

Transforming Indian Farming: The Economic Benefits of Drone Technology

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Abstract

The integration of drones in agriculture is transforming the industry by enhancing productivity, reducing costs and optimizing resource use. For Indian farmers, drones offer solutions to challenges like small land holdings, labour shortages and limited access to technology. Government support and advancements in drone technology promise significant economic benefits, improved crop yields, and sustainable farming practices, paving the way for widespread adoption and increased agricultural efficiency.

Introduction

The integration of drone technology into agriculture is revolutionizing the industry, offering significant economic benefits and addressing various challenges faced by modern farmers. As the global population continues to rise, projected to reach 9 billion by 2050, the demand for food production is expected to increase by 70 per cent. This surge necessitates the adoption of advanced technologies to enhance agricultural productivity and sustainability. For Indian farmers, who face unique challenges such as small land holdings, limited access to advanced technology, and fluctuating market prices, drones offer promising solutions to improve efficiency and productivity.

Economic Efficiency and Cost Savings

One of the primary economic advantages of using drones in agriculture is the reduction in production costs. Studies have shown that agricultural drones can significantly lower the cost of manufactured products while increasing crop yields. For instance, the use of drones reduces losses during cultivation by minimizing the number of passes of wheeled vehicles across the field, thereby decreasing trampling and soil compaction. In a comparative study, drones were found to have the highest economic effect, with savings more than twice as high as those achieved using traditional self-propelled sprayers.

For Indian farmers, who often rely on traditional farming methods, the introduction of

drones can lead to substantial cost savings. Drones can perform tasks such as spraying pesticides and fertilizers more efficiently than manual labor, reducing the amount of chemicals needed and minimizing waste. This not only lowers costs but also lessens the environmental impact of farming practices.

Precision Agriculture and Resource Optimization

Drones play a crucial role in precision agriculture, enabling farmers to make informed decisions about irrigation, fertilization and pest management. By providing real-time, high-resolution data, drones help optimize the use of resources such as pesticides and fertilizers, leading to cost savings and improved crop quality. The ability to perform site-specific farm management operations with higher precision than other aerial vehicles further enhances their economic viability.

In India, where water scarcity is a significant concern, precision agriculture facilitated by drones can be particularly beneficial. Drones equipped with advanced sensors can monitor soil moisture levels and help farmers implement efficient irrigation strategies, conserving water while ensuring crops receive the necessary hydration. Additionally, precise application of fertilizers and pesticides reduces the risk of overuse, protecting the soil and surrounding environment.

Benefits for Marginal Farmers

Marginal farmers, who operate on small land holdings and often lack access to expensive technologies, can also benefit significantly from drones. By forming cooperatives or pooling resources, marginal farmers can collectively invest in a drone, making it a cost-effective solution for small-scale farming. Drones can help these farmers achieve better yields and reduce input costs through precise application of resources.

For example, marginal farmers can use drones to monitor crop health and identify pest infestations early, allowing for timely interventions that can save crops and improve productivity. Additionally, government subsidies and programs aimed at

promoting digital agriculture can help marginal farmers access and adopt drone technology.

Market Growth and Future Prospects

The market for agricultural drones is expanding rapidly, driven by advancements in sensor technology and information systems. Analytical reports from reputable companies indicate a growing demand for drones in agriculture, with significant potential for future development. The analysis of market trends, highlights the increasing adoption of this technology in crop production and other agricultural applications.

In India, the adoption of drone technology is still in its early stages, but the potential for growth is substantial. Government initiatives aimed at promoting digital agriculture, combined with increasing awareness among farmers about the benefits of drones, are expected to drive market growth. As drone technology becomes more affordable and accessible, its use is likely to become widespread, transforming agricultural practices across the country.

Addressing Agricultural Challenges

Drones offer solutions to several challenges faced by the agricultural sector, including labor shortages, extreme weather events and inefficient use of inputs. By automating tasks such as seeding, fertilizing, and spraying pesticides, drones reduce the reliance on manual labor and enhance operational efficiency. Additionally, drones ability to monitor crop health and detect issues before they escalate helps prevent damage and improve overall productivity.

For Indian farmers, labor shortages are a significant issue, particularly during peak farming seasons. The use of drones can alleviate this problem by performing labor-intensive tasks quickly and accurately. Moreover, drones can help farmers respond to extreme weather events by providing timely data on crop conditions, allowing for rapid decision-making and intervention.

Government Support for Drone Adoption

The Government of India has recently launched a Central Sector Scheme to provide drones to Women Self Help Groups (WSHGs). The scheme aims to supply 15,000 selected WSHGs with drones for rental services to farmers for agricultural purposes, such as applying fertilizers and pesticides. WSHGs with an "A" grade as per the Deendayal Antyodaya Yojana (DAY-NRLM) guidelines will be chosen by the States from clusters of villages cultivating commercial

crops like chilies, cotton, paddy, wheat, orchards and plantations. A budget of ₹1,261 crores was allocated for the project, which aims to distribute one drone to each of the 15,000 identified WSHGs over a three-year period from 2023-24 to 2025-26.

Conclusion

The economic benefits of using drones in agriculture are clear. From reducing production costs and optimizing resource use to addressing labor shortages and improving crop yields, drones are transforming the agricultural landscape. For Indian farmers, including marginal farmers who face numerous challenges, the adoption of drone technology offers a pathway to increased efficiency, sustainability and profitability. As the technology continues to evolve, its adoption is expected to grow, further enhancing the sustainability and efficiency of agricultural practices. The Indian government, agricultural organizations and technology providers must collaborate to ensure that farmers have access to the necessary resources and training to leverage this technology effectively. With the right support, drones can play a pivotal role in advancing Indian agriculture and meeting the growing demand for food in the coming decades.

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