



Precision Farming: Accurate Utilization of Input Resources with Remote Sensing Technologies Toward Food Security

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Introduction

By 2050, Nigeria's population will grow to over 377 million people, compared to 219 million individuals as estimated for the year 2022 by Statista (2025). This will place immense pressure on the Nigerian agricultural productivity sector to meet the teeming population's demand. More so, the availability of arable lands and freshwater resources will become increasingly limited due to environmental degradation and climate change amidst this population expansion. These changes shall contribute to the challenges the Nigerian agricultural sector will experience in the future, thus necessitating the adoption of more efficient and sustainable farming practices. Precision farming offers a promising solution to these challenges by optimizing resource utilization, reducing waste, and maximizing crop yields. Thanks to developments in digital technologies, precision farming is a revolutionary farming method that maximizes inputs to maximize production while minimizing losses and environmental impact. It has started to gain traction as a viable remedy for these issues in Nigeria. With goals of striking a balance between the demand for more food production, the best use of input resources at hand, and environmental sustainability, this marks a dramatic change in agricultural management.

Methodology

This paper reviewed relevant literature and existing case studies in this field, with the ability to transform conventional farming methods and tackle intricate issues confronting the Nigerian food supply. The method acknowledges the dynamic and varied characteristics of agricultural fields by accounting for variables such as crop health, soil conditions, and climate fluctuations. It reveals the diverse landscape for precision agriculture within Nigeria, emphasizing its observable advantages, difficulties, and potential future paths. This research review is limited to both small and large-scale agricultural crop farming operations.

Results and discussion

Through a review of works of literature and case studies, this research paper reveals how precision farming utilizes sensory technologies like drones, sensor networks, the Geographic Information System (GIS), and the Global Positioning System (GPS)/Remote Sensing (RS) technologies to enable farmers to gather and analyze enormous volumes of data collated about crops, soil, and environmental conditions. Collated data equips farmers with accurate information needed to make well-informed decisions about the necessary resource allocation and management to minimize wastages and environmental impacts. It optimizes returns on inputs by maximizing yield efficiently while preserving resources.

Conclusion

The application of GIS and GPS/RS technologies in precision farming will revolutionize the way Nigerian farmers monitor and manage crops, resources, and land use. This reviewed research work, when implemented, will add to the growing body of knowledge and skills on the precision farming potential in Nigeria. It will provide a thorough analysis of the Nigerian precision agriculture scene with emphasis on providing insights into future developments.

Keywords: Precision-Farming, Digital-Technologies, Resource-Utilization, Food-Security, Nigeria.