**Problem Statement: Feeding Kenya: Overcoming Hurdles of Waste and Distribution**

The agricultural sector in Kenya is faced with critical challenges ranging from food-wasting at crop levels to transportation, which in turn causes food insecurity and environmental degradation. This challenge has been even more prevalent in the arid and semi-arid regions that make up 80% of the rest of the land area, where it has been a challenge to access nutritious food.

The post-harvest losses at the level of farm are terribly high. According to a report of FAO, "an estimated 25% of food produced in the country [was] lost between harvest and market, due to inadequacy of storage facilities, lack of infrastructure, and poor handling practice". This has been estimated by FAO to cause the country an annual loss of KES 72 billion, which compounds food insecurity problems where 27.8 percent of the population in Kenya does not get adequate access to food. Second, in 2020, food systems emissions stood at 72 percent of Kenya's total national emissions, and its significance has been recognized to be very high compared to the global average, consequently highlighting the environmental implication of food wastage.

Most parts of Kenya, particularly its arid and semi-arid areas, experience food insecurity as a result of inefficient transportation and distribution. As quoted, with relation, the World Food Programme states, "Inefficiencies in food systems mean that prices are high and market supplies are low, contributing to reduced availability of, and access to, food." This results in a disproportionate supply of food to urban areas while arid and semi-arid regions suffer severe shortages. Thus, communities in the arid and semi-arid areas suffer from a double Whammy situation whereby they have poor access to adequate nutritious food and, at the same time, they are losing their livestock through biting droughts that further worsen their vulnerability to hungriness and malnutrition. These food resources are unevenly distributed, and the climate change issues have together sown teeth for the vicious cycle of food insecurity, whereby the most vulnerable populations in Kenya have borne the brunt.

There is no doubt that this is a complex and multifaceted problem. This requires an urgent solution with innovative solutions for addressing food wastage and the efficiency of distribution, actually ensuring an enhanced climate change resilience. I strongly recommend that data-driven approaches be scaled up for efficient optimization of the whole food value chain from farm to plate, especially for the benefit of Kenya's most vulnerable communities.

**An AI-based Technology Solution on Food Supply Chain Optimization and Waste Reduction Methods to Deploy in Kenya**

Implementation of an ISDOS to enable AI-powered agricultural food wastage management down to the crop piece level for Kenya. It optimizes waste supply, demand, transportation, and valorization through advanced data analytics and machine learning.

**Key components of ISDOS:**

1. Supply and Demand Analysis:

* Data Collection: Extensive data is captured on farmers' average production, regional estimates of production, and food access in the markets across the arid and semi-arid areas of the region.

2. Predictive Modeling:

* In this step, use machine learning algorithms to make predictions about trends in supply and demand by detecting impending surpluses and shortages.

2. Route Optimization:

* Logistic Algorithms: Design AI algorithms for optimizing transportation routes to reduce travel time while maintaining the quality of perishable goods.

3. Waste Repurposing and Resource Optimization:

* Crop Residue Utilization: Utilize AI for the identification and sorting of crop residues to be put to some other use, more commonly as feeds.
* Logistics for Waste Transportation: Develop algorithms for the efficient transportation of crop remainders to livestock farmers in a cost-effective and timeous manner.

**Workflow of the ISDOS:**

1. Data Integration:

• Gather data from farmers, markets, and regional production estimates.

• Integrate information on food accessibility in arid and semi-arid regions.

2. Predictive Analytics

• Analyze supply and demand data to forecast future trends.

• Identify areas of potential surpluses or shortages.

3. Transportation Optimization:

• Use AI to determine optimal transportation routes.

• Implement dynamic scheduling to adapt to real-time conditions.

4. Waste Repurposing:

• Categorize crop residues in relation to their use in animal feed.

• Logistical optimization of conveying crop residues to livestock farmers.