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UNLOCKING ENTREPRENEURIAL OPPORTUNITIES WITH KISAN DRONES

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Abstract

Unmanned Aerial Vehicles (UAVs), commonly known as drones, are revolutionizing Indian agriculture by enhancing efficiency, reducing costs, and promoting sustainability. Liberalized policies since 2021 and government subsidies under the Sub-Mission on Agricultural Mechanization (SMAM) have driven the adoption of Kisan Drones for crop monitoring, pesticide application, and land assessments. With the potential to reduce pesticide use by 80% and water consumption by 95%, drones offer significant cost advantages, especially through rental models. Emerging business models like village-level entrepreneurship, B2B partnerships, and data analytics further support scalability and precision agriculture. However, challenges such as high initial costs, limited awareness, regulatory hurdles, and fragmented landholdings hinder widespread adoption. A collaborative way forward involving policy simplification, awareness campaigns, public-private partnerships, and skill development can bridge these gaps. By addressing these barriers, Kisan Drones can transform Indian agriculture, unlocking entrepreneurial opportunities and contributing to a sustainable, technologically advanced farming ecosystem.

Concept

Unmanned Aerial Vehicles (UAVs), commonly known as drones, are robotic vehicles that can operate remotely for various purposes. Initially developed for military applications, drones have since found uses in diverse fields, including agriculture. In August 2021, the Ministry of Civil Aviation liberalized drone-use policies, allowing certain types of drones to operate without prior permissions. Subsequently, the Department of Agriculture and Farmers' Welfare published standard operating procedures (SOPs) for drone use in spraying pesticides across agricultural, forestry, and non-cropped areas.

Uses

Agriculture drones assist farmers in adapting to various circumstances and making informed decisions. Their applications include:

- Crop Health Monitoring:

Drones can capture high-resolution images of fields, enabling farmers to detect diseases, pest infestations, and stress conditions in crops. Early identification of such issues ensures timely interventions, improving yields.

- Crop Treatment and Scouting:

Drones enable precision application of fertilizers, pesticides, and other treatments, targeting specific areas rather than blanket spraying, which reduces input costs and environmental impact.

- Irrigation Management:

Equipped with sensors, drones can identify areas with inadequate or excessive moisture, helping farmers optimize water usage and improve irrigation efficiency.

- Field Soil Analysis:

By capturing data on soil texture, fertility, and nutrient levels, drones assist in planning effective soil

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management strategies, enhancing crop productivity.

- Crop Damage Assessments:

Drones provide an efficient way to evaluate crop damage caused by natural disasters like floods, hailstorms, or droughts. This information aids in claiming insurance and planning recovery strategies.

Drone-based surveys improve crop yields, reduce time, and lower costs. The Central Government promotes the use of 'Kisan Drones' for crop assessment, land record digitization, and spraying pesticides and nutrients.

Present Status

The Department of Agriculture estimates that the service cost of a drone with a 10 kg payload is Rs. 350-450 per acre. A drone equipped with multiple batteries can operate for six hours daily, covering about 30 acres. The operational cost varies depending on crop type and topography.

As of February 9, 2022, the Directorate General of Civil Aviation (DGCA) database recorded 558 drones with unique identification numbers. These drones fall into categories such as nano (up to 250 grams), micro (up to 2 kg), and small (2-25 kg). Currently, India has 22 registered drone manufacturers and importers. Commonly used agricultural models include Omni Agri 01 (2 kg) and Agribot UAV (23 kg).

Government Support

To promote drones in agriculture and make the technology affordable, the government offers financial assistance through the Sub-Mission on Agricultural Mechanization (SMAM). Key initiatives include:

- 100% Financial Assistance: Provided to institutions like Farm Machinery Training & Testing Institutes, ICAR, KrishiVigyanKendras (KVKs), and State Agricultural Universities (SAUs) for drone demonstrations on farmers' fields.
- 75% Grants: Available for Farmer Producer Organizations (FPOs) for purchasing drones for field demonstrations.
- 40% Subsidy for Custom Hiring Centers (CHCs): A financial aid of up to Rs. 4 lakh is provided for drone purchases by Cooperative Societies, FPOs, and rural entrepreneurs.
- 50% Subsidy for Agriculture Graduates: Up to Rs. 5 lakh for CHC establishment.

Future Prospects

India’s 160 million hectares of arable land present a massive opportunity for drone manufacturers and the agri-ecosystem, including agrochemical companies, farm equipment providers, and village-level entrepreneurs. The Indian drone sector is expected to grow into a Rs. 15,000-crore market by 2026. However, convincing India’s price-sensitive farmers to adopt drone technology remains a challenge. While farmers have started embracing mechanization tools like specialized tractors and rice transplant machines, drones are perceived as expensive and out of reach.

Promise of Affordability

Despite government subsidies of up to 70% for rural entrepreneurs, encouraging farmers to rent drone services is an uphill task. Drone manufacturers emphasize cost-effective solutions. According to Abhishek Burman, Co-Founder and CEO of General Aeronautics, drones can reduce pesticide usage by up to 80% and water consumption by 95%. For example, spraying manually requires 200 liters of water per acre, while drones reduce this to 6-8 liters.

While a Kisan Drone costs Rs. 4.5-7 lakh, rental services offer a viable alternative. Farmers pay Rs. 350-450 for pesticide spraying per acre. With manual spraying costing Rs. 1,500-2,000 per acre, drones can spray 25-30 acres daily, reducing costs and increasing efficiency.

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Emerging Business Models

1. Village-Level Entrepreneurs:

Jayaprakash of Garuda Aerospace describes his model as the "Uber" of India's agri-drone market. By selling drones to village-level entrepreneurs or pesticide retailers, Garuda enables them to perform spraying activities on fields. The company also provides training, hardware, and software support.

2. Business-to-Business (B2B):

Companies like Thanos India and General Aeronautics partner with chemical and fertilizer manufacturers to integrate drones into the supply chain. This model leverages existing relationships with the farming community, bypassing the need for direct farmer engagement.

3. Service Models:

Garuda Aerospace has deployed 100 drones and collaborated with ICAR and farmer associations. With orders covering 22 crore acres across 16 states, the company ensures service scale and profitability.

4. Data Analytics:

Drones provide valuable data on farmer information and crop conditions, enabling innovations in precision agriculture. As Jayaprakash notes, the real potential lies in data, which can drive industry-wide transformation.

Challenges

1. High Initial Costs:

The cost of purchasing a drone, ranging from Rs. 4.5 to 7 lakh, remains a significant barrier for small-scale farmers. Although subsidies and rental models exist, the high initial investment discourages adoption.

2. Awareness:

A lack of knowledge among farmers about drone technology and its potential benefits slows adoption. Many are unaware of its advantages in terms of efficiency, cost reduction, and productivity.

3. Regulations:

The Directorate General of Civil Aviation (DGCA) enforces strict guidelines and requires lengthy approval processes, which act as hurdles for entrepreneurs and farmers looking to integrate drone technology.

4. Land Fragmentation:

With an average landholding size of 1-2 acres, operational challenges arise for drone deployment in small and fragmented plots. Efficient use requires consolidation or specialized strategies for smaller plots.

5. Infrastructure and Connectivity:

Rural areas often lack the essential infrastructure and connectivity required for smooth drone operations. This includes the absence of charging facilities, maintenance services, and robust internet connectivity.

Despite these challenges, the future holds promise as awareness campaigns, policy reforms, and innovative business models aim to overcome these barriers. Addressing these issues can unlock the vast potential of drones in transforming Indian agriculture.

The Way Forward

1. Policy Simplification:

Simplifying regulations by the Directorate General of Civil Aviation (DGCA) can remove bureaucratic hurdles that slow down the adoption of drone technology. Expanding financial assistance and subsidies, particularly for small-scale farmers, can make drones more affordable. A streamlined regulatory framework will foster innovation and encourage entrepreneurs to invest in drone services, creating a supportive ecosystem.

2. Awareness Campaigns:

Conducting workshops, field demonstrations, and training programs can educate farmers about the benefits

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of drones. Showcasing cost savings, efficiency, and increased productivity will help farmers see drones as viable tools rather than luxury technologies. Government and private sector partnerships can collaborate to create region-specific campaigns targeting diverse agricultural landscapes.

3. Public-Private Partnerships (PPPs):

Partnerships between the government, private companies, and academic institutions can drive technological innovation and create scalable business models. PPPs can fund research and development (R&D) initiatives to adapt drone technology to the unique challenges of Indian agriculture, such as small landholdings and diverse crop patterns. Collaborations can also support the establishment of service networks and maintenance hubs in rural areas.

4. Skill Development:

Establishing specialized training centers for drone operators and technicians will bridge the workforce gap. These centers can offer certification programs, ensuring operators are skilled in handling drones safely and efficiently. Training programs can also focus on developing entrepreneurial skills, enabling rural youth to set up Custom Hiring Centers (CHCs) or drone service businesses. Empowering the workforce with technical expertise will enhance the adoption of drones and create employment opportunities in rural regions.

Conclusion

Kisan Drones have the potential to revolutionize Indian agriculture by addressing productivity challenges, reducing input costs, and enhancing sustainability. By overcoming barriers such as cost, awareness, and regulatory hurdles, entrepreneurs can tap into a rapidly growing market. With the right mix of government support, private innovation, and grassroots education, Kisan Drones can become a cornerstone of India's agricultural transformation, paving the way for a sustainable and prosperous future.

References

Barathkumar, R., Selvanayaki, S., Deepa, N., Kannan, P., & Prahadeeswaran, M. (2024). Impact of drone technology on agriculture - farmers' perception analysis. Plant Science Today, 11(sp4). https://doi.org/10.14719/pst.5934

Das, A. K., Singh B., Rathore, K. and Kumar, K. (2024). Drones usage opportunities for entrepreneurs contributing towards Aatmanirbar Bharat. SMS Journal of Entrepreneurship & Innovation, 10(1), 24–36. https://doi.org/10.21844/smsjei.v10i01.30003

Gupta, C., Gupta, M., Joshi, P., & Kumar, A. (2021). Information and communication technology in agribusiness: A study of mobile applications in perspective of India. Journal of Applied and Natural Science, 13(2), 766–774. https://doi.org/10.31018/jans.v13i2.2620

Katekar, V., & Cheruku, J. K. (2023). The application of drone technology for sustainable agriculture in India. Current Agriculture Research Journal, 10(3), 352–365. https://doi.org/10.12944/carj.10.3.19

Mahesh K. M., P. S. Aithal and Sharma K. R. S. (2023). Impact of Aatmanirbharta (Self-reliance) agriculture and sustainable farming for the 21st century to achieve Sustainable growth. International Journal of Applied Engineering and Management Letters, 175–190. https://doi.org/10.47992/ijaeml.2581.7000.0181

Singh, R. B., Paroda, R. S., & Dadlani, M. (2022). Science, technology and innovation. In India studies in business and economics (pp. 213–250). https://doi.org/10.1007/978-981-19-0763-0_8