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.

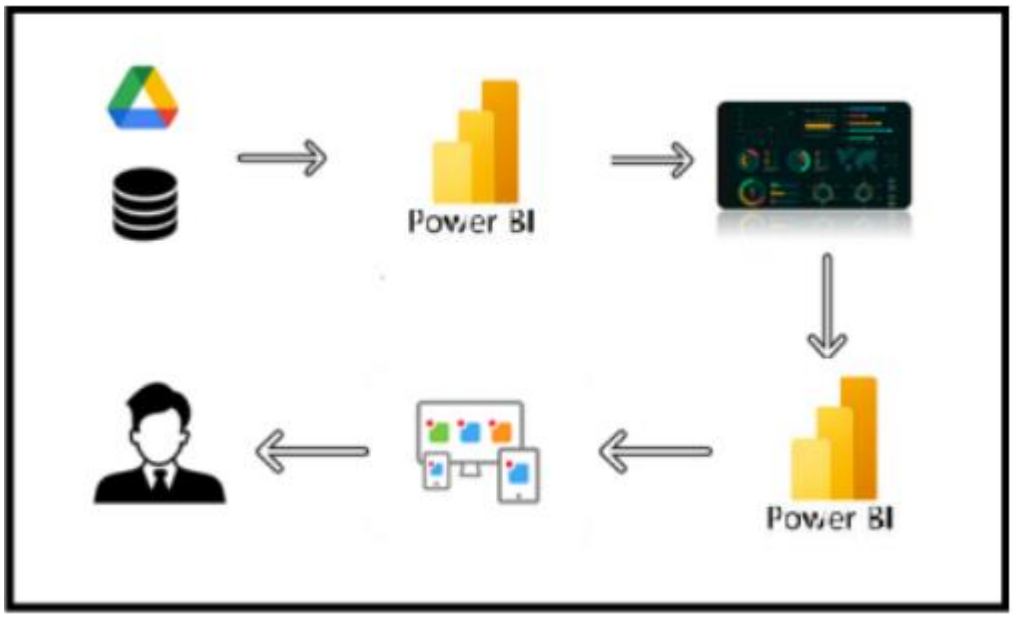
Scenario 7:Sum of Maize Production (tonnes) by Year

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
    - o Collect the dataset,
    - o Connect Data with Power BI
- Data Preparation
    - o Prepare the Data for Visualization
- Data Visualizations
    - o Visualizations
- Dashboard
    - o Responsive and Design of Dashboard
- Report
    - o Report Creation
- Performance Testing
    - o Utilization of Data Filters
    - o No. of Calculation fields
    - o No. of Visualizations/Graphs
- Project Demonstration & Documentation
    - o Record explanation Video for project end to end solution
    - o 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, evaluate outcomes and generate insights from the data.

Activity 1: Downloading the dataset

Dataset :

https://www.kaggle.com/datasets/rafsunahmad/world-food-production

world food production.csv

File Origin: 1252: Western European (Windows) | Delimiter: Comma | Data Type Detection: Based on first 200 rows

Entity	Year	Maize Production (tonnes)	Rice Production (tonnes)	Yams Production (tonnes)	Wheat Production (tonnes)	Tomatoes
Afghanistan	1961	700000	319000	7467702	2279000	
Afghanistan	1962	700000	319000	7420515	2279000	
Afghanistan	1963	713000	319000	8479074	1947000	
Afghanistan	1964	720000	380000	9113779	2230000	
Afghanistan	1965	720000	380000	10067913	2282000	
Afghanistan	1966	720000	337000	10863614	2033000	
Afghanistan	1967	768000	396000	12123091	2280000	
Afghanistan	1968	773000	402000	12840044	2354000	
Afghanistan	1969	785000	407000	14496418	2454000	
Afghanistan	1970	667000	366000	16413323	2081000	
Afghanistan	1971	670000	350000	14232062	1915000	
Afghanistan	1972	720000	400000	11274815	2450000	
Afghanistan	1973	760000	420000	11600265	2700000	
Afghanistan	1974	770000	420000	12099241	2750000	
Afghanistan	1975	780000	435000	13487679	2850000	
Afghanistan	1976	800000	448000	11424861	2936000	
Afghanistan	1977	760000	400000	11006217	2652000	
Afghanistan	1978	780000	428000	10671106	2813000	
Afghanistan	1979	760000	439000	10360042	2663000	
Afghanistan	1980	752000	415000	10773930	2550000	

Extract Table Using Examples | Load | Transform Data | Cancel

Fig 1.1: World Food Production (CSV File)

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.

Milestone 2: Data Preparation

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. Since the data is already cleaned, we can move to visualization.

<u>Data Loading</u>

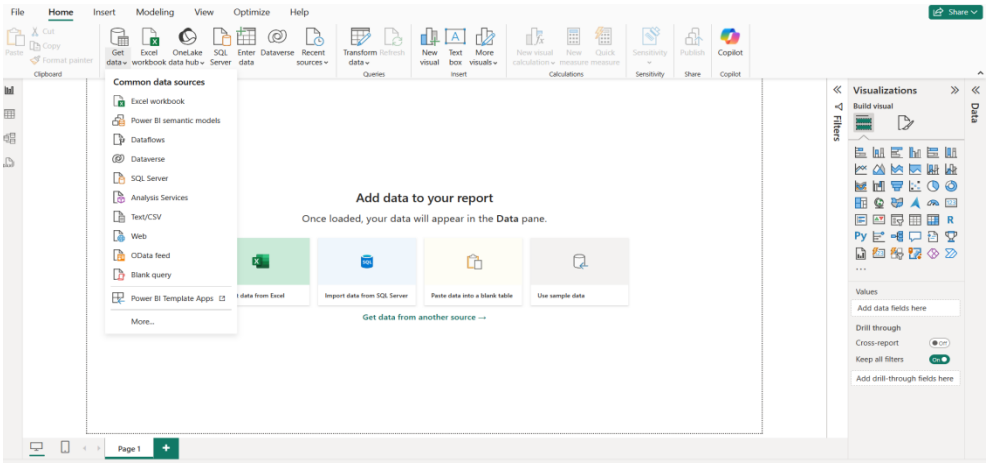


Fig 1.1: Loading Data by selecting Get Data

world food production.csv

File Origin: 1252: Western European (Windows) | Delimiter: Comma | Data Type Detection: Based on first 200 rows

Entity	Year	Maize Production (tonnes)	Rice Production (tonnes)	Yams Production (tonnes)	Wheat Production (tonnes)	Tomatoes
Afghanistan	1961	700000	319000	7467702	2279000	
Afghanistan	1962	700000	319000	7420515	2279000	
Afghanistan	1963	713000	319000	8479074	1947000	
Afghanistan	1964	720000	380000	9113779	2230000	
Afghanistan	1965	720000	380000	10067913	2282000	
Afghanistan	1966	720000	337000	10863614	2033000	
Afghanistan	1967	768000	396000	12123091	2280000	
Afghanistan	1968	773000	402000	12840044	2354000	
Afghanistan	1969	785000	407000	14496418	2454000	
Afghanistan	1970	667000	366000	16413323	2081000	
Afghanistan	1971	670000	350000	14232062	1915000	
Afghanistan	1972	720000	400000	11274815	2450000	
Afghanistan	1973	760000	420000	11600265	2700000	
Afghanistan	1974	770000	420000	12099241	2750000	
Afghanistan	1975	780000	435000	13487679	2850000	
Afghanistan	1976	800000	448000	11424861	2936000	
Afghanistan	1977	760000	400000	11006217	2652000	
Afghanistan	1978	780000	428000	10671106	2813000	
Afghanistan	1979	760000	439000	10360042	2663000	
Afghanistan	1980	752000	415000	10773930	2550000	

Extract Table Using Examples | Load | Transform Data | Cancel

Fig 1.2: World Food Production CSV File

World Food Production

Data

Search

world food production

- Apples Production (tonnes)
- Avocados Production (tonnes)
- Bananas Production (tonnes)
- Cocoa beans Production (tonnes)
- Coffee, green Production (tonnes)
- Entity
- Grapes Production (tonnes)
- Maize Production (tonnes)
- Meat, chicken Production (tonnes)
- Oranges Production (tonnes)
- Palm oil Production (tonnes)
- Peas, dry Production (tonnes)
- Potatoes Production (tonnes)
- Rice Production (tonnes)
- Rye Production (tonnes)
- Soybeans Production (tonnes)
- Sugar cane Production (tonnes)
- Sunflower seed Production (tonnes)
- Sweet potatoes Production (tonnes)
- Tea Production (tonnes)
- Tomatoes Production (tonnes)
- Wheat Production (tonnes)

Fig 1.3: The Data in tonnes

Data Cleaning

Entity	Year	Maize Production (tonnes)	Rice Production (tonnes)	Yams Production (tonnes)	Wheat Production (tonnes)	Tomatoes Production (tonnes)	Tea Production (tonnes)	Sweet
Albania	2003	206900	0	64	259900	456933	1130	
Albania	2004	216200	0	70	253400	512195	1100	
Albania	2005	219900	0	78.82	260000	513780	1455	
Albania	2006	245400	0	85.34	230900	548934	1566	
Albania	2007	215900	0	91.91	249500	567313	1440	
Albania	2008	245000	0	98.42	335000	559249	640	
Albania	2009	265100	0	104.63	333100	641034	480	
Albania	2010	362000	0	110.6	294900	718235	200	
Albania	2011	366400	0	116.37	292800	771606	290	
Armenia	1992	4195	475415230	220000	180181070	19384866	1653	
Armenia	1993	3910	482738720	240000	184487150	20899218	520	
Armenia	2012	19131	650476600	234769.94	285734080	72956184	350	
Armenia	2013	20906	657198800	237078.66	272117500	77516100	380	
Armenia	2014	20158	661821000	240000	297869000	84922776	397	
Armenia	2015	21720	658137000	250000	288305180	87112400	450	
Armenia	2016	21026	659920500	246378.67	309875700	94784904	500	
Armenia	2017	10413	659753660	246839.55	307132450	95748904	39720	
Armenia	2018	7615	673591500	246875.95	315417440	98927410	44081	
Armenia	2019	4758	681251460	246524.56	320513570	101672600	48222	
Armenia	2020	6467	678217100	246000	320208260	102721210	47757	
Armenia	2021	6000	690560200	245000	328610800	107023300	48565	
Asia	1961	31601108	708148400	247000	333671300	109817470	58709	
Asia	1962	31028646	198778130	248692.06	325832960	110230904	57877	
Asia	1963	34999330	207411000	250019.73	335905920	111772100	56605	
Asia	1964	38885010	227561300	251228.61	343725100	115508620	60327	
Bhutan	2013	75717	7500	167500	2742	127678	14900	
Bhutan	2014	77243	6300	161200	4600	126215	254	

Table: world food production (11,912 rows)

Fig 1.4: The column containing zero values

Cleaning by deleting the zero values

Rice Production (tonnes)	Ya
0	
0	
0	
0	
0	
0	
0	
0	
0	
475415230	
482738720	
650476600	
657198800	
661821000	
658137000	
659920500	
659753660	
673591500	
681251460	
678217100	
690560200	
708148400	
198778130	
207411000	
227561300	
7500	
6300	

Fig 1.5: Zero values in Rice Production (tonnes)

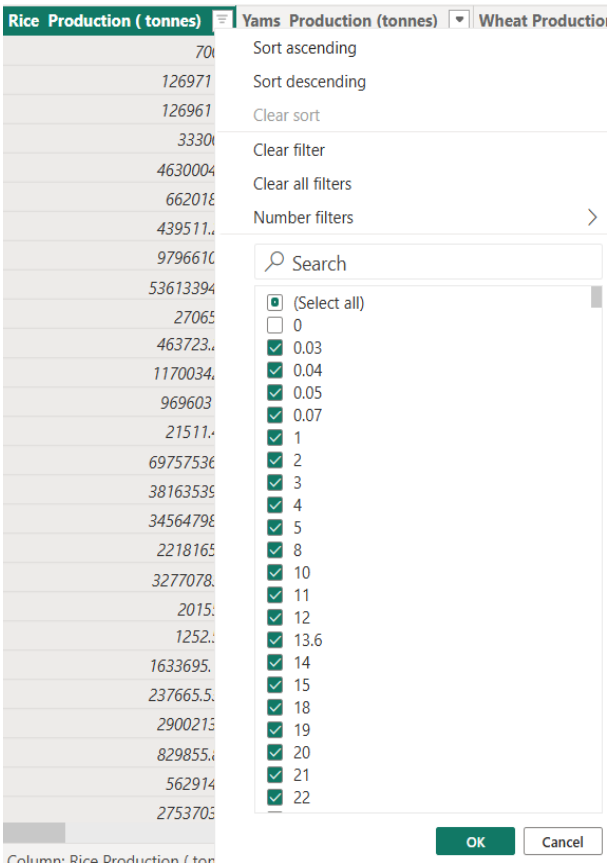


Fig:1.6: Deselecting the zero values

After cleaning the data by removing zero values

Rice Production (tonnes)
7000
12697110
12696110
333000
4630004.6
662018.2
439511.24
9796610.8
53613394.8
27065.4
463723.24
117003422
96960319
21511.42
69757536.2
38163539.8
34564798.4
2218165.4
327707838
201552
1252.52
1633695.16
237665.532
2900213.6
829855.82
562914.4
2753703.6

Fig: 1.7: Values without zeros

Converting the Decimal values to Whole numbers because we are using the data in tonnes

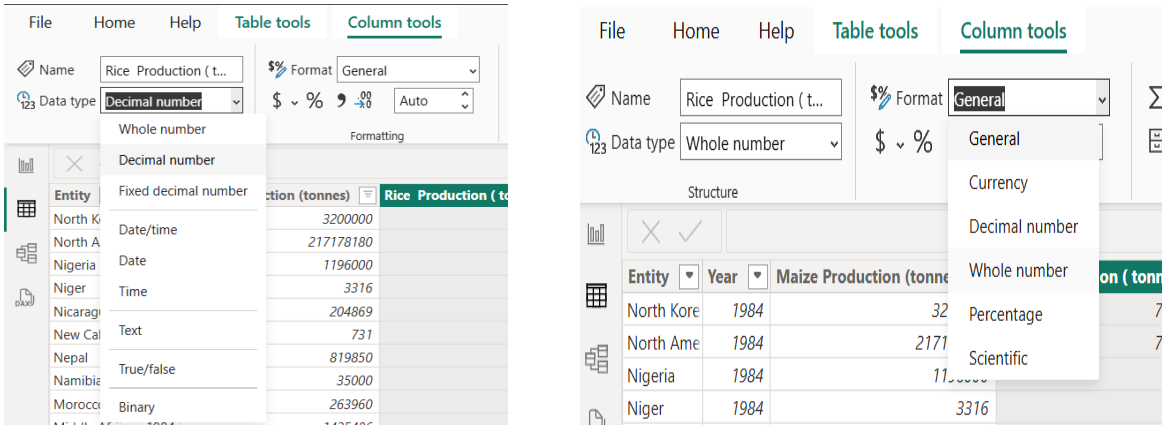


Fig 1.8: Selecting Decimal number and General to convert into Whole numbers

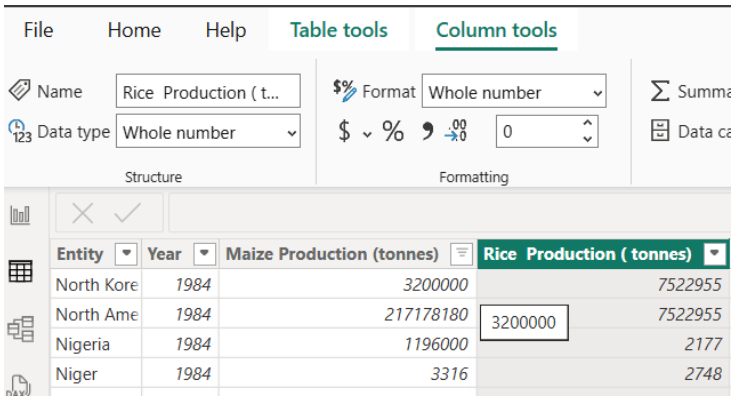


Fig 1.9: After conversion of Whole numbers

Milestone 3: Data Visualization

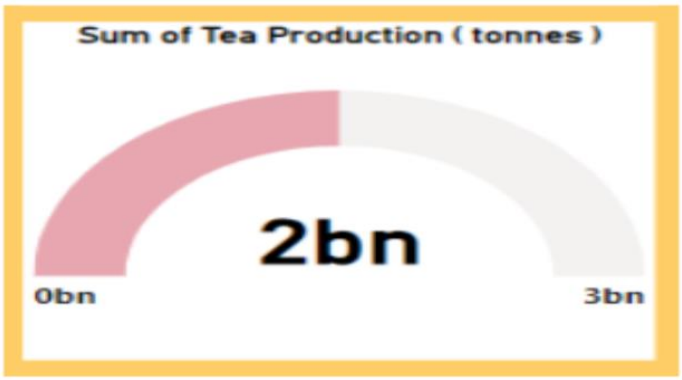
Data visualization is the process of creating graphical representations of data to help people understand and explore the information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs, and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

Activity 1: World Food Production(1961-2023)

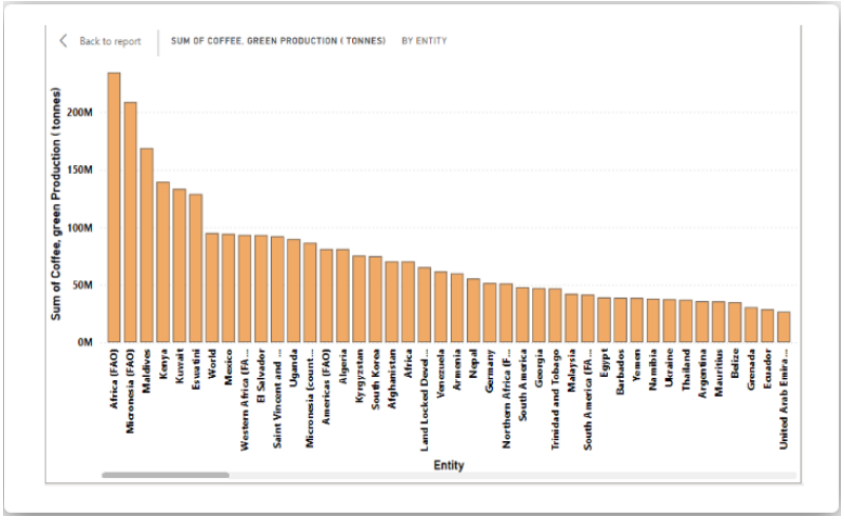
Activity 1.1: Sum of Rice Production (tonnes)

Activity 1.2: Sum of Wheat Production (tonnes)

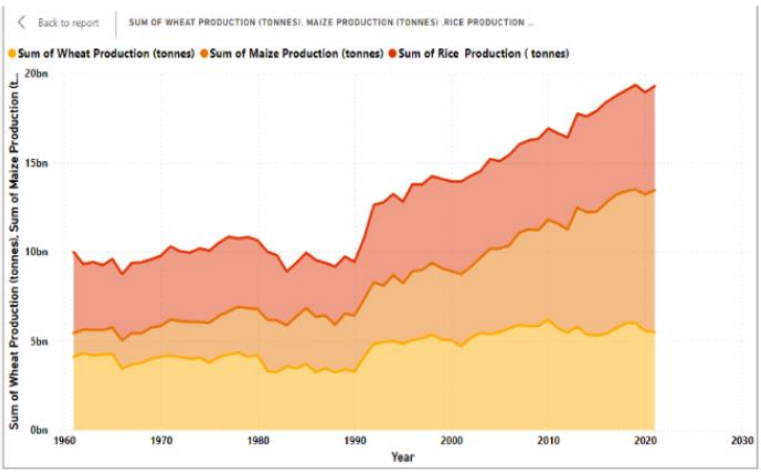
Activity 1.3:sum of Tea Production (tonnes)



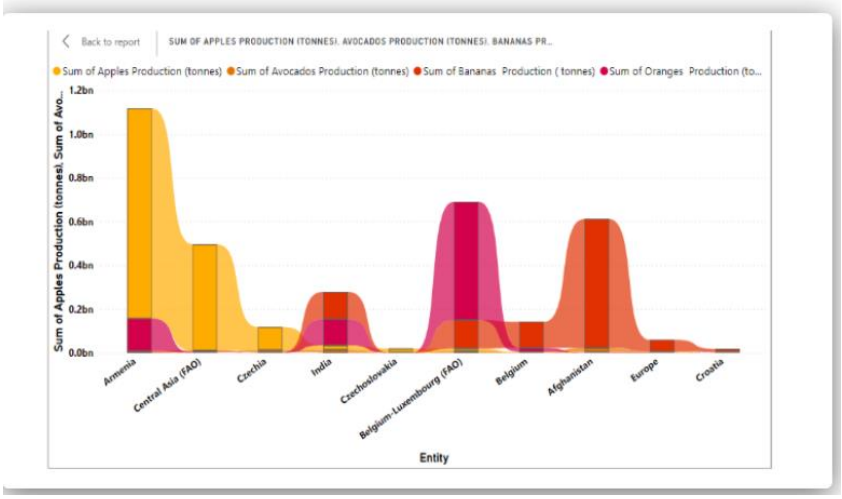
Activity 1.4: Sum of Coffee, Green Production (tonnes) by Entity



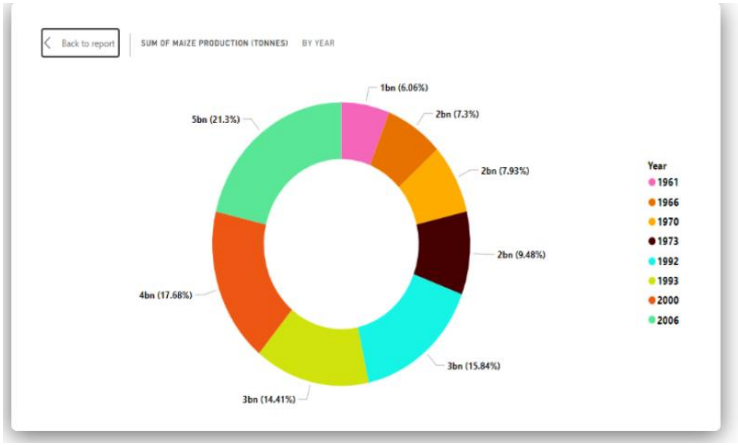
Activity 1.5: Sum of Wheat, Maize, and Rice Production (tonnes) by Year



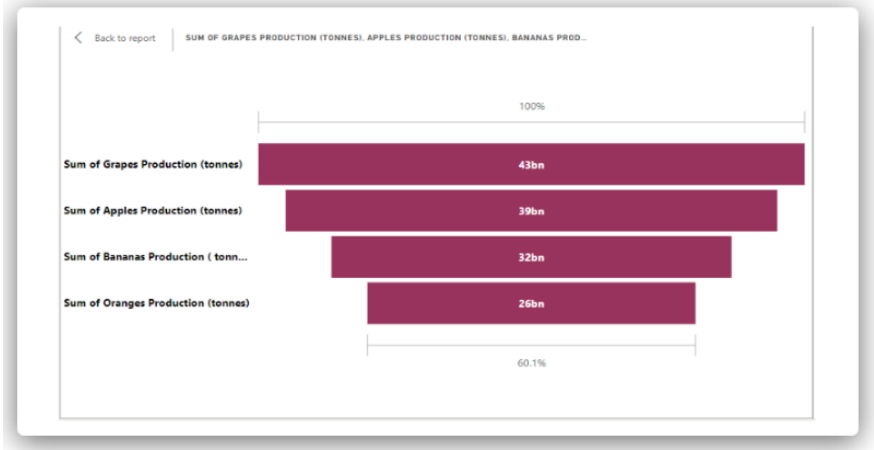
Activity 1.6: Sum of Apples, Avocados, Bananas, and Oranges Production (tonnes) by Entity



Activity 1.6: Sum of Maize Production (tonnes) by Year



Activity 1.7: Sum of Grapes, Apples, Bananas, and Oranges Production (tonnes)

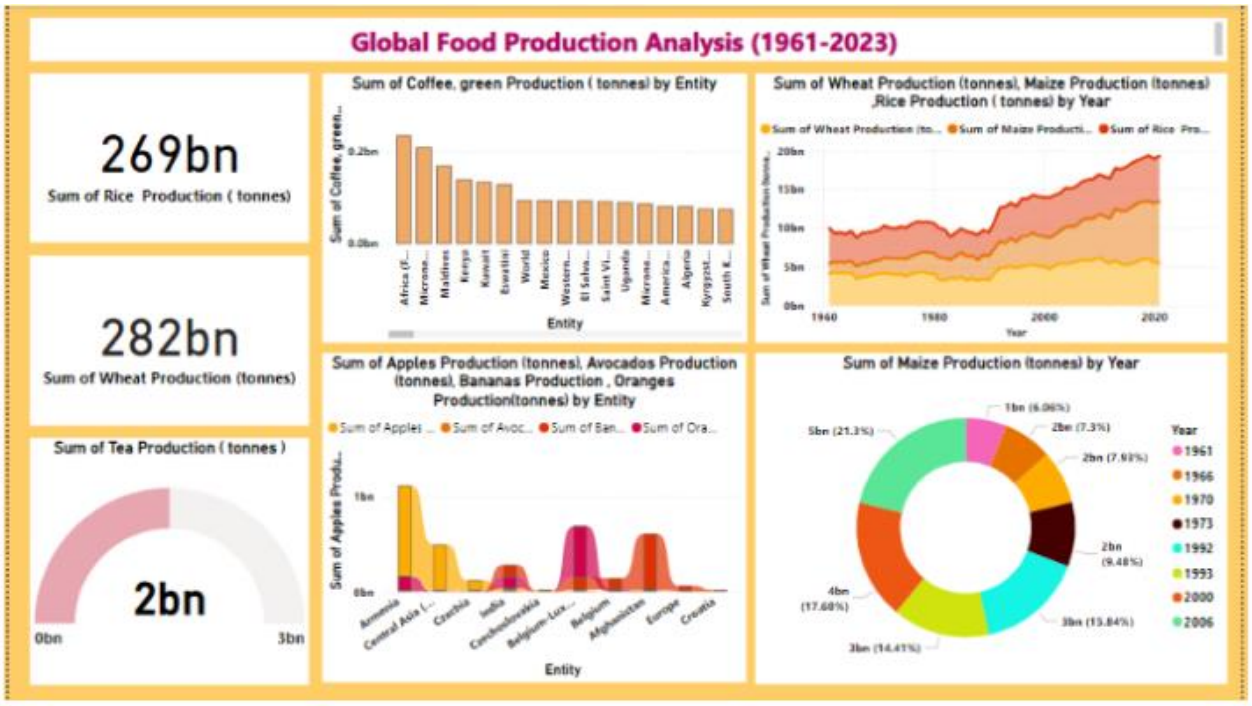


Milestone 4: Dashboard

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

<u>Dashboard</u>



Milestone 5: Report

A 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.

Activity 1: Design of Report

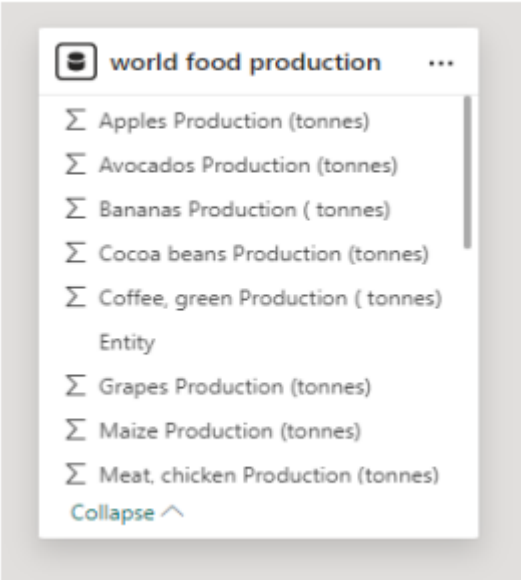
Designing a report in Power BI involves connecting to data sources, creating visualizations like charts and graphs, customizing their appearance and interactivity, organizing them logically on the canvas, formatting elements for consistency and clarity, and optionally creating dashboards for a summarized 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

Milestone 6: Performance Testing

Activity 1: Amount of Data Loaded

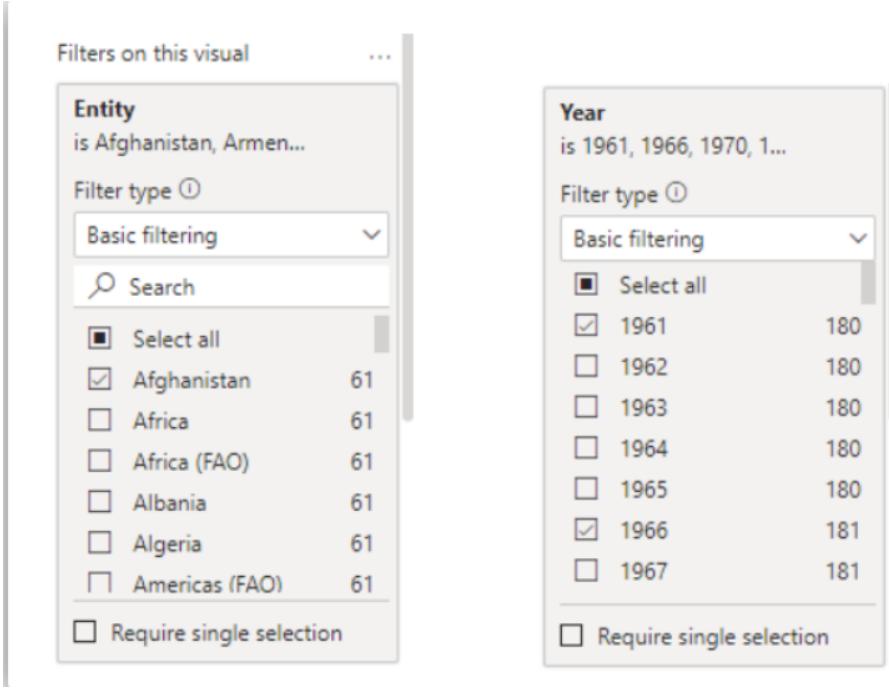
"Amount of Data Loaded" refers to the quantity or volume of data that has been imported, retrieved, or loaded into a system, software application, database, or any other data storage or processing environment. It's a measure of how much data has been successfully processed and made available for analysis,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



Activity 2: Utilization of 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 "Entity" as Filter



Activity 2.2: No of Visualizations/ Graphs

- The total Oranges Production (tonnes)
- The total Sugar Cane Productions (tonnes)
- The total Soybeans Production (tonnes)
- The total Palm Oil Production (tonnes) by Entity
- The total Grapes Production (tonnes) by Entity
- The total Meat,Chicken Production (tonnes) by Year
- The total Maize Production (tonnes) by Year
- The total Peas, dry Production (tonnes)
- The total Rice Production (tonnes) by Entity
- The total of Grapes, Apples, Bananas, Oranges, Coffee, Avocado Productions (tonnes)

Milestone 7:Project Demonstration & Documentation

https://drive.google.com/drive/folders/1RH5qkrtaacYuzGrvZphOoeqoxjqBEVDM?usp=drive_link