

# Global Food Production Trends and Analysis: A Comprehensive Study from 1961 to 2023 Using Power BI

## Team Details:

**Team ID:** LTVIP2025TMID19876

- **Team Leader:** Gudipudi Sumithra (21481A5433)  
Mail id: [sumithragudipudi11@gmail.com](mailto:sumithragudipudi11@gmail.com)
- **Team member:** Konakalla Phaneendra Kumar (21481A5463)  
Mail id: [phani2822@gmail.com](mailto:phani2822@gmail.com)
- **Team member:** Kadimi Meghana (21481A5441)  
Mail id: [meghanakadimi04@gmail.com](mailto:meghanakadimi04@gmail.com)
- **Team member:** Komaraju Udaya Kiran (21481A5461)  
Mail id: [uday36658@gmail.com](mailto:uday36658@gmail.com)

## Technologiesused:

- **Excel/CSV**–Used as the dataset source.
- **Power Query**– For data cleaning and transformation.
- **DAX (Data Analysis Expressions)**–For creating calculated measures and aggregations.
- **PowerBI**– For data visualization and dashboard creation.

## Introduction:

ABC Company undertook a comprehensive study of global food production trends from 1961 to 2023, leveraging Power BI for insightful visualizations. The analysis encompassed key agricultural commodities, revealing that total rice production amounted to 269 billion tonnes, while wheat production reached 282 billion tonnes. The study highlighted that tea production stood at 2 billion tonnes, with Africa emerging as the leading producer of green coffee. Additionally, the research underscored a steady rise in wheat, maize, and rice production over the years, with wheat showing the most significant increase.

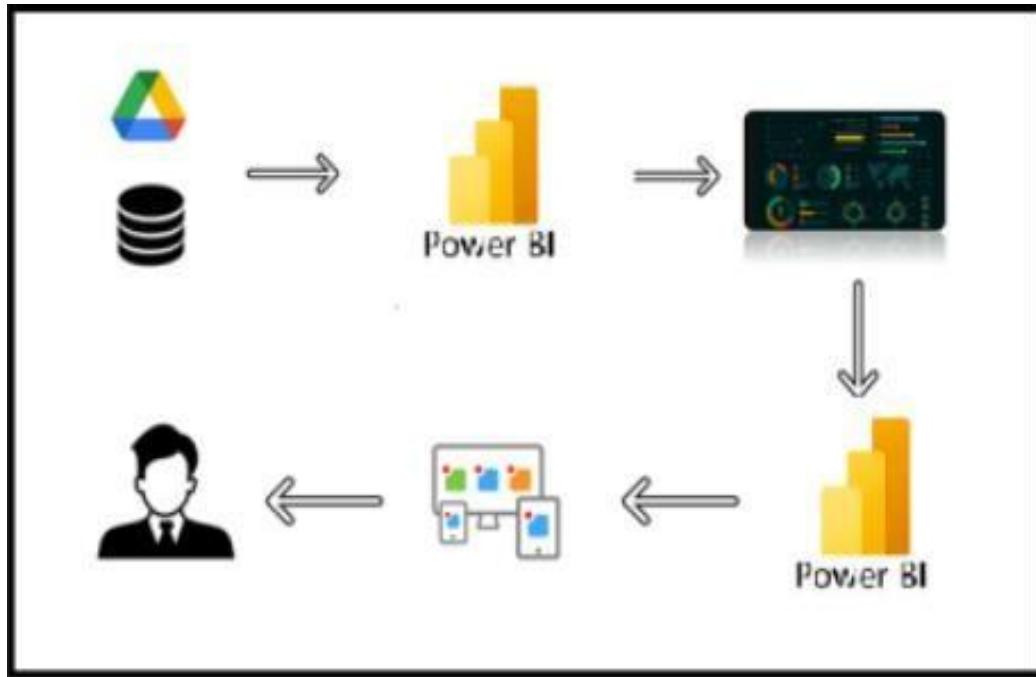
The project also explored the production volumes of apples, avocados, bananas, and oranges by different regions, identifying Europe and Asia as significant contributors. Maize production demonstrated consistent growth, particularly from the late 1980s onward. The study further indicated that grapes had the highest total production among fruits at 43 billion tonnes, followed by apples, bananas, and oranges. This comprehensive analysis equips ABC Company with valuable insights to better understand global food production trends, aiding strategic decision-making in the agricultural sector.

**Scenario 1** –ABC company explores the significant trends in rice production worldwide. By leveraging Power BI, the study analyzes the sum of rice production (tonnes) over the period, revealing a total global output of 269 billion tonnes. Using the decomposition tree, the study identifies key factors influencing rice production, such as soil type, climate conditions, and irrigation practices. The analysis highlights that **fertile** alluvial soil, consistent water availability, and optimal temperature ranges lead to the highest rice yields. These insights provide a data-driven approach to standardizing best practices across regions, ensuring improved global rice production efficiency and food security.

**Scenario 2** –This study highlights the sum of wheat production (tonnes), revealing a total global output of 282 billion tonnes over this period. By analyzing key agricultural factors, the study identifies that fertile loam soil, balanced nitrogen-rich fertilizers, and optimal irrigation schedules significantly enhance wheat yield. The decomposition tree further uncovers that maintaining temperatures between 15-25°C and soil moisture at optimal levels leads to the highest wheat production. These insights emphasize wheat's crucial role in global food security and help in refining sustainable cultivation practices, ensuring consistent and efficient wheat production worldwide.

**Scenario 3** –The study highlights the sum of tea production (tonnes), showcasing a total global output of 2 billion tonnes. A gauge chart visually represents the scale of tea production in comparison to other major crops. Through data analysis, it is identified that optimal tea yield is achieved with well-drained loamy soil, consistent rainfall or controlled irrigation, and moderate temperatures between 18-25°C. The decomposition tree further reveals that organic fertilizer application and shade-grown methods enhance tea quality and production. These insights help refine precision agriculture techniques, ensuring sustainable and efficient tea cultivation worldwide.

## Technical Architecture:



## Project Flow:

To accomplish this, we have to complete all the activities listed below,

- Data Collection & Extraction from Database
  - Collect the dataset
  - Storing Data in DB
  - Perform SQL Operations
  - Connect DB with Power Bi
- Data Preparation
  - Prepare the Data for Visualization
- Data Visualizations
  - No of Unique Visualizations
- Dashboard
  - Responsive and Design of Dashboard
- Report
  - Responsive and Design of Dashboard
- Performance Testing
  - No of Visualizations/Graphs
- Project Demonstration & Documentation
  - Record explanation Video for project end to end solution
  - Project Documentation- Step by step project development procedure

# Milestone 1: Data Collection & Extraction from Database

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes and generate insights from the data.

## Activity 1: Collect the dataset

Please use the link to download the dataset: [Dataset Link](#)

Name of the dataset: world\_food\_production.csv

## Activity 1.1: Understand the data

Data contains all the meta information regarding the columns described in the CSV files

Column Description of the Dataset:

- Entity: Represents the country or region where the food production data is recorded.
- Code: A unique identifier or code for each entity (country or region).
- Year: The specific year for which the data is recorded, ranging from 1961 to 2023.
- Apples\_Production (tonnes): The total annual production of apples measured in tonnes.
- Avocados\_Production (tonnes): The total annual production of avocados measured in tonnes.
- Bananas\_Production (tonnes): The total annual production of bananas measured in tonnes.
- Coffee\_green\_Production (tonnes): The total annual production of green coffee measured in tonnes.
- Grapes\_Production (tonnes): The total annual production of grapes measured in tonnes.
- Maize\_Production (tonnes): The total annual production of maize measured in tonnes.
- Oranges\_Production (tonnes): The total annual production of oranges measured in tonnes.
- Rice\_Production (tonnes): The total annual production of rice measured in tonnes.
- Tea\_Production (tonnes): The total annual production of tea measured in tonnes.
- Wheat\_Production (tonnes): The total annual production of wheat measured in tonnes.

## Activity 2: Connect Data with PowerBI

- Open **PowerBI Desktop**.
- Click on **Home >GetData**.
- Choose **Excel/CSV/Database** (depending on the dataset format).
- Browse and select the dataset file.
- Click **Load/Transform** to import the data into Power BI for further processing.

# Milestone 2: Data Preparation

Preparing the data for visualization involves cleaning the data to remove irrelevant or missing data, transforming the data into a format that can be easily visualized, exploring the data to identify patterns and trends, filtering the data to focus on specific subsets of data, preparing the data for visualization software, and ensuring the data is accurate and complete. This process helps to make the data easily understandable and ready for creating visualizations to gain insights into the performance and efficiency. Since the data is already cleaned, we can move to visualization.

## 1. Data Cleaning:

- Removed duplicates and handled null values where applicable.

## 2. Data Transformation:

- Applied Power Query transformations for better data structuring.
- Ensured all columns were in the correct datatype.

## Milestone 3: Data Visualization

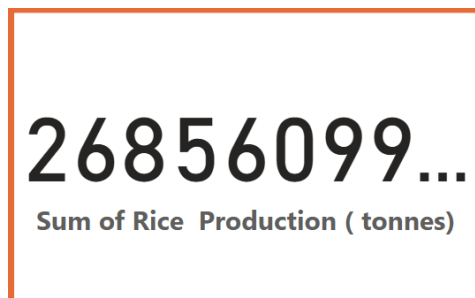
Data visualization is the process of creating graphical representations of data to help people understand and explore the information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs, and maps, data visualizations can help people quickly identify patterns, trends, and outliers in the data.

### Activity 1: No of Unique Visualizations

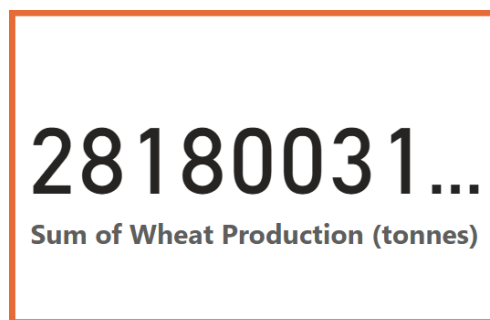
The number of unique visualizations that can be created with this dataset is extensive. Various types of visualizations help analyze global food production trends and their environmental impacts. These visualizations can be used to compare food production across different regions and time periods, track production trends from 1961 to 2023, analyze distribution patterns, and identify relationships between key agricultural and environmental variables. Utilizing Power BI, these insights can support data-driven decision-making in food security, sustainability, and policy planning. Common visualizations include:

#### Visualizations Used:

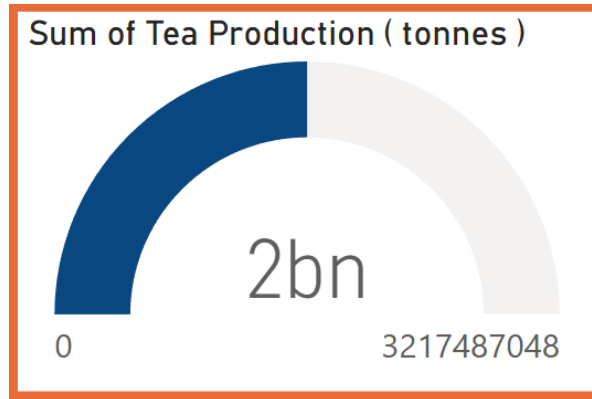
**Activity 1.1:** A summary metric that represents as Sum of Rice Production (tonnes)



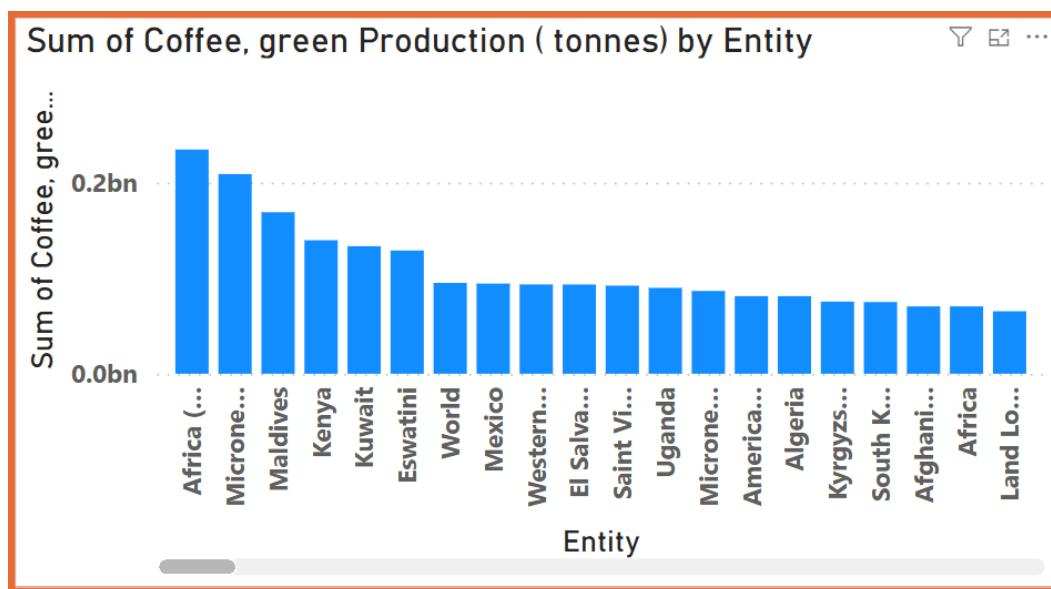
**Activity 1.2:** A summary metric that represents as Sum of Wheat Production (tonnes)



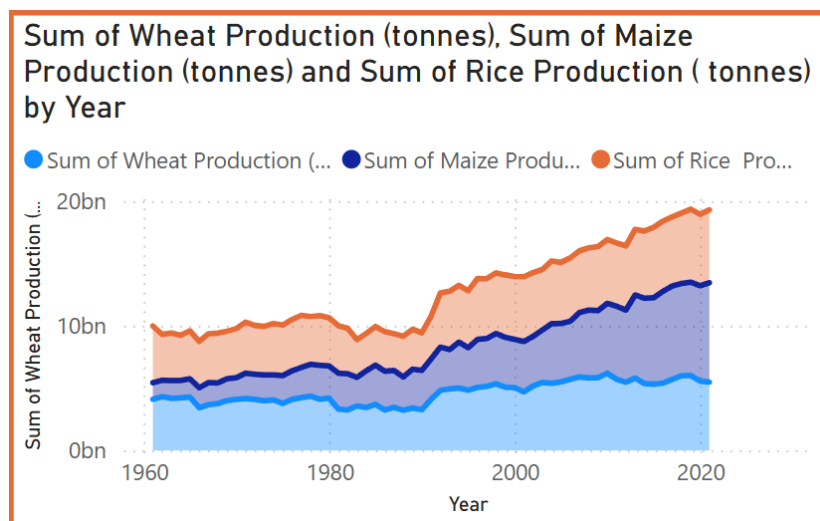
**Activity 1.3:** A gauge chart to monitor the key performance by calculating Sum of Tea Production (tonnes)



**Activity 1.4:** A vertical bar chart that represents the Sum of Coffee, Green Production (tonnes) by Entity

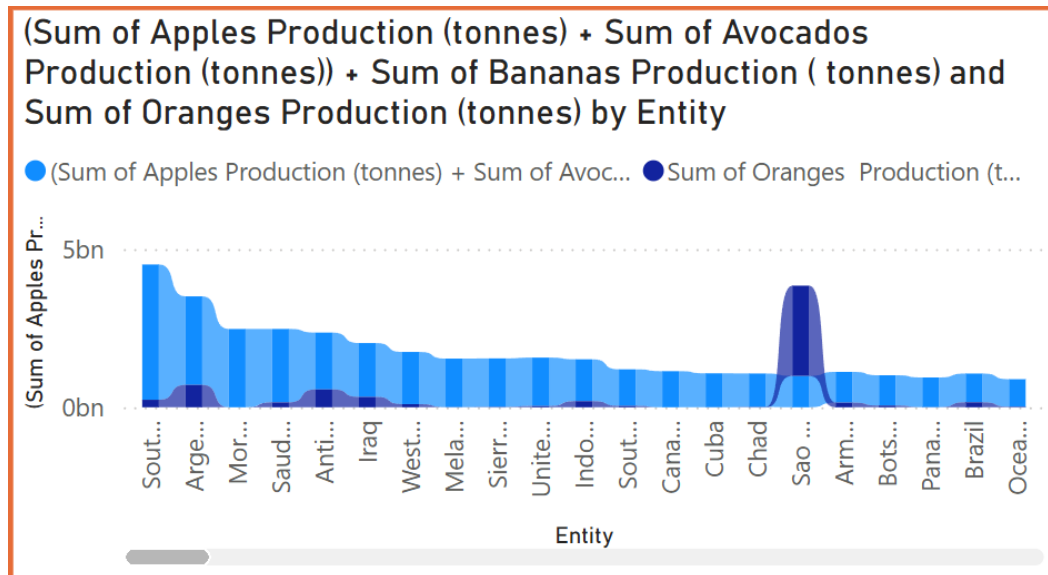


**Activity 1.5:** A stacked area chart that shows Sum of Wheat, Maize, and Rice Production (tonnes) by Year.

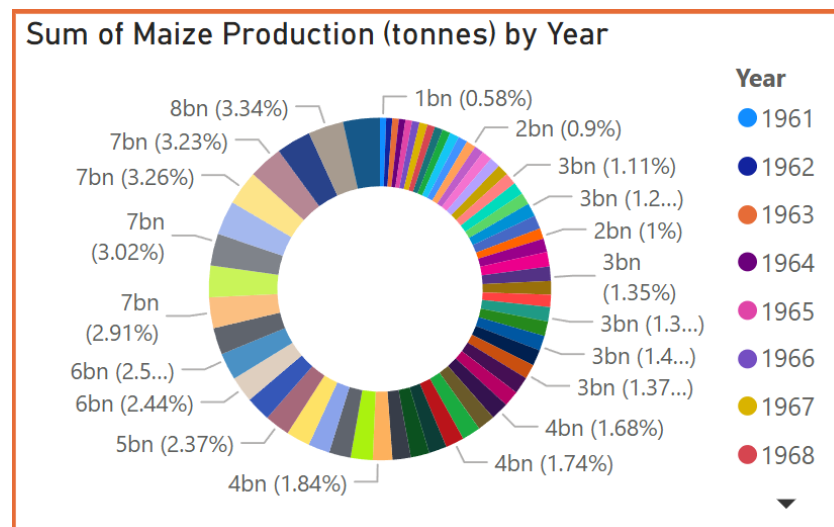


**Activity 1.6:** A combination chart that shows Sum of Apples, Avocados, Bananas, and Oranges

Production(tonnes) by Entity



**Activity 1.7:** A donut chart that shows Sum of Maize Production (tonnes) by Year



## Milestone 4: Dashboard

A dashboard is a graphical user interface (GUI) that displays information and data in an organized, easy-to-read format. Dashboards are often used to provide real-time monitoring and analysis of data and are typically designed for a specific purpose or use case. Dashboards can be used in a variety of settings, such as business, finance, manufacturing, healthcare, and many other industries. They can be used to track key performance indicators (KPIs), monitor performance metrics, and display data in the form of charts, graphs, and tables.

### Activity 1: Responsive and Design of Dashboard

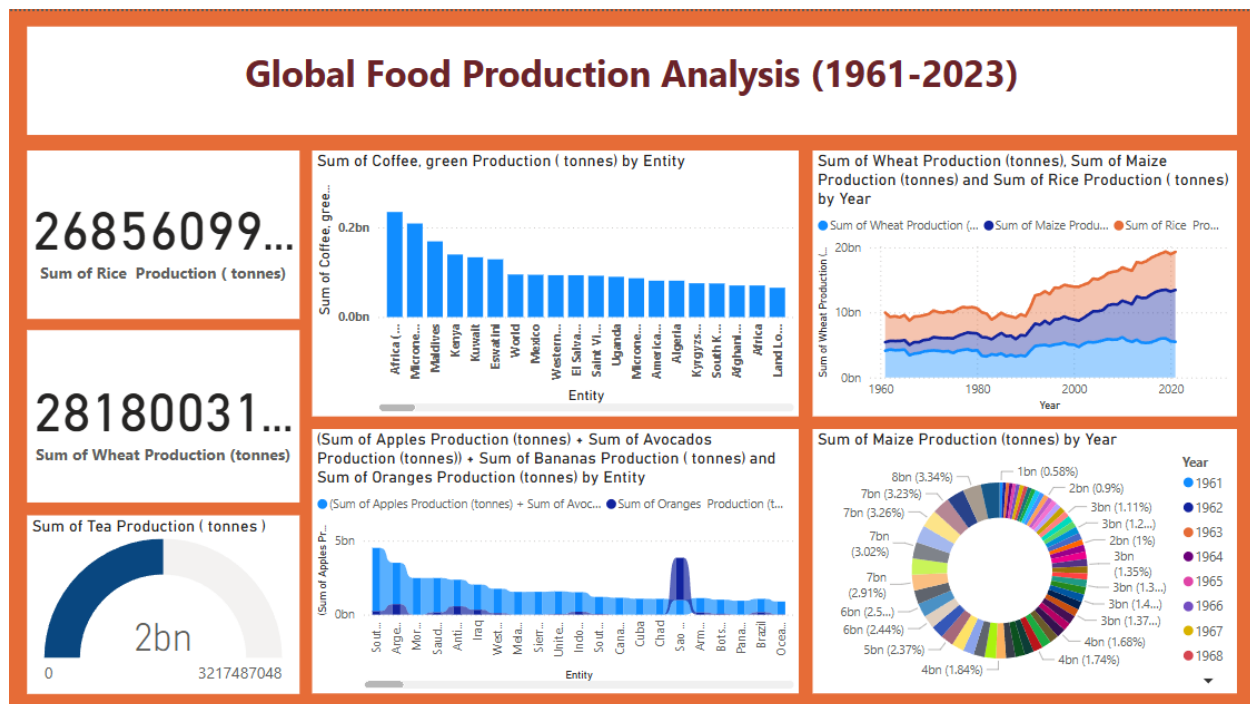
The responsiveness and design of the Global Food Production dashboard are crucial to ensuring that the

insights derived from the dataset are easily interpretable and actionable. Key considerations for designing a responsive and effective dashboard include:

- **User-Centered Design:** Ensuring that the dashboard is intuitive and easy to navigate for users analyzing global food production trends.
- **Clear and Concise Information:** Presenting key metrics and visualizations in an easily understandable format to highlight production patterns from 1961 to 2023.
- **Interactivity:** Implementing slicers and drill-throughs to allow users to filter data dynamically based on region, crop type, production volume, and environmental factors.
- **Data-Driven Approach:** Utilizing real-time and historical data updates to provide accurate and relevant insights into food production trends.
- **Accessibility:** Designing the dashboard to be user-friendly for all stakeholders, including policymakers, researchers, farmers, and analysts.
- **Customization:** Allowing users to adjust visualization settings based on their analytical needs for in-depth trend analysis.
- **Security:** Ensuring that only authorized users have access to sensitive agricultural data and food production insights.

The ultimate goal is to create a dashboard that is user-friendly, interactive, and data-driven, providing actionable insights to improve decision-making in agricultural and environmental management.

Once you have created views on different sheets in Power Bi you can pull them into a dashboard.



## Milestone 5: Report

A data report is a comprehensive document that provides a detailed and structured account of data analysis, findings, and insights. It is typically used for in-depth analysis, documentation, and communication of results. Reports are suitable for a diverse audience, including decision-makers, analysts, and stakeholders who need a comprehensive understanding of the data. A data report is a way of presenting data and analysis in a narrative



format,with thegoalofmakingtheinformation more engaging and easier to understand. A data story typically includes a clear introduction that sets the stageand explains the context for the data, a bodythat presents the data and analysis in a logical and systematic way, and a conclusion that summarizes the keyfindings and highlights their implications.

Created a **comprehensive Power BI report** summarizing key insights into global food production trends. The report includes:

- Growth patterns of food production across different regions and time periods.
- Correlation analysis between climate factors (temperature, humidity) and agricultural output.
- Data-driven insights to support better decision-making in food security, sustainability, and policy planning.

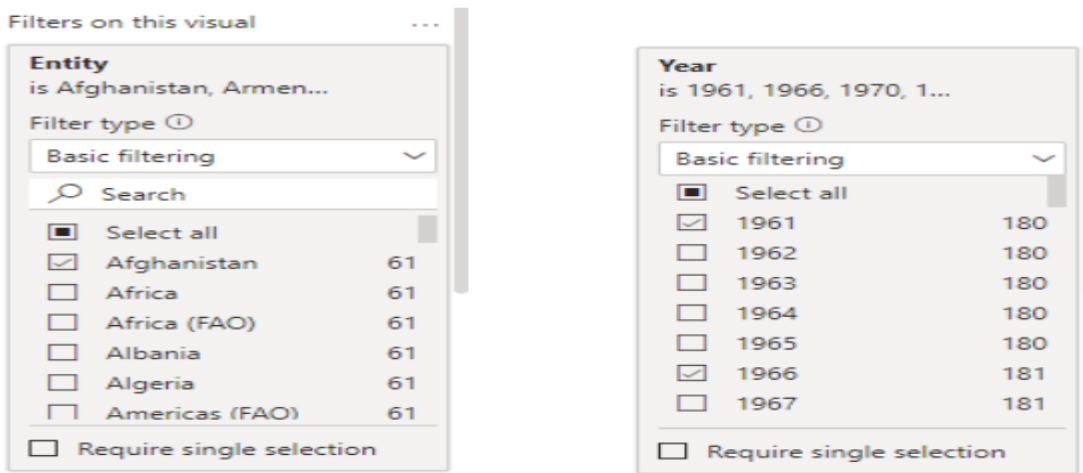
## Milestone 6 : Performance Testing

Performance testing is a crucial aspect of software development aimed at evaluating the speed, responsiveness, stability, and scalability of an application under various workload conditions. It involves simulating real-worldusage scenarios to assess how the system behaves and performs under stress, peak loads, or normal conditions.

### Activity 1: Utilization of Data Filters

The utilization of data filters plays a pivotal role in streamlining information processing and analysis across various domains. By selectively extracting or excluding specific data points based on predefined criteria, filters enable efficient data management and enhance decision-making processes.

"Utilization of Filters" refers to the application or use of filters within a system, software application, or data processing pipeline to selectively extract, manipulate, or analyze data based on specified criteria or conditions.

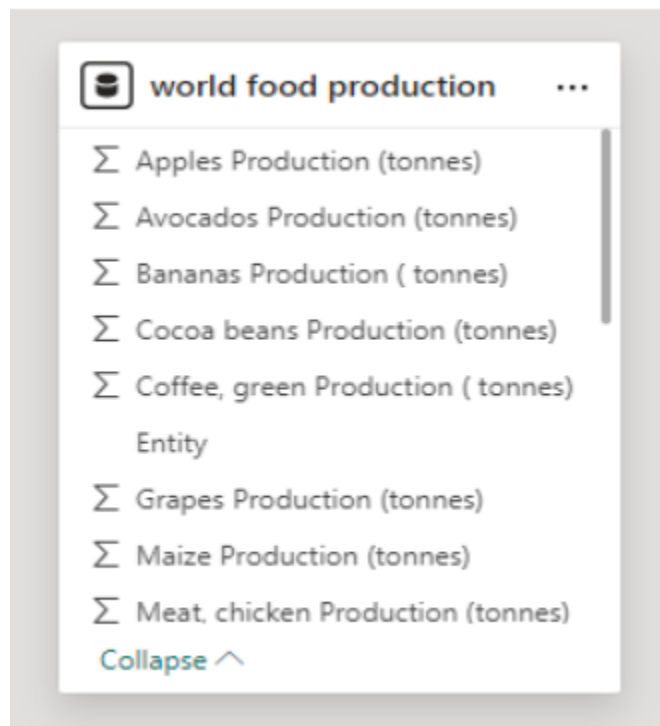


## Activity 2: No of Visualizations/ Graphs

- Sum of Rice Production (tonnes)
- Sum of Wheat Production (tonnes)
- Sum of Tea Production (tonnes)
- Sum of Coffee, Green Production (tonnes) by Entity
- Sum of Wheat Production (tonnes), Maize Production (tonnes), Rice Production (tonnes) by Year
- Sum of Apples, Avocados, Bananas, Oranges Production (tonnes) by Entity
- Sum of Maize Production (tonnes) by Year
- Sum of Grapes, Apples, Bananas, Oranges Production (tonnes)

## Activity 3: Amount of data needed

"Amount of Data Loaded" refers to the quantity or volume of data that has been imported, retrieved, or loaded into a system, software application, database, or any other data storage or processing environment. It's a measure of how much data has been successfully processed and made available for analysis, manipulation, or use within the system.



## Milestone 7: Project Demonstration & Documentation

Below mentioned deliverables to be submitted along with other deliverables

### Activity: Record explanation Video for project end to end solution and documentation

Explanation video: [Video Link](#)