**Global Food Production Trends and Analysis (1961–2023)**

**Objective:**

To conduct an in-depth analysis of global food production trends spanning from 1961 to 2023, focusing on country-wise and commodity-specific patterns. This project aims to uncover meaningful insights into top-producing nations, high-volume agricultural commodities, and regional specializations. By leveraging the power of interactive, dynamic dashboards in Power BI, the goal is to transform raw data into actionable intelligence that supports data-driven decision-making in the agricultural and food policy domains.

**Dataset Overview:**

* **Source**: World food Production, Kaggle dataset
* **Link**: <https://www.kaggle.com/datasets/rafsunahmad/world-food-production>
* **Timeframe**: 1961 to 2023
* **Records**: Country-wise annual production (in tonnes) of many food commodities.
* **Attributes**:
  + *Country/Entity*
  + *Year*
  + *Commodity (Item)*
  + *Production Quantity (tonnes)*

**Tools & Technologies Used:**

* **Power BI**: Dashboard creation, interactivity, filters, and visualizations
* **Power Query Editor**: Data transformation and cleaning
* **DAX (Data Analysis Expressions)**: Used for KPI calculations, filtering logic, dynamic titles
* **Microsoft Excel:** (initial data examination)

**Data Cleaning & Preparation:**

Comprehensive data cleaning and transformation were carried out using **Power Query Editor in Power BI**, ensuring the dataset was analysis-ready and optimized for interactive visualization. The dataset sourced from [Kaggle – World Food Production](https://www.kaggle.com/datasets/rafsunahmad/world-food-production) required several preprocessing steps:

* **Null Handling**: Removed records with missing or null values in critical fields such as Item, Country, Year, or Value.
* **Commodity Filtering**: Excluded non-food or redundant commodity entries to focus the analysis on relevant agricultural products.
* **Standardization of Entities**: Normalized inconsistent country and region names to maintain uniformity across visuals and filters.
* **Categorical Grouping**: Created a custom classification column to group individual items under broader commodity categories such as:
  + *Cereals*, *Fruits*, *Root Crops*, *Oilseeds*, *Cash Crops*, etc.
* **Unit Conversion**: Transformed production figures into **billions of tonnes** for better readability and cross-category comparisons.
* **Date Formatting**: Ensured all Year values were properly typed and restricted to the range **1961–2023**.
* **DAX Calculations**:

To support dynamic analysis and interactive dashboards, several calculated columns, DAX measures, and data modeling elements were added:

* **New Measures:**

♢ *Total Production*: Computes the sum of production values across all commodities and years.

♢ *Total Production (Sum)*: Additional measure to aggregate total production at different levels (country, category, year).

* **New Table:**

♢ *Production Items Table*: A derived table to isolate distinct production items, useful for category-level filtering and segmented analysis.

* **Category-wise Aggregation:** Logic implemented to dynamically compute totals and rankings per commodity category.
* **Time-Series Analysis:** Measures created to evaluate trends, year-over-year comparisons, and top-producing countries over time.
* **Conditional Visual Logic:** Used DAX expressions to drive interactive behaviour in charts and highlight key insights.

These steps ensured data integrity, analytical flexibility, and enhanced performance—providing a reliable foundation for deriving actionable insights and crafting compelling visual narratives.

**Dashboard 1: Global Production Overview**

This interactive dashboard provides a high-level summary of global food production from **1961 to 2023**, offering intuitive insights into key commodities, trends, and regional contributions. Built using the **World Food Production dataset from Kaggle** ([link](https://www.kaggle.com/datasets/rafsunahmad/world-food-production)), the dashboard integrates multiple visual elements for a comprehensive analytical experience.

**🔹 Visual Elements & Descriptions:**

* **Pie Charts**  
  Display the commodity-wise production distribution across major categories:
  + *Fruits*, *Oilseeds*, *Root Crops*, *Cash Crops*, and *Cereals*  
    Each chart highlights the proportional contribution of key items within each category (e.g., oranges, soybeans, potatoes, etc.).
* **Line Chart**  
  Illustrates the **year-wise production trend of Sugar cane**, which is the highest-volume commodity in the dataset.  
  This visualization emphasizes growth patterns and fluctuations over six decades.
* **KPI Card**  
  Presents the **cumulative sugar cane production** from 1961 to 2023, totaling approximately **621.62 billion tonnes**, emphasizing its global significance.
* **Clustered Bar Chart**  
  Compares the **annual production trends** of three major export-oriented cash crops:
  + *Coffee*, *Tea*, and *Cocoa Beans*  
    This visual allows for multi-commodity trend analysis across the years.
* **Treemap**  
  Displays **total production by country/entity**, offering a visual hierarchy that quickly identifies top contributors (e.g., Asia, Americas, Armenia).
* **Slicers & Filters**  
  Interactive filters enable users to explore data by dynamically:
  + **Year**
  + **Entity (Country/Region)**
  + **Production Item**
* **Donut Chart + KPI Card**  
  A combined visual highlighting **the total production volume for a selected item or entity**, aiding in comparative analysis and context setting.

**Dashboard 2: Analytical Report View**

This dashboard serves as a **narrative-driven analytical summary**, translating the raw data and visual findings into structured insights, trends, and patterns. Designed to complement the data-heavy “Global Overview” dashboard, this view provides context and interpretation to support strategic understanding.

**🔹 Visual Elements & Descriptions:**

➤ **Ribbon Chart**

* + Displays the **Top 10 entities (countries or regions)** based on total food production volume (1961–2023).
  + Highlights global leaders such as **Asia**, **World Average**, **Americas (FAO)**, and **Western Africa**, each contributing over 25–50 billion tonnes.

➤ **Textual Analysis Panels**

Organized into clearly defined thematic blocks, these panels provide interpretative insights based on the underlying data. The components include:

* + **Individual Crop Trends**  
    Summarizes cumulative production for key global crops such as:
    - *Wheat*: 282 billion tonnes
    - *Rice*: 269 billion tonnes
    - *Tea*: 2 billion tonnes  
      Allows stakeholders to compare relative importance across staple commodities.
  + **Commodity Insights**  
    Identifies top-performing crops by total production volume:
    - *Grapes* (43 billion), *Apples* (39 billion), *Bananas* (32 billion), *Oranges* (26 billion)  
      Provides clarity on high-demand crops across global markets.
  + **Regional Production Patterns**  
    Highlights region-specific specializations, such as:
    - **Africa, Asia, and the Americas** leading in *green coffee* production
    - Steady rise in *maize* post-1980s
    - *Wheat* as a fast-growing crop globally
  + **Sugarcane Production Highlights**  
    Focused insight on the most-produced crop globally:
    - Total output: **621.62 billion tonnes**
    - Key producers: **Brazil, India, and China**, driven by demand for sugar and ethanol
  + **Country-Level Observations**
    - Emphasizes that **Europe, Asia, and the Americas** dominate in crop variety and volume
    - Notes steady contributions from **high-income** and **Northern American countries**
  + **Visual Interpretation Summary**  
    Interprets how different chart types contribute to storytelling:
    - *Bar charts* for ranking and comparison
    - *Donut & pie charts* for distribution clarity
    - *Line charts* for historical trend analysis
    - *Treemaps* for proportional and hierarchical comparisons

**Key Insights Derived:**

**➤ Individual Crop Trends (1961–2023):**

* **Rice**: 269 billion tonnes
* **Wheat**: 282 billion tonnes
* **Tea**: 2 billion tonnes

**➤** **Top-Produced Commodities:**

* **Grapes**: 43 billion tonnes
* **Apples**: 39 billion tonnes
* **Bananas**: 32 billion tonnes
* **Oranges**: 26 billion tonnes

**➤** **Sugarcane Production:**

* Highest produced crop: *621.62 billion tonnes*
* Top producers: **Brazil**, **India**, **China**
* Used for sugar and ethanol industries

**➤ Regional Specialization:**

* **Africa, America, and Asia** lead green coffee production.
* **Maize** production increased notably after the 1980s.
* **Wheat** shows a steep rise, indicating growing importance.

**➤** **Country Patterns:**

* **Asia** leads with over 50 billion tonnes
* **Europe, Americas**, and high-income nations show steady contributions

**Dashboard Screenshot:**

A close-up of a graph

AI-generated content may be incorrect.

**Report Screenshot:**

A graph of food production analysis

AI-generated content may be incorrect.

**My Contribution:**

* Imported raw FAO data and performed complete **data cleaning** using Power Query.
* Categorized commodities into meaningful groups for visual clarity.
* Designed and developed both dashboards end-to-end in **Power BI**.
* Created **DAX measures** for KPIs, filters, and dynamic charts.
* Derived insights and structured the **visual report page**.
* Ensured design consistency using a clean, brown-themed layout.

**Access Link:**

**GitHub Repository Link :** [*https://github.com/isShrutibhatia/SmartBridge\_Project*](https://github.com/isShrutibhatia/SmartBridge_Project)

**OneDrive Link :***[SmartBridge\_Project.pbix](https://abes365-my.sharepoint.com/:u:/g/personal/shruti_22b1541086_abes_ac_in/EXU-8vcDcCdJmDHS5ySG0ToBfOZp8nRckoUi1Fc9rZpjxA?e=RFZwYX)*

**Challenges Faced:**

* Grouping commodities into meaningful and non-overlapping categories.
* Managing and cleaning data spanning **60+ years** for 100+ items.
* Designing a dashboard that is both **insightful and visually simple**.

**Conclusion:**

This project highlights key global food production patterns and enables interactive filtering for deeper analysis. Power BI proved essential for turning a massive dataset into a consumable, visually engaging, and insight-rich dashboard.