**FOOD WASTE OPTIMIZATION IN SUPERMARKETS**

**Problem Statement:**

Supermarkets generate significant food waste due to overstocking, inaccurate demand forecasting, inefficient markdown strategies, and lack of real-time inventory insights. This not only leads to financial losses but also contributes to environmental degradation and food insecurity. The goal of this project is to analyze food waste patterns and develop a data-driven dashboard that helps supermarkets minimize waste, optimize inventory, and improve sustainability.

**Project Steps:**

**1. Define Objectives**

* Reduce food waste by identifying key waste contributors (product category, store).
* Build a dashboard that enables actionable insights to reduce spoilage and cost.
* Improve inventory and markdown strategies using data insights.

**2. Data Collection**

* Gather or simulate data on:
* Product sales and expiry dates
* Waste quantity and reasons
* Store locations and categories

**3. Data Cleaning & Preparation**

* Handle missing values, standardize formats, and create calculated columns.
* Use Power Query or Python for preprocessing.

**4. Exploratory Data Analysis (EDA)**

* Identify trends in waste by:
  + Product category
  + Store location
  + Time of year (seasonality)
* Use visuals like heatmaps, bar charts, and line graphs.

**5. Dashboard Development (Power BI)**

* KPIs: Total Cost, Waste Cost, Quantity Sold, etc.
* Visuals: Pie charts, line graphs, matrix tables, bar charts, slicers for filtering by store Location, waste reason, etc.
* Drill-through pages for product-level insights.

**6. Recommendations & Action Plan**

* Implement **dynamic pricing** for near-expiry products
* Set up donation channels for unsold, edible food
* Schedule smarter **restocking** cycles based on demand prediction
* Dynamic pricing – Discount Meat & Seafood by 20% near expiry to reduce waste by 15%.
* Cold Storage – Upgrade storage in South/West to cut spoilage by 10%.
* NGO Donation – Donate 650Kg/week of edible waste (30% increases).

**Key Insights:**

* Meat & Seafood wastes the most (10.2M INR) due to a 3- day shelf life.
* Bengaluru leads in waste (4.1M INR) due to overstocking Fresh Vegetables (151 Kg).
* Hot weather (1855 instances) increases spoilage in South/West regions.
* 50 % of inventory cost (33M INR) are wasted.

**Tools used:**

* Python – For data cleaning and preprocessing.
* Power BI – For data analysis and data visualization.
* Power Query – For data cleaning and also transform & load data.
* DAX – To calculate measures like Total Cost, Waste Cost.