Farmers utilize the internet, remote sensing, and geographic information systems to expand their knowledge, to monitor soil and field crops.

Keywords: Indian farmers, image sensing, computer in agriculture

1. Introduction
Agriculture accounts for about 26% of total GDP. In 2016, Gross Value Added (GVA), agriculture and related industries, industries and services grew at 9.64%, 8.32% and 11.87%, respectively [1]. Agriculture plays an important role in economic and social development in most developing countries. Adequate quality information is a necessary condition for improving all areas of agriculture. With the rapid advancement of computers, the preprocessing of data and related information can be efficiently created, stored, analyzed and disseminated and used to support farmers and agricultural communities in increasing the productivity and sustainability of agriculture. The application of computers to agriculture was originally used for simple and accurate calculations by converting statistical formulas or complex models into digital farms, which proved to be relatively tedious to calculate manually [2, 3]. In the next generation, the same computers were used to mechanize, automate and develop strategic decision support systems for agricultural production and defense research. Remote sensing contributes to yield prediction, soil suitability of crops, and resource allocation to various agricultural resources [4]. This article aims to review and define the role of computers in agricultural development in rural India, most importantly the sharing of computers in disseminating agricultural information to farmers and agricultural communities. GIS is a semi-automated computer hardware infrastructure that includes software that can collect, store, process, analyze, isolate and display identified geographic and geographical location information.

2. Impact of Growth
The rapid growth of computer and Internet use by agricultural producers indicates that many farmers see the technology as a positive and growing competitive advantage. A 1997 USDA/National Agricultural Statistics Service (USDMNASS) survey found that 31% of American farmers own or rent a computer. Only 13% have internet access. By 2001, these figures had increased to 50% and 43% (USDMNASS, 2003). The adoption and use of computers and the Internet by farmers depends on the expected impact on farm productivity and competitiveness. These impacts may be related to various internal factors related to computer use, such as more efficient record keeping, decision-making and production processes [4].

3. Major Imaging Technologies in Agriculture
3.1 GIS
Geographical Information Systems (GIS) is a technology that provides a means to collect and use geographic data to facilitate agricultural development. Digital maps are usually much more valuable than identical maps printed on paper. This is because the digital version can be combined with other data sources to analyze the information in a graphical representation.

Most operational GIS are used for topic mapping, spatial query processing, and decision support [5]. GIS is widely applied not only in agricultural research but also in practical applications in the field, and has many applications and tactical advantages in the agricultural industry in the near future.

3.2 Remote Sensing
Remote sensing methods are widely used in agriculture and agronomy. The use of remote sensing is essential for monitoring various agricultural activities. The information remote sensing center plays an important role in providing an overview of agricultural science as it is very suitable for collecting information on a large area with high revisit frequency [6]. We promise to help identify and prevent hazards like by analyzing the flood situation caused due to continuous rains and analyzing pest infestations in advance. Collecting this statistical data allows farmers to make effective decisions before sowing to increase yield and crop quality [7]. It can also benefit changes, crop rotations, and crop types as changes in soil are detected. This allows you to preserve the quality of your results while maintaining maximum growth.

4. Conveniences of Remote Sensing and GIS
Agricultural planning has always been a home-based working framework. This largely depends on the recorded facts and data sets obtained for large lands surveyed over several years or so. However, there are several natural factors that can influence the inability to find a satisfactory record. We have identified various factors that affect crop growth and corresponding quality indicators to assist GIS farmers.

4.1 Precision Agriculture
Remote sensing can benefit precision agriculture, allowing the farm to fully produce high-quality products. It can help to eliminate outdated data collected only on the basis of previous facts and draw more rational conclusions about quality agricultural tactics [8]. It provides crop statistics for decision-making and planning, including other functions such as crop growth and soil condition monitoring, and enables the generation of periodic revised reports related to the total area cultivated.

4.2 Soil and Weather Data
It also helps to efficiently collect soil and weather impact data based on real-time data collection. Soil quality varies within the same field. The amount of sunlight, shade and rain in different areas also varies, affecting the overall quality of the crop.

4.3 Food Resource Mapping
Remote sensing is essential to map food sources vulnerable to natural disasters. The World Food Program (WFP) is one of the largest users of GIS data to take action based on drought and flood condition data. The organization also plays an important role in protecting the food supply by building projects such as dams and irrigation.

4.4 Land Monitoring
GIS can help to recognize impervious soils in affected areas. Land monitoring is carried out to find the archaeological features of the land. It has proven to be an essential agricultural science tool for gaining quality information and making quick decisions.

4.5 Land Identification
GIS also plays an important role in identifying new land on which suitable crops can be planted. It also includes the ability to continuously deliver production to make existing production efficient or to meet the needs of a growing population.

4.6 Realistic Structural Monitoring
The earth's surface is a restricted reservoir with an enormous quantity of spatial data that needs painstaking manipulation, in-depth analysis, and structural modeling [9]. GIS can help you do this in a realistic and productive way. Remote sensing may also improve it by estimating yields based on inputs including temperature and habitat analysis, mineral area changes, soil change, water availability, land type, favorable weather conditions, environmental evaluation, and so on.

5. Role of E-commerce in Agricultural Sector
The use of the Internet has had the effect of shrinking the planet. In recent years, e-commerce has entered the agricultural sector. E-commerce is increasingly used in agriculture as the Internet becomes more and more popular among those involved in all types of agricultural businesses. To actively participate in e-commerce, both buyers and sellers must have Internet access [10]. Not only that, but the fact that you are at least familiar with basic hardware and software usage. In today's world, most of the typical transactions such as the purchase, production, sale, packaging and shipping of products in small agricultural enterprises rely on e-commerce. Through Internet forums, social networking sites and online knowledge bases, farmers receive a lot of information. With their help, they contact other farmers and experts and exchange know-how. There are many online databases, articles, and newspapers that provide a lot of information to help farmers increase their productivity.

6. Conclusion
Farmers may also use computers to improve and refresh their knowledge, but a variety of factors influence computer users, including the complexity of the farm, the degree of external help, age, time, network, personality, and learning strategy. Formal classes might be created to address these issues, and the availability of authorized material should be enhanced. This also aids future planning for crop-oriented land management in order to evolve and expand socio-economic activities. Modern advancements in the fields of remote sensing and geographic information systems (GIS) promise to integrate all accessible data from a management standpoint. GIS not only facilitates the extraction, processing, and loading of needed data, but it also supports crucial decision-making tools for problem-solving in support of long-term agricultural growth and sustainable agriculture challenges. Remote sensing data, primarily in the form of large images, can be used to detect nutrient and mineral deficiencies, widespread crop diseases, water scarcity or excess, weed infestation, pest and insect damage, and more. Remote sensing and GIS are efficient and effective technological systems that propose potentially mature action plans based on management policies to ensure agricultural and environmental sustainability of any region.

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