Drone farming: A leap in modern agriculture of India

Tripti Mishra [1] Robin Kumar [2] Arvind Kumar Shukla[3]

Abstract

Unmanned aerial vehicles, or UAVs, are becoming more and more common in India's agriculture industry. Drone usage in agriculture is expected to increase at a remarkable rate, with a 38.5% compound annual growth rate (CAGR). Farmers can reap several advantages from drones, including increased productivity, better agricultural yields, lower expenses, and increased precision. Drone technology adoption could, however, be hampered by a number of issues, including cost, regulatory obstacles, a lack of knowledge and training, and a fear of losing one's job. This article will examine drone technology's present state, potential, possibilities for the future, and obstacles in Indian agriculture.

Introduction

Agriculture used to be a labour-intensive endeavour that mainly relied on the farmer's instincts and customs. That was not too long ago. Technological breakthroughs are driving a tremendous shift in the agricultural landscape today.

Drone use is one such invention that has revolutionized contemporary farming. Numerous uses for these tiny, unmanned aircraft have been discovered in the field of agriculture, including precision farming, data collection, insect management, and crop monitoring.

In agriculture, drones are being used to survey and map farms in great detail. They can fly over fields and gather information about topography, soil types, and other crucial elements that may have an impact on crop growth. Farmers can utilize this information to plan their planting and harvesting schedules by using it to produce precise maps.

Current Status of Drone Technology in Agriculture in India

Drone use in agriculture is being actively promoted by the Indian government, particularly for nutrient and pesticide spraying, land record digitization, and crop assessment. In an effort to facilitate the ownership and operation of drones in the nation, the government has released the National Drone Policy and the Drone Rules 2021. The Kisan Drone Scheme, another initiative of the government, offers funding to organizations,

Tripti Mishra [1] Robin Kumar [2] Arvind Kumar Shukla[3]
[1]Research scholar, Department of Soil Science and Agricultural Chemistry, ANDUA&T,Ayodhya,
[2] Assistant Professor, Department of Soil Science and Agricultural Chemistry, ANDUA&T,Ayodhya,
[3]Research scholar, Department of Soil Science and Agricultural Chemistry, BUA&T, Banda

individual farmers, and business owners so they can buy and operate drones for farming.

A FICCI-EY analysis claims that by 2030, drones might boost India's manufacturing potential to around $50 billion and generate over 500,000 direct and indirect jobs. According to the report, one of the main industries boosting demand for drones in India is agriculture, which is expected to account for $885.7 million of the market by 2021.

The Potential of Drone Technology in Agriculture in India

Among the many tasks that drones can perform in the agriculture industry are the following:

Crop mapping: Drones are able to take detailed pictures and data of the crops, as well as offer details on their growth, production, and overall health. This can assist farmers in seeing problems early and taking appropriate action. Drones can also assist farmers in maximizing their input and output by providing data on soil quality, moisture content, and fertilizer levels.

Crop spraying: Using drones, farmers can efficiently and precisely apply pesticides, fertilizers, and other chemicals to their crops. This can reduce the number of resources wasted and the amount of hazardous chemicals that farmers and the environment are exposed to. Nano-urea and nano-DAP are novel fertilizers that are more efficient and

environmentally friendly than traditional ones, and they can be sprayed using drones.

Crop monitoring: Throughout the growing season, drones can be used to monitor the crops and give farmers real-time feedback and alarms. This can enhance the quality and quantity of the harvest and assist in identifying and preventing illnesses, pest infestations, and crop damage. Drones can also be used to track weather patterns and give farmers forecasts and advisories.

Crop transportation: Crops may be quickly and easily transported from farms to markets with the help of drones. Farmers' revenues can rise as a result, and post-harvest losses can be decreased. Drones can help lessen reliance on road infrastructure by delivering seeds, saplings, and other inputs to fields.

Future prospects

Drones in agriculture have a bright future. We may anticipate progressively more powerful and capable drones with ever-more-advanced data and analysis as technology develops. Drones in agriculture may be used in the following ways in the future:

➡ **Integration with Artificial Intelligence (AI)**: AI and machine learning technologies are becoming more and more integrated with drones in agriculture. This makes it possible to analyze the gathered data in a more

advanced way. AI is more accurate in identifying specific plant illnesses, nutrient shortages, and pest infestations. Based on real-time data, it may also recommend optimal farming practices and forecast yield projections.

➡ **Improved Flight Time and Battery Technology**: Drones' flying times are expected to increase as battery technology progresses. They can cover more terrain in a single mission due to their longer flying periods, which increases their efficiency for monitoring greater agricultural regions.

➡ **Access to Smaller Farms**: Drones' growing accessibility and affordability could let smaller farms and even individual farmers reap the benefits of drone technology. The democratization of technology has the capacity to completely transform farming methods across all dimensions.

➡ **Widespread Adoption:** We may expect a wider and more widespread deployment of drone technology as the agricultural community grows increasingly cognizant of its benefits. Drones are going to be a more and more important tool for farmers to use when making decisions about their operations.

Challenges and limitations

Although the use of drones in agriculture is growing and clearly beneficial, there are a number of obstacles and restrictions that must be taken into account.

➡ **Regulatory Issues**: Regulations may restrict the use of drones in agricultural operations. Drone usage is subject to different laws and regulations in different nations. Usually, the purpose of these laws is to control airspace congestion, protect privacy, and guarantee safety. For instance, the Directorate General of Civil Aviation (DGCA) in India has released standards that include getting permissions and following safety precautions for operating civil remotely piloted aircraft systems (RPAS), which includes drones.

➡ **Privacy Concerns**: Concerns about privacy may arise from the use of drones carrying cameras for data collection and crop monitoring. Drone aerial photography has the ability to take pictures of nearby properties or people without their permission. It is essential to address these issues and make sure drone technology is used responsibly.

➡ **Technical Constraints**: Drones have their own set of technical restrictions. Due to battery limitations, they can only fly for a short period of time, which makes monitoring wide agricultural areas difficult. Another restriction is payload

capacity, or the capacity to carry more sensors or equipment. Drone designs and onboard equipment are always evolving, but in order to fully utilize them, these technological limitations must be handled.

➡ **Cost Considerations**: For farmers, drones are an investment. Drone equipment maintenance and acquisition can be expensive. There are smaller, less expensive drones on the market, but they might not have as many sophisticated functions. For farmers, balancing the costs and anticipated benefits is a crucial issue.

Conclusion

Drone technology has the potential to revolutionize the Indian agriculture industry by offering farmers a host of advantages, including increased productivity, higher crop yields, lower costs, and better precision. Drone technology adoption could, however, be hampered by a number of issues, including cost, regulatory obstacles, a lack of knowledge and training, and a fear of losing one's job. To overcome these obstacles and establish a supportive and enabling ecosystem for the use of drones in agriculture, further efforts and initiatives are required. Drones have the potential to significantly change Indian agriculture and guarantee the prosperity and food security of the nation.