Solution Requirements for Global Food Production Analysis in Power BI

To develop a comprehensive **Global Food Production Analysis** using **Power BI**, the solution should include the following key requirements:

---

1. Data Requirements

1.1 Data Sources

- **FAO Database** – Global food production and agricultural statistics
- **World Bank Agriculture Data** – Economic and trade insights
- **UN Reports** – Climate change, food security, and sustainability data
- **Satellite & IoT Sensor Data** – Real-time agricultural monitoring (e.g., crop health, soil conditions)
- **Government & Research Reports** – Country-wise food policies and production statistics
- **Excel / CSV Databases** – Historical datasets from 1961 to 2023

1.2 Data Attributes

- **Production Volume (Metric Tons, Kilograms, etc.)**
- **Crop Types (Wheat, Rice, Corn, etc.)**
- **Livestock Production (Meat, Dairy, Poultry, etc.)**
- **Climate & Weather Data (Temperature, Rainfall, CO2 Levels, etc.)**
- **Trade & Export Data (Imports/Exports by Country/Region)**
- **Food Supply & Demand Trends**

---

2. Data Processing & Integration

2.1 Data Storage & ETL Process

- **Azure Data Lake / SQL Server / Snowflake** – Centralized data storage
- **Power Query / Power Automate** – Data cleaning, transformation, and automation
- **ETL Pipelines** – Extract, Transform, Load process for integrating multiple data sources

2.2 Data Modeling in Power BI

- **Fact & Dimension Tables** – Star schema for optimized performance
- **DAX (Data Analysis Expressions)** – Custom measures & calculated columns
- **Hierarchies & Relationships** – Time-based, region-based, and product-based hierarchies

---

3. Power BI Dashboard & Reports

3.1 Key Dashboards

- **Global Food Production Trends** (1961-2023)
- **Country-Wise Production Analysis** (Top producers, year-on-year trends)
- **Climate & Agricultural Impact Dashboard**
- **Supply Chain & Trade Analysis**
- **Forecasting Future Food Production Trends (AI/ML Integration)**

3.2 Data Visualization Features

- **Interactive Maps** – Geospatial analysis of food production
- **Time-Series Graphs** – Trends from 1961 to 2023
- **KPIs & Metrics** – Production volume, efficiency, climate impact
- **Drill-Through & Drill-Down Reports** – Detailed country and crop-wise breakdown

---

4. End-User & Business Requirements

4.1 Users & Stakeholders

- **Government & Policymakers** – Food security & sustainability planning
- **Agriculture Experts & Researchers** – Impact analysis & innovation
- **Businesses & Investors** – Market trends, trade, and profitability insights
- **NGOs & International Organizations** – Food security and climate impact reporting

4.2 Security & Access Control

- **Role-Based Access Control (RBAC)** – Different access levels for analysts, policymakers, and business users

- **Data Encryption & Compliance** – GDPR, FAO, and World Bank data protection standards

---

5. AI/ML & Advanced Analytics

- **Predictive Analytics** – AI-based forecasting for food production trends
- **Anomaly Detection** – Identifying irregularities in production and supply chain
- **Natural Language Querying (Q&A Feature in Power BI)** – Users can ask questions in natural language