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

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| **Abstract:**The Internet of Things (IoT) has provided ways to improve almost every industry imaginable. In agriculture, the Internet of Things has not only provided solutions to often time-consuming and labor-intensive tasks, but has completely changed the way we think about agriculture. Many believe that IoT can add value to all aspects of agriculture, from growing crops to forestry. Although IoT can improve agriculture in many ways Intelligent agriculture means managing farms using modern information and communication technologies to increase the quantity and quality of products by optimizing the necessary human work. This paper provides smart agriculture has the real potential to produce a more productive and sustainable form of agricultural production based on a more precise and resource-efficient approach. New farms will finally fulfill humanity's eternal dream. It will feed our population which is exploding.**Keywords**: Smart, Farming, Intelligent, Future |

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**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. Smart agriculture is a relatively new concept in advanced agricultural enterprise management. Smart farming in agriculture means the use of various software and devices to optimize and automate routine processes. With the spread of the Internet and mobile devices, such technologies have become available not only to large companies, but also to small private sites. This helps farmers optimize production and compete with larger farms. Since intelligent agricultural practices have undeniable advantages for companies compared to traditional methods, it is worth taking a closer look at the specifics of this approach. The essence of intelligent agriculture is the introduction of new technologies in agricultural activities. The use of drones, artificial intelligence, big data, the Internet of Things, satellites and more make farming and agriculture "smart", allowing farmers to optimize their work and achieve better results. All this reduces the proportion of manual work, lowers financial costs and increases production volumes, making agricultural business more cost-effective. Now, the use of advanced technologies in agriculture is more important than ever. According to forecasts, the world population will grow by 34 percent until the year 2050. This requires higher yields and optimized use of natural resources. Climate change is making the situation worse. All this makes it necessary to adopt effective working methods. How could smart agriculture help local agriculture? Today's service and technology providers offer farmers the tools and techniques to optimize literally every step of their operation, from monitoring fields and using drones to deliver pesticides to creating the ideal greenhouse climate and harvesting crops. Climate-smart agriculture is a distinct approach that specifically focuses on the impact of weather conditions 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 Its Technologies Application In Agriculture*. (2022, October 21). Smart agriculture is the future of all agricultural production. Its implementation enables farmers to effectively manage production that meets the growing needs of the population, creating a human and ecological environment. Modern technologies can provide farmers with comprehensive management, monitoring, planning and research capabilities. The spread of smart agriculture is inextricably linked to the development of technology, especially satellite solutions. Modern and universal satellites can significantly contribute to the optimization of agricultural activities and be a key link for making production decisions. Platforms such as EOSDA Crop Monitoring can participate in data transfer between each IoT link and facilitate the integration of processed satellite images into dedicated platforms. The future of smart agriculture on Earth is in space. Smart agriculture is the future of all agricultural production. Its implementation enables farmers to effectively manage production that meets the growing needs of the population, creating a human and ecological environment. Modern technologies can provide farmers with comprehensive management, monitoring, planning and research capabilities.

 2. *Smart farming, precision agriculture to achieve a more sustainable world*. Iberdrola. Retrieved July 21, 2023,Intelligent agriculture means the use of new technologies born in agriculture and processing at the dawn of the fourth industrial revolution to increase the quantity and quality of production, using resources as much as possible and minimizing environmental impact. The introduction of technology in agriculture and processing also makes it possible to increase food security around the world. Among today's disruptive and future technologies for agriculture, the Internet of Things allows optimizing the monitoring of farms mainly with smart sensors that can measure everything from solar radiation to controlling the humidity and temperature of the leaves of each animal, the diameter of the animal or controlling the temperature of the animal. Agriculture, artificial intelligence and robotics are mainly used to interpret field images and apply fertilizers and pesticides with surgical precision or control weeds. On a farm, for example, this means that microphones can be used to detect screaming piglets that are pinched by a guy, and a vibration can be sent to him via a sensor to make him stand up.

**Smart farm in Actions**

 *3. Smart Farming- Advanced Agriculture Technologies [Updated 2023]*. (n.d.). Retrieved July 21, 2023, Smart farming focuses on increasing farm productivity with the help of technology - hardware and software. Smart agriculture focuses on managing farms, plantations and all related agricultural operations using IoT, drones, robotics, machines and artificial intelligence to pave the way for predictable agribusiness. Smart agriculture focuses on the use of information from different sources (historical, geographical and instrumental) to manage the operations of the agricultural enterprise. Technological progress does not inherently mean that it is an intelligent system. Intelligent agricultural technologies are distinguished by their ability to store data and understand it. Smart agriculture uses hardware (IoT) and software (Software as a Service or SaaS) to collect data and provide actionable insights to manage all operations on the farm, both pre-harvest and post-harvest. The data is organized, available at all times and full of information from all economic and field work fields, which can be monitored from anywhere in the world.

**Smart farming**

* Each farm is analyzed to determine appropriate crop varieties and input requirements for optimization and profitability
* All farm information is centrally located on a digital platform
* Early detection and application of inputs only in the affected area, saving costs
* Uses satellite imagery to identify different zones of facilities
* Reliable weather forecasts maximize the utilization of resources and minimize losses
* Automation of work tasks increases productivity and time and cost efficiency

*4. India’s Smart Agriculture Strategies | IBEF*. (n.d.). India Brand Equity Foundation. Retrieved July 22, 2023, Sustainable agriculture -A growing population and changing diets have put enormous pressure on India's land. Farmers struggle to keep up as crop levels flatten, soil degradation increases, water scarcity increases, biodiversity declines and natural disasters increase. In addition, agriculture accounts for nearly 14 percent of India's total greenhouse gas emissions. Climate-smart agriculture (CSA) can help sensitively transform agri-food systems and mitigate the devastating effects of climate change, while producing food and energy in a sustainable way. Farmers in India are gradually realizing the benefits of CSA. CSA is an integrated approach to managing cropland, livestock, forest and fisheries. Improved productivity: CSA can help produce more food without compromising quality, which would contribute to food security and boost income growth for farmers, especially for poor and marginalized groups. Improved resilience: CSA can reduce vulnerability to pests, drought and climate-related shocks and risks. It can also help farmers grow and thrive in long-term stressful and adverse environments. Reduced emissions: One of the main benefits of CSA is expected to be reduced emissions. Automation will lead to less labor-intensive operations, which would help reduce emissions through food production, prevent deforestation, and reduce emissions of greenhouse gases such as carbon dioxide into the atmosphere. This results in people reducing energy from non-ecological sources.

5. M. A., Gad, A., & Zahran, M. B. (2021). Smart farming for improving agricultural management. *The Egyptian Journal of Remote Sensing and Space Science*, *24*(3, Part 2), 971–981 Intelligent agriculture is a technology whose implementation is based on the use of artificial intelligence and the Internet of Things in cyber-physical farm management (Bacco et al., 2019). Smart farming solves many problems related to crop production, because it allows monitoring changes in climatic factors, soil properties, soil moisture, etc. With the Internet of Things (IoT) technology, it is possible to connect various remote sensors, such as robots, ground sensors and drones, because this technology allows devices to be connected using the Internet for automatic operation (AlMetwally et al.) The main idea of ​​precision agriculture is to improve the administrative practices of agricultural enterprises, on the one hand to increase plant production and on the other hand to avoid misuse of fertilizers and pesticides (Amato et al., 2015 Efat and El-zeiny, 2017). Many studies have been done on the application of ANN models in Intelligent Irrigation Water Management (SIWM). Evaluation of reference evapotranspiration (ETO) is one of the most important parameters in crop irrigation because it determines the irrigation schedule (Cruz-Blanco et al., 2014). The Penman-Monteith (PM) model is most commonly used to estimate evapotranspiration, although it requires a large amount of data to estimate ET accurately. (2018, Shitu et al) Because GIS is combined with remote sensing, artificial intelligence, GPS and other technologies, it can save significant amounts of water that would otherwise be needed for irrigation.

**Ethical Practice**

Until now, ethical considerations have often been sidelined because the collection of data has been deemed necessary, and concerns about how the data could be misused have subsequently been discussed. However, with the proliferation of big data in smart agriculture, it is more important than ever to focus on the ethical aspects of data management (access, control, consent) and practices. Big data can help improve profitability and productivity in the agricultural sector. A number of challenges remain to be addressed, such as access, benefit sharing, equity, inclusion, data ownership and rights, and data management. It is important to address questions such as what opportunities do digital technologies offer? Does everyone in the value chain have the same information and understanding? How does trust develop between large agricultural companies and farmers? As you know, views of data can be controlled by anyone who owns the data. Addressing the right ethical issues and engaging all stakeholders in the agricultural sector (especially farmers) in an open dialogue, it provides valuable insights into how data is collected and used and for what purposes, how to bridge the digital divide and how to create transparency to build trust between stakeholders.

**Conclusion**

Poor and marginal farmers who depend on agriculture for their livelihood are greatly affected by climate change. Technology and smart practices can help reduce risks from, for example, climate change. India is constantly trying to formulate and implement policies to make agriculture more sustainable. Artificial intelligence has the potential to completely change the current trends in farming and agriculture. Given India's vibrant corporate structure, business-government partnerships can help create a smart agriculture industry.

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