A STUDY OF SMART AND INTELLIGENT FARMING: THE FUTURE OF AGRICULTURE-LITERATURE REVIEW

Abstract

Almost every industry can be improved thanks to the Web or Internet of Things (IoT). The World Wide Web and Internet of Things in agriculture has not only made it possible to carry out activities that were previously labor- and time- intensive, but it has also significantly changed how we view agriculture. Many people think that the Internet of Things can benefit every aspect of agriculture, from crop-growing to forestry. Despite the fact that IoT can greatly enhance agricultural Intelligent agriculture refers to managing farms with the use of modern technologies for communication and information in order to maximize the necessary labor of people while increasing the amount and quality of the produced goods. According to the research presented in this paper, environmentally conscious farming has the potential to result in a more productive and resource-efficient form of agricultural production. Finally, new farms will satisfy humanity's.

Keywords: Smart, Farming, Intelligent, Future

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I. INTRODUCTION

Agriculture is like the life force of a nation, just as India's information system and cultural heritage is its backbone. As a civilization, we have always worshiped nature and were a prosperous society that focused mainly on agriculture, but we eventually embraced other areas as well. Agriculture remains the largest contributor to India's GDP and this number is expected to double or even triple in the coming years. In addition, the life of farmers was made easier by the development of technology and the restoration of organic agriculture. India is one of the world's largest food exporters. Therefore, it is necessary to continue to support agriculture as a country. As the population increases along with changes in food and climate conditions, new smart technologies are needed that affect all aspects of human activity. A developing concept in contemporary agricultural enterprise management is the notion of smart agriculture. In the realm of farming, smart agriculture entails the utilization of a diverse array of tools and software designed to streamline and automate routine tasks. These technological solutions are now accessible to not only small-scale private farms but also to large agribusinesses, owing to the widespread proliferation of the internet and mobile devices. Farmers can increase production and compete with larger farms because of this. Given that using intelligent farming methods has indisputable business benefits over using traditional methods, it is important to examine this approach's defining features. The application of advances in technology into farming procedures is the core of intelligent agriculture. Agrarian practices and crop cultivation evolve into "intelligent" undertakings by integrating man-made satellites, machine learning, extensive datasets, the Network of Connected Devices, and an array of cutting-edge technologies. These advancements empower agriculturalists to optimize their workflow management and attain superior results. All of this decreases the amount of manual labor, lowers financial costs, and boosts production volumes, improving the efficiency of the agricultural industry. The application of cutting-edge technologies in agriculture is more crucial than ever right now. Up to 2050, the population of the globe is expected to increase by 34%. Higher yields and efficient use of natural resources are necessary for this. The situation is getting worse due to climate change. Adopting efficient working techniques is important as a result of all of this. How might intelligent agriculture benefit regional agriculture? The tools and methods available to farmers today from service and technology providers allow them to optimize practically every aspect of their business, from field surveillance to greenhouse design. climate and crop harvesting. The concept of "climate-smart agriculture" is unique and focuses on the influence of weather on agricultural decision-making.

II. RESEARCH METHODOLOGY

Descriptive analysis of secondary data is used in research to help smart agriculture in local agriculture. Several publications were obtained through articles, blogs, journals and references. The researcher conducted a literature review to determine which factors might play a role. To identify smart agricultural technologies that can give a boost to the declining traditional agricultural sector. Using smart techniques like precision agriculture, efficient water management, soil moisture and moisture monitoring are imperative methods to increase yield per acre..

III. REVIEW OF LITERATURE

1. Smart Farming and the Use of Technology in Agriculture. October 21, 2022. The prospects of every aspect of farming lies in innovative agriculture. By using it, farmers may effectively monitor production to satisfy the population's expanding requirements while also fostering an environment that is both socially and environmentally responsible. Modern technology may give farmers complete management, monitoring, planning, and research skills. The advancement of smart cultivation is intricately tied to technological progress, notably revolving around satellite technologies. Modern, Orbiting spacecraft have the potential to significantly enhance agricultural operations and act as a vital component in the decision-making process. Platforms such as EOSDA Crop Monitoring can facilitate data transmission between each IoT node, simplifying the integration of processed satellite imagery into customized systems. As we look to the future of precision farming, we extend our horizons beyond Earth into space. The potential future of agricultural production hinges on the pursuit of efficient farming practices.

   By using it, farmers may effectively regulate production to meet the population's expanding requirements while also fostering an environment that is both socially and environmentally responsible. Farmers today have access to powerful management, monitoring, planning, and research techniques.

2. To create a more sustainable planet, utilize innovative farming and accurate farming. July 21, *2023,*Applying fresh innovations developed in agriculture and processing at the start of the fourth industrial revolution, agricultural innovation aims to improve production quantity and quality while utilising resources as efficiently as possible and reducing environmental effect. Increasing food security globally is also made practical by the use of technology in processing and agriculture. Among the disruptive and emerging technologies for agriculture today, the Internet of Things enables farms to be better monitored, primarily with the help of smart sensors that can measure solar radiation, control the humidity and temperature of each animal's leaves, measure the diameter of the animal, and regulate the temperature of the farm. Artificial intelligence, robotics, and agriculture are mostly used to interpret field photographs, administer nutrients and insecticides precisely, or destroy weeds. For instance, on a farm, this entails the use of microphones to detect screaming piglets being pinched by a man and the transmission of a vibration to him via a sensor to cause him to rise up.

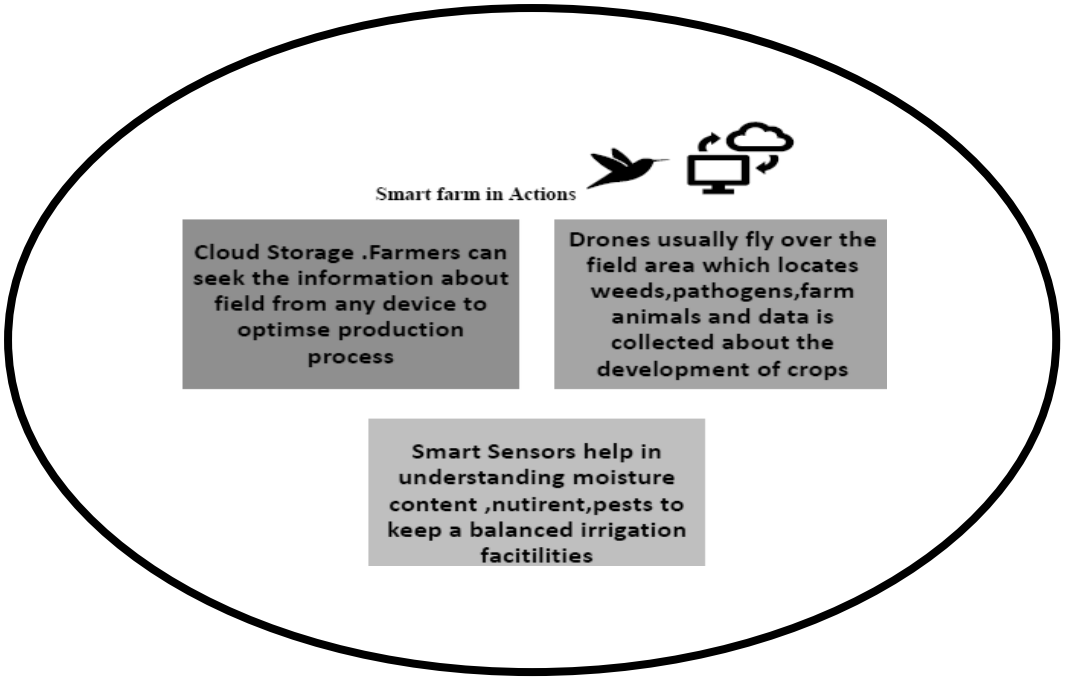

Figure1: Smart Farming And Its Technologies Application In Agriculture. (2022, October 21)

3. Sustainable Farming - Modern Agriculture Technologies 21st July 2023, With the use of devices and software, intelligent agriculture aims to boost farm output. Using IoT, drones, robotics, machines, and artificial intelligence, innovative farming focuses on controlling farms, cultivation, and other connected agricultural operations to provide a stable agribusiness environment. In order to manage the operations of the agricultural company, smart agriculture relies on using data from several sources (historical, geographical, and instrumental). Progress in technology does not automatically imply intelligence in a system. Intelligent agriculture technologies stand out thanks to their capacity for storing and comprehending data. In order to collect data and offer useful insights, smart agriculture employs hardware (the Internet of Things) and software (Software as a Service, or SaaS). to gather information and offer useful analysis so that the farm can manage every aspect of its operations, both before and after harvest. The data is well-organized, always accessible, and packed with details about every aspect of the economy and field activity. It can be accessed from any location in the world.

   To maximize productivity and profitability, each farm is examined to identify the best crop varieties and necessary inputs.

   - On a digital platform, there is a single location for all agricultural information.
   - Cost-saving measures include early detection and application of inputs just where they are needed.
   - Identifies various facility zones using satellite photography.
   - Reliable weather forecasts reduce losses and maximize resource utilization
   - Automation of labor tasks improves productivity and time and cost effectiveness.

4. According to IBEF's report on "Smart Agriculture Strategies in India," accessed on July 22, 2023, sustainable agricultural methods are of paramount importance -Land of India is under enormous stress due to rising numbers of people and changing eating habits. As crop levels decline and soil degradation gets worse, groundwater becomes more in short supply, biodiversity disappears, and disasters caused by nature worsen, farmers find it difficult to keep up. Additionally, agriculture contributes for almost 14% of all emissions of greenhouse gases in India. Climate-smart agriculture (CSA) can assist in gently altering agri-food systems and reducing the catastrophic consequences of climate change while sustainably generating food and energy. Farmers in India are starting to understand the advantages of CSA. An integrated management strategy for agriculture, cattle, forests, and fisheries is called CSA. CSA can assist in increasing food production without sacrificing quality, which will increase productivity. CSA is an integrated method of managing fisheries, livestock, forests, and agriculture. Increased productivity: CSA can aid in increasing food production without sacrificing quality, which would support food security and spur income growth for farmers, particularly those in low-income and marginalized communities. CSA can lessen risk to pests, drought, and climate-related shocks and risks, improving resilience. In long-term harsh and unfavorable settings, it can also aid farmers in thriving and growing. Reduced emissions are one of the major advantages of CSA, which are anticipated. Automation will result in less labor-intensive processes, reducing emissions from food production, halting deforestation, and lowering atmospheric concentrations of greenhouse gases like carbon dioxide. People consequently use less energy from non-ecological sources.

5. M. A., A. Gad, and M. B. Zahran (2021). (Bacco 2019). the application of artificial intelligence and the "Networked Devices." in the management of cyber-physical farms serves as the cornerstone of smart agriculture. Because it allows for the monitoring of changes in meteorological conditions, soil characteristics, soil moisture, etc., smart farming helps to solve numerous issues with crop production. As a result of the Web of Things (also known as IoT) technology's ability to connect devices through the Internet for autonomous operation, it is possible to connect a variety of remote sensors, including robots, ground sensors, and drones. Precision agriculture's major goal is to increase plant output while preventing the misuse of pesticides and fertilizers Amato (2015) and Efat and El-zeiny (2017), it is apparent that agricultural enterprises must enhance their administrative practices. Numerous studies have focused on the application of Artificial Neural Network (ANN) models in the context of Smart Irrigation Water Management (SIWM). The assessment of reference water loss through evaporation ETO) holds great significance in agricultural irrigation, as it forms the basis for establishing irrigation schedules, as noted by Cruz-Blanco in 2014.) While effective ET prediction demands a substantial amount of data, the Penman-Monteith (PM) model remains the most commonly employed method for estimating evapotranspiration, as highlighted by Shitu 2018.GIS can save a lot of water since it combines GPS, artificial intelligence, remote sensing, and other techniques without which irrigation would not be possible

IV. ETHICAL PRACTICE

The collecting of data has frequently been justified as necessary in the past, and subsequent discussions regarding potential misuse of the data have frequently been held at the expense of ethical issues. The explosion of big data in new cultivation, however, makes it

paramount important considerations such as access, control, and consent. Big data holds the potential to significantly enhance agricultural productivity and profitability. However, several critical issues must be addressed, including access, equitable benefit sharing, data ownership, rights, and overall data management.These matters necessitate thoughtful resolution. It is imperative to explore the opportunities presented by digital technology and identify any knowledge gaps within the agricultural value chain. Building trust among key stakeholders, including large agricultural enterprises and farmers, is vital. It's worth noting that data ownership translates into control over its use and dissemination. Consequently, it becomes essential to gain insights into data collection and utilization, bridging the digital divide, and fostering transparency. This can be achieved through addressing relevant ethical concerns and involving all stakeholders, particularly farmers, in an open dialogue within the agricultural sector.than ever to pay attention to the ethical principles of data management (access, control, and consent). Big data can aid in boosting agriculture output and profitability. Access, benefit sharing, equity, inclusion, data ownership and rights, and data management are just a few of the issues that need to be resolved.

Addressing issues like what opportunities do digital technology bring is crucial. Are there any gaps in the knowledge and comprehension of those involved in the value chain? How can trust between people grow major agriculture businesses and farmers? As you are aware, whoever owns the data has control over how it is viewed.

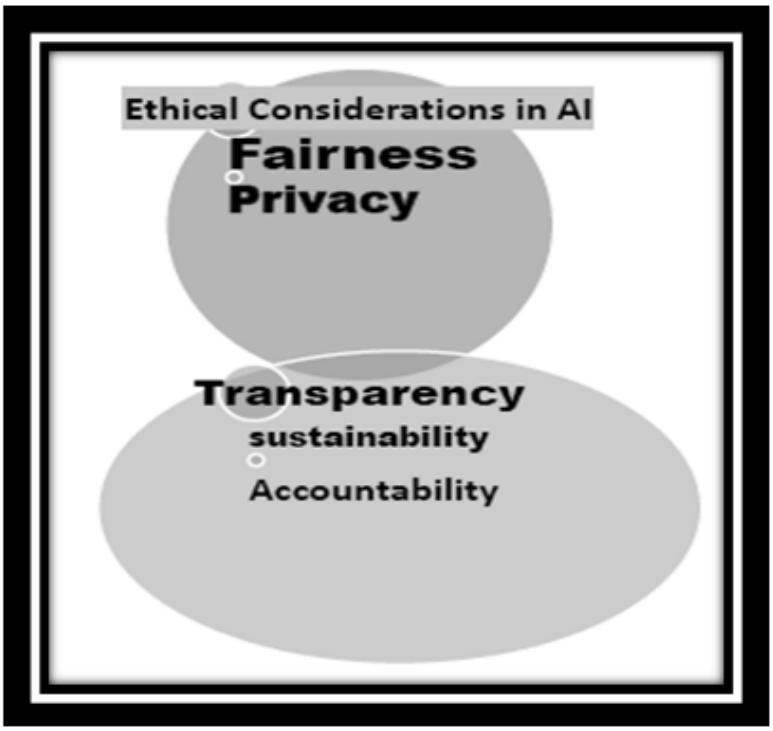

Figure 2: Van der Burg, S., Bogaardt, M. J., & Wolfert, S. (2019). Ethics of Smart Farming:

V. CONCLUSION

Climate change has a significant impact on poor and marginal farmers who depend on agriculture for their livelihood. Risks from things like global warming can be reduced with

the use of technology and wise practices. India is consistently committed to formulating and implementing policies aimed at enhancing the sustainability of its agricultural sector. The ongoing transformations in farming and agriculture hold the promise of being revolutionized by the integration of artificial intelligence. Collaborative initiatives between the private sector and government can play a pivotal role in nurturing the growth of a smart agriculture industry, capitalizing on India's dynamic corporate landscape.

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