# **Concept Note (SDG-12: Responsible Consumption & Production**

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## **Title: Development of an AI Assistant for Reducing Food Waste in Agriculture Supply Chains**

## **Introduction**

Food waste and water scarcity are pressing issues in the agricultural supply chain, especially in developing regions. Post-harvest losses due to improper storage, spoilage, and delayed intervention lead to significant wastage of resources. With the rise of AI technologies, there is an opportunity to develop intelligent systems that provide real-time guidance to farmers and stakeholders for efficient crop management. This report presents the design and development of an AI-based assistant to reduce food waste by predicting shelf life, analyzing spoilage risk, and recommending timely actions based on weather and crop data.

## **Problem Statement**

There is a lack of accessible and intelligent solutions for small-scale farmers to assess spoilage risk and take action to minimize post-harvest food waste. Traditional methods rely on manual inspection and experience, which may not be timely or accurate. This results in premature spoilage, economic losses, and inefficient use of food and water resources.

## **Objective**

To build a multilingual AI assistant capable of accepting voice, image, and text inputs to analyze crop conditions, predict spoilage risk based on current weather, and provide recommendations to reduce food waste. The assistant aims to support farmers with minimal technical background and integrate with existing mobile or web platforms.

## **Why This Problem?**

India and many developing countries face high levels of food and water wastage due to supply chain inefficiencies. Perishable crops like tomatoes, bananas, and leafy vegetables have short shelf lives and are particularly vulnerable. By addressing this challenge, the project contributes to food security, farmer welfare, and environmental sustainability.

## **Solution**

The solution involves creating a smart assistant named AnnRakshak, which leverages weather APIs, machine learning, and language models to interact with users and guide them on crop shelf life and handling. The assistant is built in Python using Gradio for UI, integrates voice input, and supports English and Hindi languages.

- Predict shelf life dynamically using crop and temperature data.  
 - Visualize spoilage risk through intuitive graphs.  
 - Generate follow-up questions and answers based on user input.  
 - Provide natural language recommendations in user’s preferred language.  
 - Built-in translation and speech recognition for multimodal access.

## **Technical Implementation**

- Collected and enriched crop datasets with temperature-based shelf life info.  
 - Integrated OpenWeatherMap API to fetch real-time weather data.  
 - Used Gemini AI model to generate AI-based recommendations and Q&A.  
 - Implemented user interface with Gradio for web-based interaction.  
 - Added multilingual support, voice input handling, and graph generation.

## **Why IBM Resources and Tools?**

IBM Watson, IBM Cloud, and Watson Studio were considered as deployment options for model hosting and scalability. These platforms offer reliable infrastructure for AI and ML integration with enterprise-grade security and ease of use. They ensure seamless collaboration, model training, and data handling with support for scalable APIs.

## **Conclusion**

This project demonstrates the potential of AI-driven assistants in solving real-world problems like food wastage. By combining weather data, crop insights, language processing, and visual tools, the assistant helps farmers make informed decisions and reduce losses. Future improvements may include mobile deployment, farmer feedback integration, and real-time image-based crop health detection.