



Precision Irrigation Solutions Adoption and Cost-Effectiveness in Commercial Farming: A Case Study of the Delta Region, Nigeria

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Abstract

Precision irrigation solutions have become increasingly important for commercial farming in arid regions of Nigeria, particularly in the Delta region where water scarcity and variability pose significant challenges to crop productivity. A mixed-methods approach was employed, including a survey of 120 randomly selected farmers, structured interviews with 15 key informants, and a cost-benefit analysis of irrigation systems across five commercial farms. Statistical models were used to analyse data on water usage and yield changes over two years. Precision irrigation solutions led to an average increase in crop yields by 20% compared to non-precision methods, with significant reductions in water consumption of up to 35%. The cost-benefit analysis indicated that the return on investment for precision irrigation systems was between 1.5 and 2 per unit of increased yield. The adoption of precision irrigation solutions has proven to be a viable strategy for enhancing agricultural productivity in the Delta region, with notable improvements in both output and resource efficiency. Governments and development agencies should promote awareness campaigns on the benefits of precision irrigation systems, while also providing subsidies or grants to farmers who invest in these technologies. Furthermore, there is a need for infrastructure support such as reliable water supply and electricity connections. Precision Irrigation, Commercial Farming, Cost-Effectiveness, Yields Improvement

Keywords: African Geography, Precision Agriculture, Geographic Information Systems (GIS), Cost-Benefit Analysis, Irrigation Efficiency, Remote Sensing, Farm Management Models

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