**Description of the Smallholder Farming Dataset**

The Smallholder Farming Dataset represents a scenario where agricultural practices are conducted on small-scale farms. This dataset includes information on farm size, resource access, sustainable farming practices, economic indicators, crop types, soil types, soil health indices, and household income. The goal is to understand the dynamics of smallholder farming, identify factors influencing productivity and sustainability, and explore strategies for improving the livelihoods of smallholder farmers.

## **Features**

1. Farm\_Size\_Hectares: The size of the smallholder farm in hectares.
2. Resource\_Access: The level of access the smallholder has to agricultural resources, categorized as Limited, Moderate, or Abundant.
3. Sustainable\_Farming\_Practices: Whether sustainable farming practices are adopted on the smallholder farm (Yes/No).
4. Economic\_Indicators: Indicators representing the economic conditions of the smallholder farm.
5. Crop\_Type: The type of crops cultivated on the smallholder farm.
6. Soil\_Type: The classification of soil on the smallholder farm (e.g., 'Sand', 'Loamy sand', 'Sandy loam', 'Loam', 'Silt loam', 'Silt', 'Sandy clay loam', 'Clay loam', 'Silty clay loam', 'Sandy clay', 'Silty clay', 'Clayey').
7. Access\_to\_Credit: indicate whether the smallholder has access to loan or credit (e.g., 'Yes', 'No'),
8. Mode\_of\_Operation: How the smallholder farm operates their farm (e.g., 'Use of animal', 'Mechanical power')
9. Soil\_Health\_Index: An index representing the health and fertility of the soil on the smallholder farm.
10. Household\_Income (target): The total income of the household associated with the smallholder farm.

## **Possible research questions to explore**

These research questions aim guide you explore the dataset to address the challenges and opportunities associated with smallholder farming, with a focus on factors influencing productivity, sustainability, and the economic well-being of smallholder farmers. Machine learning models can contribute valuable insights for designing effective policies and interventions tailored to the needs of smallholder agriculture.

1. **Impact of farm size on productivity**

* How does the size of a smallholder farm impact agricultural productivity, and can machine learning models predict optimal farm sizes for specific crop types?

1. **Resource access and sustainable practices**

* What is the relationship between resource access and the adoption of sustainable farming practices, and can models recommend practices based on resource constraints?

1. **Economic indicators and crop selection**

* How do economic indicators influence the selection of crop types on smallholder farms, and can machine learning models predict optimal crop choices for economic sustainability?

1. **Sustainable farming practices and soil health**

* What sustainable farming practices positively correlate with soil health on smallholder farms, and can these practices be recommended for different soil types?

1. **Income distribution and household well-being**

* How is household income distributed among smallholder farms, and how does it impact overall household well-being?

1. **Crop diversity and sustainable practices**

* Is there a correlation between crop diversity on smallholder farms and the adoption of sustainable farming practices, and can models recommend diverse cropping strategies for sustainability?

1. **Optimizing resource allocation**

* Can machine learning models optimize resource allocation on smallholder farms, considering factors such as farm size, resource access, and sustainable practices?

1. **Sustainable practices and economic resilience**

* How do sustainable farming practices contribute to the economic resilience of smallholder farms, and can models identify practices that enhance economic stability?

1. **Soil health indices and economic performance**

* Is there a relationship between soil health indices and the economic performance of smallholder farms, and how can this relationship be leveraged for sustainable agriculture?

1. **Impact of sustainable practices on household income**

* How do sustainable farming practices on smallholder farms impact household income, and can models predict income improvements based on the adoption of specific practices?