**Master Thesis Proposal - Internship**

**Company Description**

The World Bank is an international development organization owned by 187 countries. Its role is to reduce poverty by lending money to the governments of its poorer members to improve their economies and to improve the standard of living of their people.

**Research Question**

How can fertilizer government subsidy programs in Kenya be made more efficient and effective using a data-driven (ML/AI) approach?

The project description does not contain a research question and its objectives are focused on creating a soil health map and providing tailored fertilizer mix recommendations.

**Expected Results**

* A comprehensive soil health map covering all Kenyan sub-counties.
* Tailored fertilizer mix recommendations for each agro-ecological zone.
* A scalable model for other countries facing similar agricultural challenges.
* Enhanced efficiency in government fertilizer subsidy programs, leading to improved crop yields and sustainable farming practices.

**Methodology**

This project proposes leveraging Data Science and ML/AI to create a large-scale soil health map, identifying nutrient deficiencies and optimizing fertilizer mixes at a sub-county level. This innovative approach will consider various data sources including soil sampling, satellite imagery, and crop surveys.

First, a soil sampling plan must be developed, which should minimize the amount of sampling points and maximize the sampled area in Kenya and then the plan will be used to create a detailed soil health map using digital soil mapping, for which Random Forest, ANN, Simulated Annealing can be used.

<https://www.sciencedirect.com/science/article/pii/S0016706122000568>

<https://research.wur.nl/en/publications/sampling-design-optimization-for-soil-mapping-with-random-forest>

<https://www.montana.edu/extension/pspp/documents/SoilSamplingStrategies.pdf>

<https://www.mdpi.com/2073-445X/13/3/365>

**Data and Confidentiality**

The data will be open-source data and possibly requested data from companies. The World Bank has not asked anything regarding confidentiality.