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

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 - Sum of Rice Production (tonnes)

This section prominently displays the total global rice production, amounting to 269 billion tonnes over the period from 1961 to 2023. It highlights the significant volume of rice produced, emphasizing its importance as a staple food crop worldwide.

Scenario 2 - Sum of Wheat Production (tonnes)

Highlighting the global wheat production, this section shows a total of 282 billion tonnes produced between 1961 and 2023. This underscores wheat's crucial role in global food security and its widespread cultivation.

Scenario 3 - Sum of Tea Production (tonnes)

This section shows a gauge chart illustrating the total tea production, amounting to 2 billion tonnes. The visual emphasizes the scale of tea production compared to other major crops.

Scenario 4 - Sum of Coffee, Green Production (tonnes) by Entity

A bar chart depicting the distribution of green coffee production among various entities. Africa, Asia, and America are leading producers, reflecting regional contributions to global coffee supply.

Scenario 5: Sum of Wheat, Maize, and Rice Production (tonnes) by Year

An area chart showing the annual production trends of wheat, maize, and rice from 1961 to 2023. It highlights the growth trajectories and fluctuations of these essential crops over the years.

Scenario 6 - Sum of Apples, Avocados, Bananas, and Oranges Production (tonnes) by Entity

This stacked bar chart illustrates the production volumes of apples, avocados, bananas, and oranges by different entities. It highlights the diverse contributions to global fruit production.

Scenario 7 - Sum of Maize Production (tonnes) by Year

A donut chart depicting the yearly maize production distribution across different years. It shows how maize production has evolved, with specific years highlighted for their significant contributions.

Scenario 8 - Sum of Grapes, Apples, Bananas, and Oranges Production (tonnes)

This bar chart compares the total production volumes of grapes (43 billion tonnes), apples (39 billion tonnes), bananas (32 billion tonnes), and oranges (26 billion tonnes). It provides a comparative view of the global production scales of these popular fruits.

Technical Architecture:
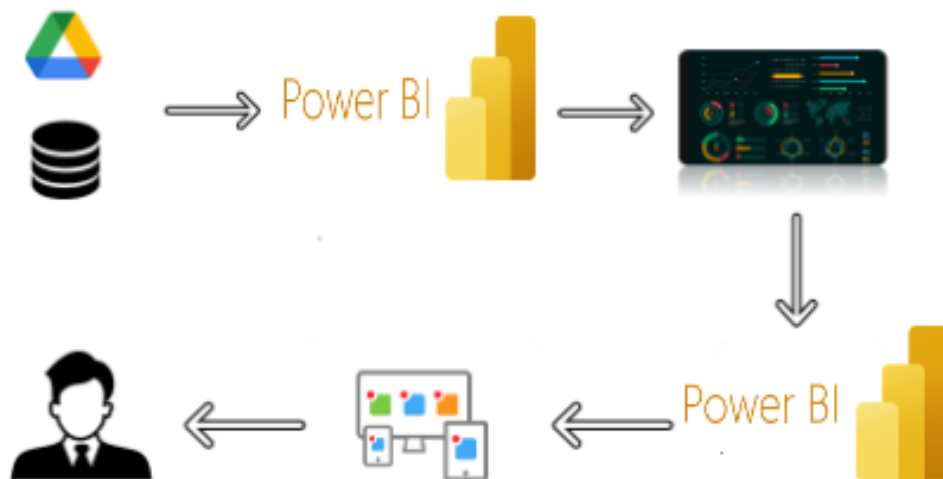
Project Flow

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

- Data Collection & Extraction from Database
    - Collect the dataset,
    - Connect Data with Power BI
- Data Preparation
    - Prepare the Data for Visualization
- Data Visualizations
    - Visualizations
- Dashboard
    - Responsive and Design of Dashboard
- Report
    - Report Creation
- Performance Testing
    - Utilization of Data Filters
    - No. of Calculation fields
    - 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: Downloading the dataset

Please use the link to download the dataset: Link

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 Power BI

With Power BI, users can seamlessly connect to a wide range of data sources, including databases, cloud services, spreadsheets, and streaming data. This capability allows organizations to consolidate disparate data sources into a single, unified platform, breaking down data silos and enabling holistic analysis.

Explanation video link:

Data Loading Link

Milestone 2: Data Preparation
Data preparation is a critical phase in the data lifecycle, encompassing activities that transform raw data into a format suitable for analysis. This multifaceted process involves several steps including data cleaning, integration, transformation, and enrichment. Data cleaning involves identifying and rectifying errors, inconsistencies, and missing values within datasets to ensure accuracy and reliability.

Activity 1: Prepare the Data for Visualization

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.

Explanation video link 1:

Data Cleaning Link

Milestone 3: Data Visualization

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.

Activity 1: No of Unique Visualizations

The number of unique visualizations that can be created with a given dataset is vast. Some common types of visualizations that can be used to analyze the trends and efficiency of Global Food Production Trends and Analysis (1961-2023) include bar charts, line charts, stacked area charts, heat maps, scatter plots, pie charts, maps, KPI cards, and treemaps. These visualizations can be used to compare production levels across countries, track changes over time, show distribution and relationships between variables, analyze regional food production patterns, and highlight key insights on global food security and efficiency.
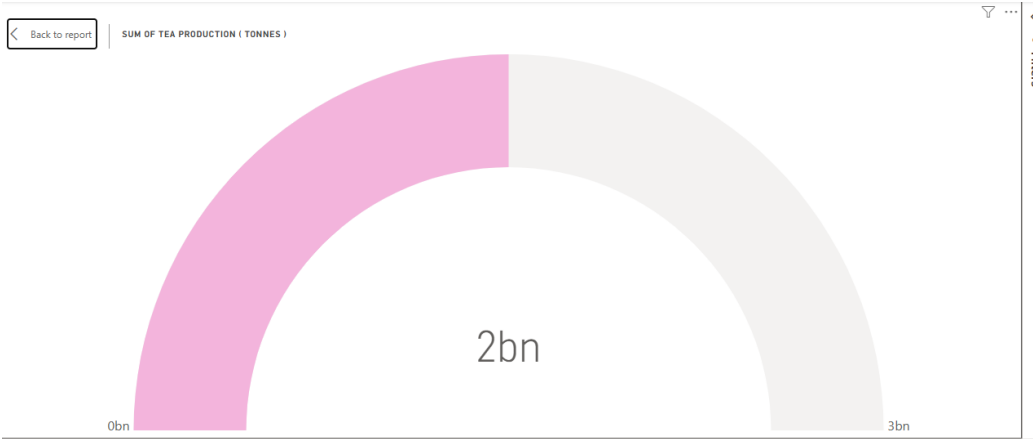
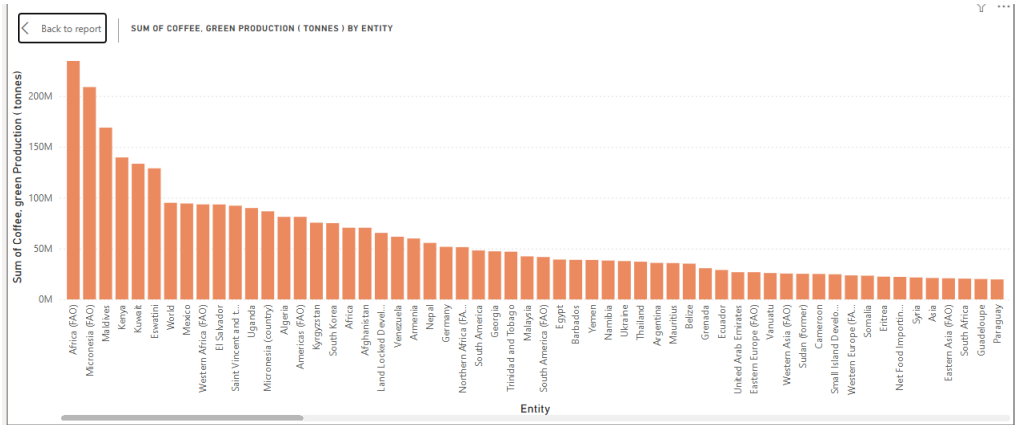### Activity 1.1: Sum of Rice Production (tonnes)

269bn

Sum of Rice Production (tonnes)
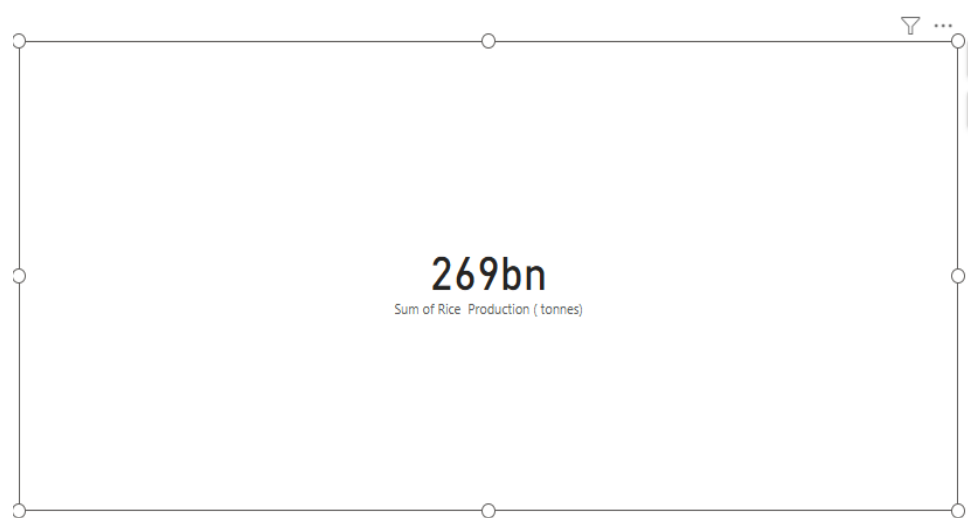
Activity 1.2: Sum of Wheat Production (tonnes)

282bn

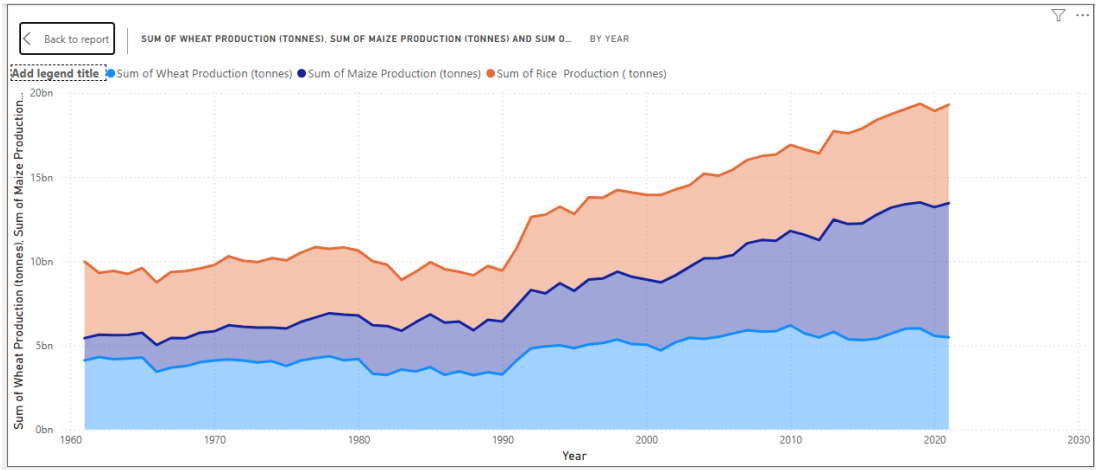Sum of Wheat Production (tonnes)
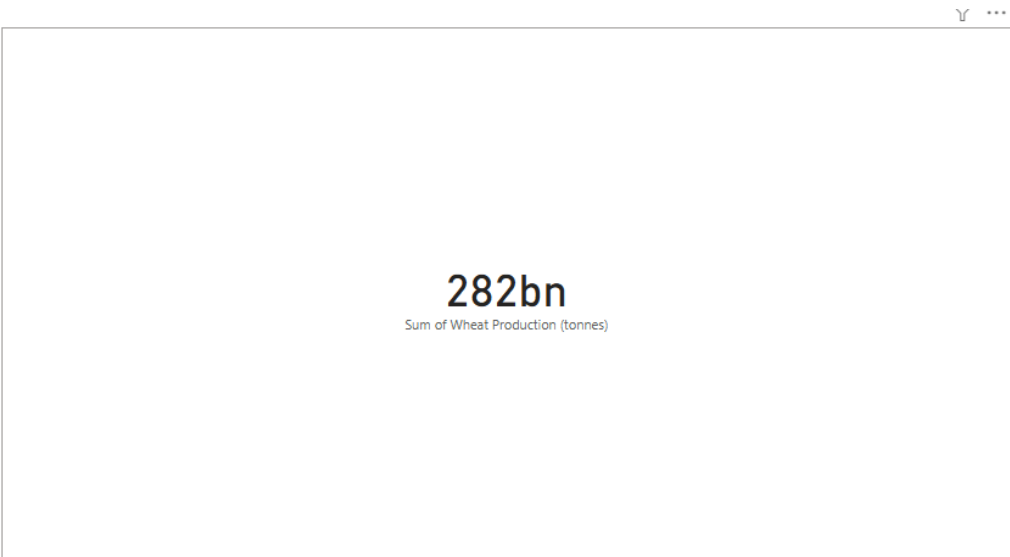
Activity 1.3: Sum of Tea Production(tonnes)
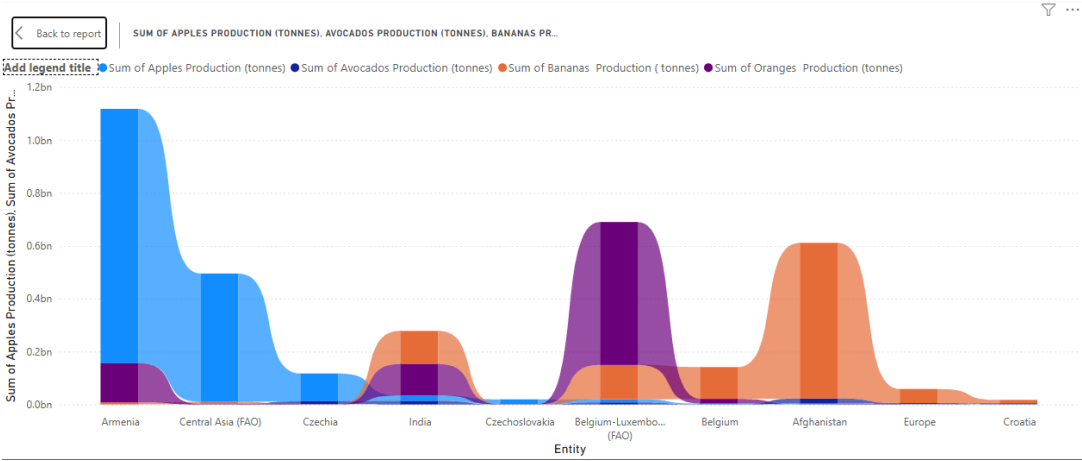

Activity 1.4: Sum of Coffee, Green Production (tonnes) by Entity
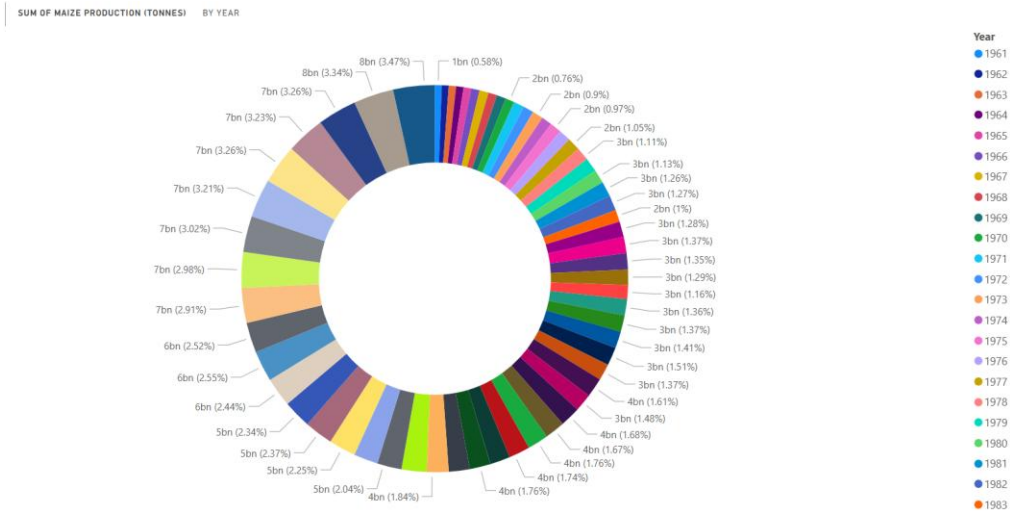

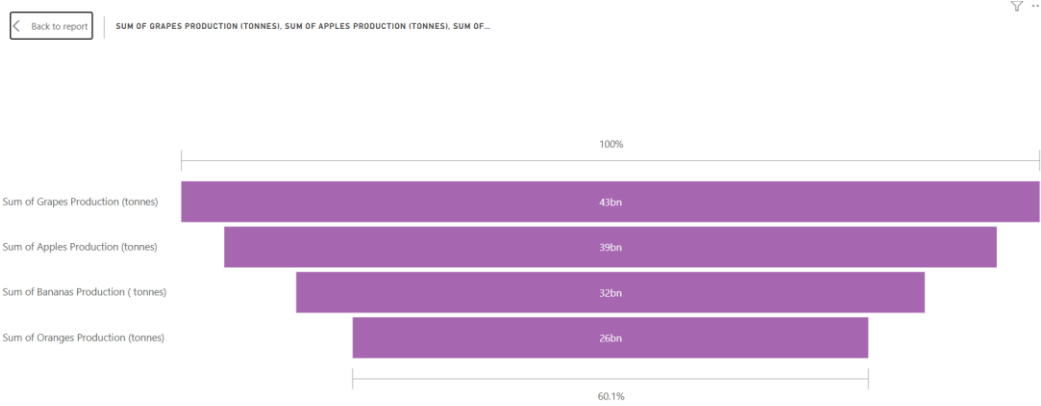**Activity 1.5: Sum of Wheat, Maize, and Rice Production (tonnes) by Year**

Activity 1.6: Sum of Apples, Avocados, Bananas, and Oranges Production (tonnes) by Entity

Activity 1.7: Sum of Maize Production (tonnes) by Year

Activity 1.8: Sum of Grapes, Apples, Bananas, and Oranges Production (tonnes)

Milestone 4: Dashboard

A dashboard in Power BI provides an interactive visual summary of data, helping analyze trends and comparisons. For Global Food Production Trends (1961-2023), it can include bar charts, line charts, maps, and KPIs to show production patterns across regions and years. Interactive filters allow users to explore specific countries, food types, and time periods, making data analysis more insightful and efficient. Additionally, drill-through and tooltip features can be used to provide deeper insights into specific data points, enhancing user experience and decision-making.

Activity :1- Responsive and Design of Dashboard

A responsive dashboard in Power BI ensures that visualizations adapt seamlessly across different screen sizes and devices, providing an optimal user experience. Proper layout design, such as using grid-based arrangements, card visuals, and well-structured slicers, enhances readability and usability. For Global Food Production Trends (1961-2023), the dashboard should have a clean and intuitive design, using contrasting colors for different food categories, appropriate font sizes, and interactive elements like drill-throughs and tooltips for deeper insights. Maintaining a balance between aesthetics and functionality ensures that the dashboard remains user-friendly while delivering valuable data-driven insights.

Once you have created views on different sheets in PowerBi you can pull them into a dashboard.
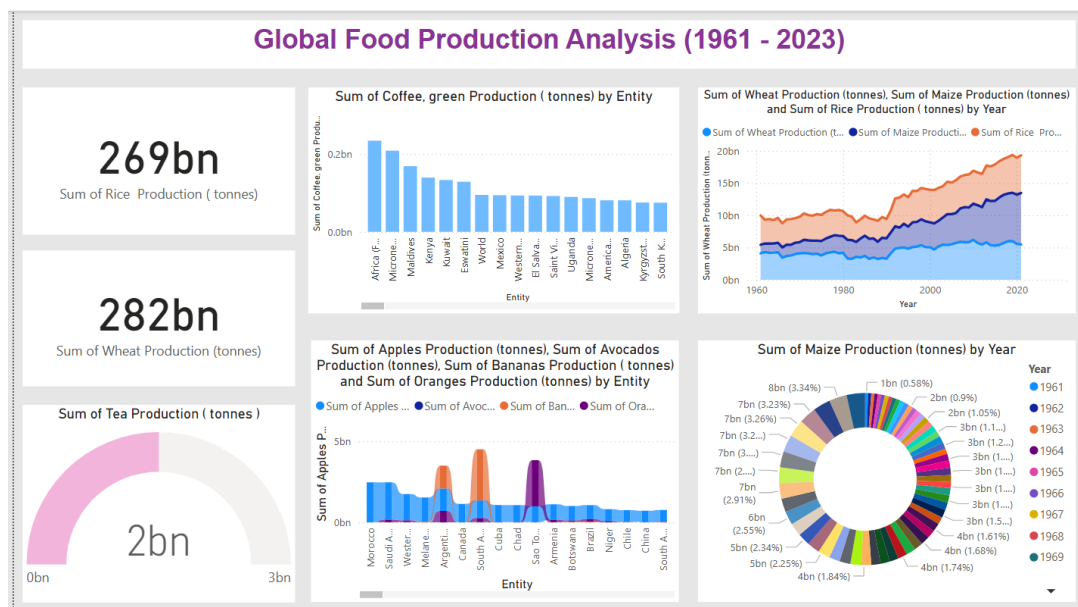
Milestone 5: Report

Designing a report in Power BI involves connecting to data sources, creating visualizations like charts and graphs, customizing their appearance and interactivity, organizing them logically on the canvas, formatting elements for consistency and clarity, and optionally creating dashboards for a summarized view. Throughout the process, it's essential to consider the audience's needs and ensure the report effectively communicates insights from the data. Finally, iterate based on feedback to continually improve the report's design and usefulness

Report 1:

Milestone 6: Performance Testing

Performance testing in Power BI ensures dashboards run smoothly by optimizing loading speed, responsiveness, and queries. Techniques like DAX optimization, reducing visuals, using aggregations, and Performance Analyzer help improve efficiency. Proper data modeling and indexing can further enhance performance, ensuring faster interactions, quick data refresh, and scalability for large datasets.

Activity 1: Amount of Data Loaded

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.
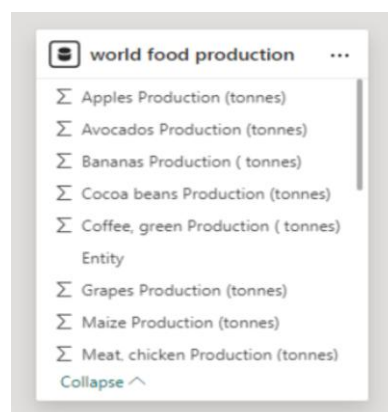
Activity 2: Utilization of Data Filters

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 2.1: Selected "Country" as a Filter
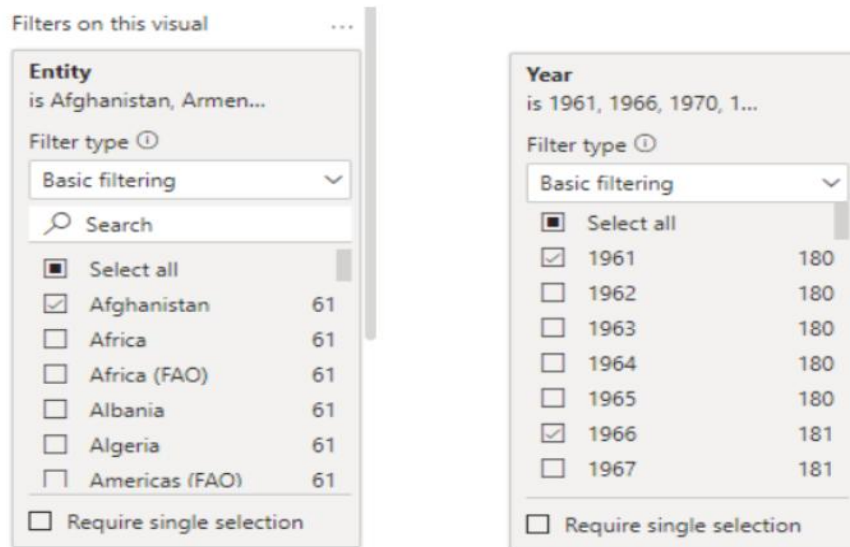
Activity 2.2: No of Visualizations/ Graphs

- 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)

Milestone 7: Project Demonstration & Documentation

Below mentioned deliverables to be submitted along with other deliverables

Activity 1: Record explanation Video for project end to end solution

Creating a record explanation video for a project's end-to-end solution is crucial for ensuring clarity and transparency in its implementation. This video serves as a comprehensive guide, detailing every aspect of the project from inception to completion.

Activity 2: Project Documentation-Step by step project development procedure

Create document as per the template provided