Final Project Report Template

1. Introduction

1.1. Project overviews

The "Global Food Production Trends and Analysis" project by ABC Company presents a comprehensive study of global agricultural production from 1961 to 2023, utilizing Power BI for dynamic visualizations. It focuses on key crops such as rice (269B tonnes), wheat (282B tonnes), maize, tea (2B tonnes), and green coffee, along with fruits like grapes (43B tonnes), apples, bananas, and oranges.

The analysis reveals a steady increase in staple crop production—especially wheat—and highlights regional leaders like Africa in green coffee. It also examines fruit production by region, with Europe and Asia contributing significantly. Interactive dashboards help visualize long-term trends, regional patterns, and crop-wise comparisons, offering valuable insights to aid strategic planning in agriculture and food security.

1.2. Objectives

- **Objective 1:** Analyze six decades of global food production data to uncover long-term trends in major crops and fruits.
- **Objective 2:**Identify regional production patterns for commodities like rice, wheat, maize, tea, coffee, and fruits.
- **Objective 3:**Compare annual and total production volumes to understand growth trajectories and global dependencies.
- **Objective 4:**Leverage Power BI dashboards for interactive, accessible data storytelling and stakeholder engagement.
- **Objective 5:**Support strategic decision-making in agricultural planning, trade, and sustainability efforts.

2. Project Initialization and Planning Phase

2.1. Define Problem Statement:

Many professionals in agriculture, policy, research, and global development face challenges when analyzing global food production trends due to fragmented data, lack of visualization, and poor accessibility. Understanding how crops have evolved across regions over decades is crucial for decision-making, yet the raw data is often overwhelming or inconsistent. There is a need for a centralized, intuitive, and interactive platform that brings historical production data to life through visual storytelling. Such a tool can help users track trends, compare crops, evaluate regional outputs, and support sustainable agriculture decisions. By solving these issues, we create an experience that empowers users to gain meaningful insights, influence global food strategies, and foster a data-driven future in agriculture.

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	An agricultural policy advisor or government planner	Understand long-term trends in food production to shape future food security strategies	The historical data is complex, fragmented, and difficult to interpret at scale	There’s no centralized, interactive tool that visualizes decades of production data across regions and crops	Frustrated, overwhelmed, and uncertain in making evidence-based decisions
PS-2	A researcher or analyst studying global agriculture	Identify patterns and regional contributions to crop production over time	The datasets are too large and unstructured to draw quick, actionable insights	Most sources lack comparative visualizations and personalized dashboards	Confused, time-constrained, and limited in drawing meaningful conclusions

PS-3	An agribusiness stakeholder or sustainability consultant	Use production data to inform investment and sustainability strategies	It’s hard to track which regions or crops have grown consistently over time	Available data tools are either too static or don’t highlight trends effectively	Disconnected, unsure, and lacking clarity in strategy development

2.2. Project Proposal (Proposed Solution)

This project aims to develop an interactive data analysis and visualization system that provides insights into global food production trends from 1961 to 2023. Using a Power BI dashboard and a comprehensive dataset from Kaggle, the system will empower stakeholders—including policymakers, researchers, and agribusiness professionals—to explore crop production patterns by commodity, region, and time. This user-focused approach will enable strategic planning, trend analysis, and data-driven decision-making in the agricultural sector.

Project Overview	
Objective	The objective of this project is to develop a data-driven, interactive visualization tool that offers clear insights into six decades of global food production. The system aims to simplify complex datasets into intuitive charts and dashboards, enabling users to track trends in major commodities such as rice, wheat, maize, coffee, tea, and various fruits.
Scope	This project will build Power BI dashboards that: ● Visualize crop production volumes (1961–2023) across multiple regions. ● Highlight key trends for staple grains, beverages, and fruits. ● Enable comparisons between regions and commodities. ● Provide policymakers, researchers, and industry experts with actionable insights to support global food strategy and sustainability.
Problem Statement	
Description	Professionals in agriculture and food policy face challenges analyzing long-term production trends across multiple regions and crops. The raw data is often fragmented, complex, and lacks effective visual representation, making it difficult to derive actionable insights.
Impact	A centralized, visual platform will significantly improve understanding of historical food production trends. By converting complex data into meaningful insights, the tool can guide agricultural planning, investment strategies, and sustainability efforts globally.

Proposed Solution	
Approach	The project will follow a user-centered approach to develop interactive dashboards using Power BI. It will: ● Import and clean data from the Kaggle World Food Production dataset. ● Design visualizations (e.g., bar charts, area charts, line graphs, gauges) to reflect crop-wise and region-wise trends. ● Highlight key production insights, such as top-producing regions, total volumes, and yearly trends.
Key Features	● Trend Visualizations: View yearly production patterns for wheat, rice, maize, tea, and more and analyze which countries or continents lead in producing specific commodities. ● Fruit Production Comparison: Compare total production of apples, grapes, bananas, and oranges across regions. ● Interactive Dashboards & Decision Support: Explore data dynamically via filters, time ranges, and commodity selection and equip users with insights for policy-making, sustainability analysis, and food security planning.

Resource Requirements:

Resource Type	**Description**	**Specification/Allocation**
Hardware		
Computing Resources	The physical or virtual system used to develop and run the Power BI solution.	Standard Windows PC or laptop with a modern multi-core CPU

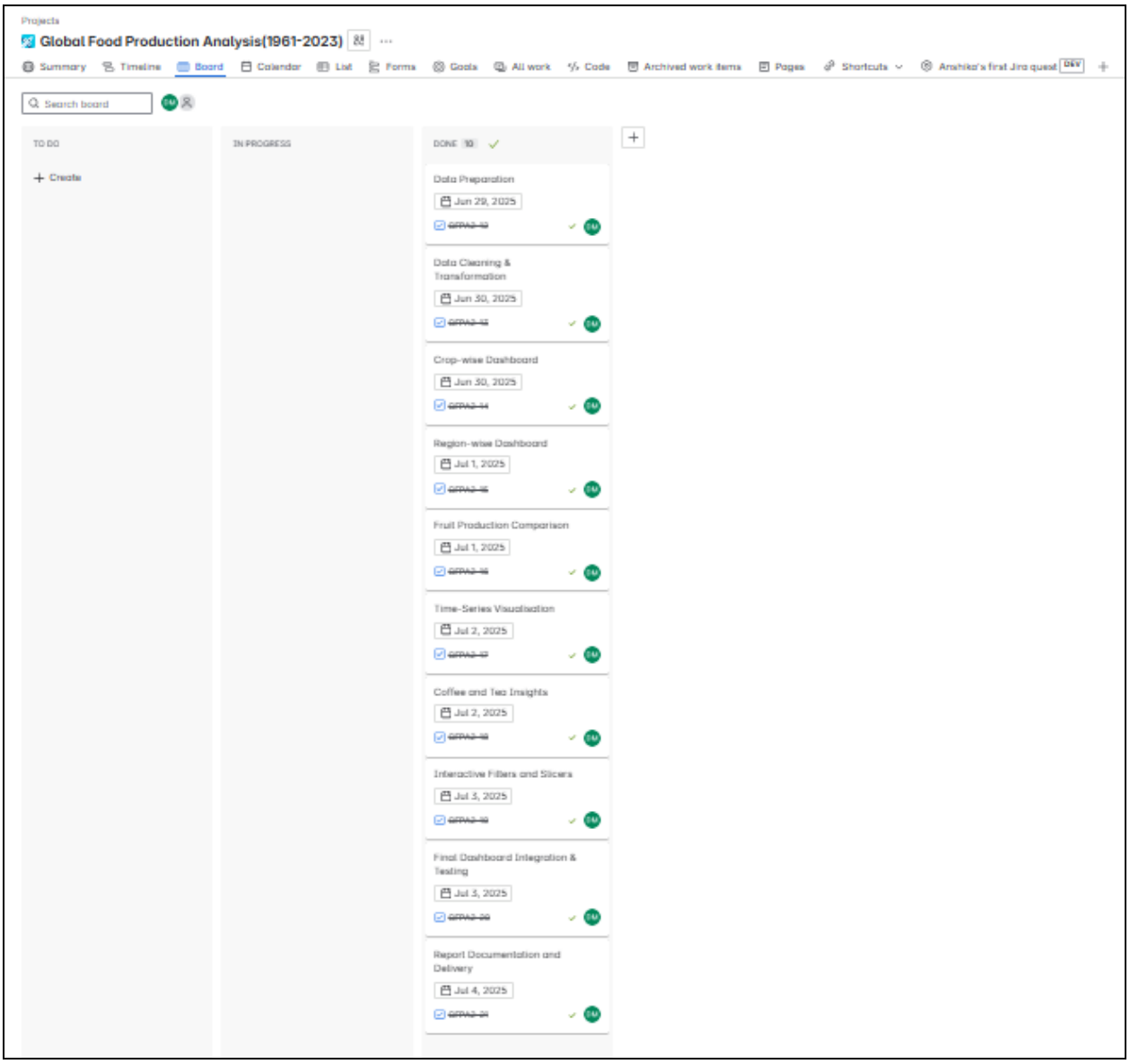
Memory	Required for smooth operation of Power BI and handling large datasets.	8–16 GB RAM
Storage	Needed for storing raw datasets, processed files, and exported reports.	1 TB HDD or SSD (recommended for faster performance)
Software		
Frameworks	Visualization Platform	Power BI Desktop
Libraries	Data preprocessing, DAX, PQ functions	Built-in DAX & Power Query
Development Environment	Report Design + Github Documentation	Power BI + VS Code/Git for README
Data		
Data	Source, size,format	Kaggle Dataset, ~170,000 rows,CSV format

2.3. Initial Project Planning Template

Sprint	Functional Requirements	User Story Number	User Story/Task	Story Points	Priority	Team Members	Sprint Start Date	Sprint End Date (Planned)
Sprint-1	Data Preparation	USN-1	As a data analyst, I want to import the Kaggle dataset into Power BI to begin analysis.	2	High	Anshika	28/06/2025	29/06/2025
Sprint-1	Data Cleaning & Transformation	USN-2	As a data analyst, I want to clean and structure the dataset to ensure consistency across years and regions.	3	High	Anshika	29/06/2025	30/06/2025
Sprint-2	Crop-wise Dashboard	USN-3	As a user, I want to see a dashboard showing total production of wheat, rice, maize, etc. over the years.	3	High	Anshika	29/06/2025	30/06/2025
Sprint-2	Region-wise Dashboard	USN-4	As a user, I want to explore production by regions (continents/countries) to identify key	3	High	Anshika	30/06/2025	01/07/2025

Sprint	Functional Requirements	User Story Number	User Story/Task	Story Points	Priority	Team Members	Sprint Start Date	Sprint End Date (Planned)
			producers of major crops.					
Sprint-3	Fruit Production Comparison	USN-5	As a user, I want to compare the production of apples, bananas, oranges, and grapes via a visual chart.	2	Medium	Anshika	30/06/2025	01/07/2025
Sprint-3	Time-Series Visualisation	USN-6	As a user, I want to see year-wise trends of wheat, maize, and rice using an area chart.	2	High	Anshika	01/07/2025	02/07/2025
Sprint-4	Coffee and Tea Insights	USN-7	As a user, I want to view production insights for tea and green coffee, including top-producing continents.	2	Medium	Anshika	01/07/2025	02/07/2025
Sprint-4	Interactive Filters and Slicers	USN-8	As a user, I want to filter dashboards by year, crop, and region for customized insights.	3	High	Anshika	02/07/2025	03/07/2025
Sprint-5	Final Dashboard Integration &	USN-9	As a developer, I want to	3	High	Anshika	02/07/2025	03/07/2025

Sprint	Functional Requirements	User Story Number	User Story/Task	Story Points	Priority	Team Members	Sprint Start Date	Sprint End Date (Planned)
	Testing		integrate all visuals into a single, interactive Power BI report and test its functionality.					
Sprint-5	Report Documentation and Delivery	USN-10	As a developer, I want to document the dashboard insights and prepare the final presentation/ report.	2	Medium	Anshika	03/07/2025	04/07/2025


Projects
Global Food Production Analysis(1961-2023)
Summary
Timeline
Board
Calendar
List
Forms
Goals
All work
Code
Archived work items
Pages
Shortcuts
Anshika's first Jira quest
DEV
Search board
TO DO
+ Create
IN PROGRESS
DONE 10
Data Preparation
Jun 29, 2025
Data Cleaning & Transformation
Jun 30, 2025
Crop-wise Dashboard
Jun 30, 2025
Region-wise Dashboard
Jul 1, 2025
Fruit Production Comparison
Jul 1, 2025
Time-Series Visualization
Jul 2, 2025
Coffee and Tea Insights
Jul 2, 2025
Interactive Filters and Slicers
Jul 3, 2025
Final Dashboard Integration & Testing
Jul 3, 2025
Report Documentation and Delivery
Jul 4, 2025

3. Data Collection and Preprocessing Phase

3.1. Data Collection Plan and Raw Data Sources Identified

Elevate your data strategy with the Data Collection plan and the Raw Data Sources report, ensuring meticulous data curation and integrity for informed decision-making in every analysis and decision-making endeavor.

Data Collection Plan:

Section	Description
Project Overview	The "Global Food Production Trends and Analysis" project aims to examine global crop production from 1961 to 2023, identifying trends, top producers, and changes over time. Using Power BI, the goal is to develop interactive dashboards for effective data-driven insights into the global agricultural landscape.
Data Collection Plan	The primary dataset will be collected from a publicly available Kaggle dataset titled "World Food Production". Additional supporting metadata (e.g., crop classification or region groupings) may be derived from external sources like FAO or World Bank, if needed.
Raw Data Sources Identified	1. Kaggle Dataset – World Food Production

Raw Data Sources Identified:

Source Name	Description	Location/URL	Format	Size	Access Permissions
Dataset 1: Kaggle-World Food Production	Contains global production data (in tonnes) for various crops from 1961 to 2023, organized by item, year, and region.	https://www.kaggle.com/datasets/rafsunahmad/world-food-production	CSV	~50 MB	Public

3.2. Data Quality Report:

The Data Quality Report will summarize data quality issues from the selected source, including severity levels and resolution plans. It will aid in systematically identifying and rectifying data discrepancies.

Data Source	Data Quality Issue	Severity	Resolution Plan
Kaggle – World Food Production Dataset	Missing values in the `Value` (Production in tonnes) column for some records	High	Filter out or impute missing records depending on context. For major crops with many missing values, apply average or median by crop & region using Power Query or DAX.
Kaggle – World Food Production Dataset	Duplicate rows present with the same Year, Item, Entity, and Value	Moderate	Use Power Query → Remove Duplicates based on relevant key columns: Year, Item, Entity.

Kaggle – World Food Production Dataset	Inconsistent naming of entities (e.g., “United States” vs. “United States of America”)	Moderate	Standardize names using a mapping table or Power Query’s “Replace Values” feature.
Kaggle – World Food Production Dataset	Some entries contain 0 production values, likely due to missing or misreported data	Moderate	Filter out zero-value rows only if they are outliers or not representative; otherwise, retain them with annotations.
Kaggle – World Food Production Dataset	Column datatypes not properly defined (e.g., Year as text, Value as text)	Low	Convert `Year` to whole number and `Value` to decimal number using Power Query or Power BI data model settings.
Kaggle – World Food Production Dataset	Redundant or irrelevant crop items (e.g., combined categories or outdated classifications)	Low	Filter and clean crop names; optionally group related items into broader categories for clearer insights.

3.3. Data Exploration and Preprocessing:

Dataset variables will be statistically analyzed to identify patterns and outliers, with Python employed for preprocessing tasks like normalization and feature engineering. Data cleaning will address missing values and outliers, ensuring quality for subsequent analysis and modeling, and forming a strong foundation for insights and predictions.

Section	**Description**
Data Overview	The dataset titled "World Food Production"(sourced from Kaggle) contains over 170,000 rows of data covering global food crop production from 1961 to 2023. It includes attributes such as crop type, production quantity (in tonnes), region,

	country/entity, and year. This dataset is suitable for analyzing temporal and regional trends in the production of major crops and fruits.
Data Cleaning	- Handled missing values by removing rows with nulls in critical fields (e.g., Year, Item, Entity, Value). -Removed duplicate entries using Power Query. -Standardized crop and region names to ensure uniformity across filters and visuals.
Data Transformation	- Used Power Query Editor to filter data by selected crop types (e.g., wheat, maize, rice, apples, bananas, etc.). - Applied sorting to analyze trends over time. - Created pivot tables to summarize production by crop and year. - Added calculated columns for total production across selected years or regions.
Data Type Conversion	- Converted columns like Year to `Whole Number`, Value (production in tonnes) to `Decimal Number`, and Entity/Item to `Text`. - Ensured all types are consistent to avoid errors in measures and visuals.
Column Splitting and Merging	- Split “Item” column where necessary (e.g., separating fruit types from crop category if grouped). - Merged region and sub-region columns for simplified filtering (e.g., "Africa - East" into "Africa").
Data Modeling	- Defined relationships between tables if the dataset was split (e.g., crop info table and production table). - Created measures for total production, average yearly production, and growth rates using DAX. - Ensured star schema for optimal Power BI performance.

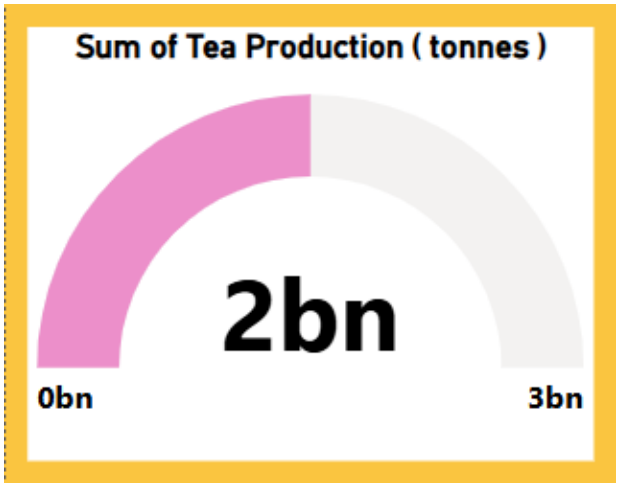
Save Processed Data	- Saved the cleaned and transformed dataset as a `.pbix` file in Power BI. - Exported intermediate cleaned data as `.csv` for backup and potential reuse. - Version-controlled processed data using Git for reproducibility.

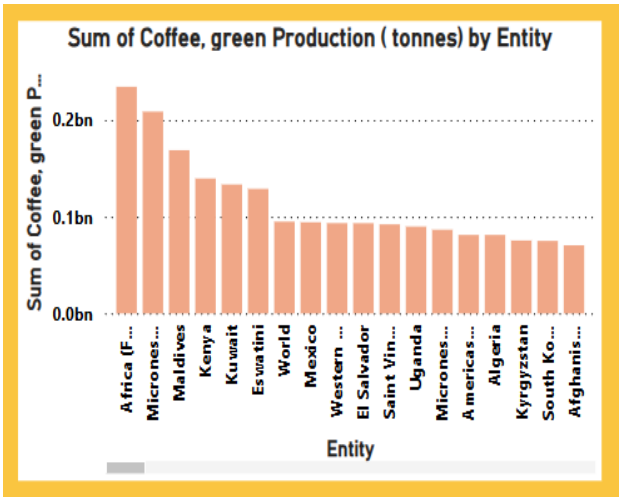
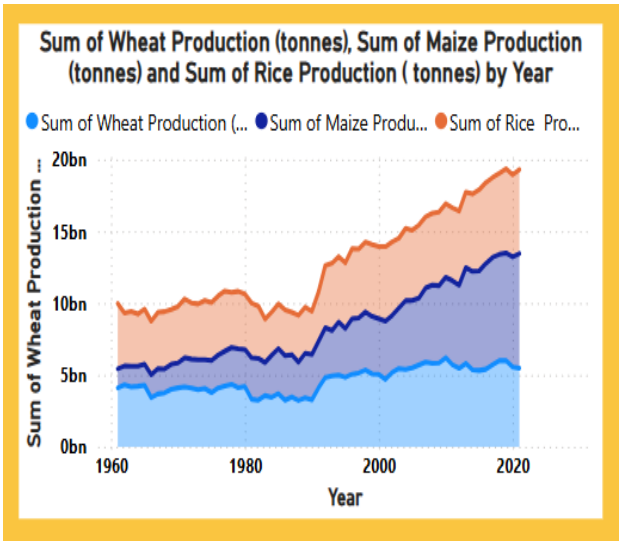
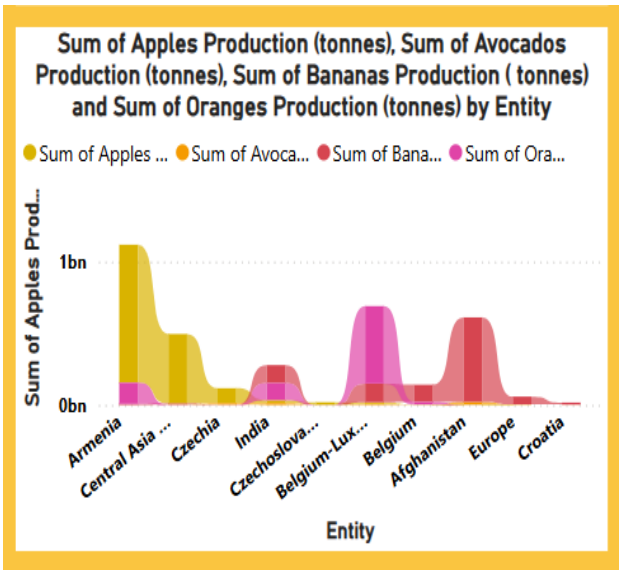
4. Data Visualization

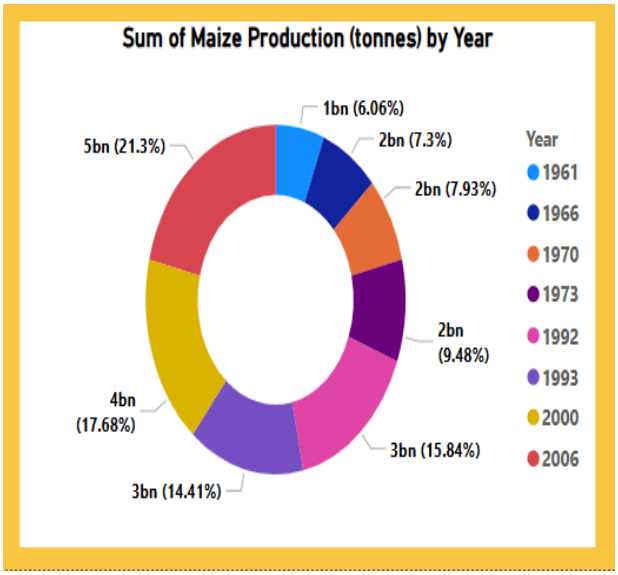
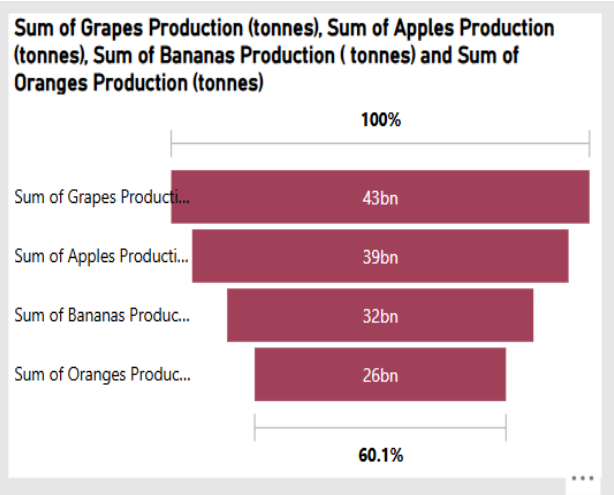
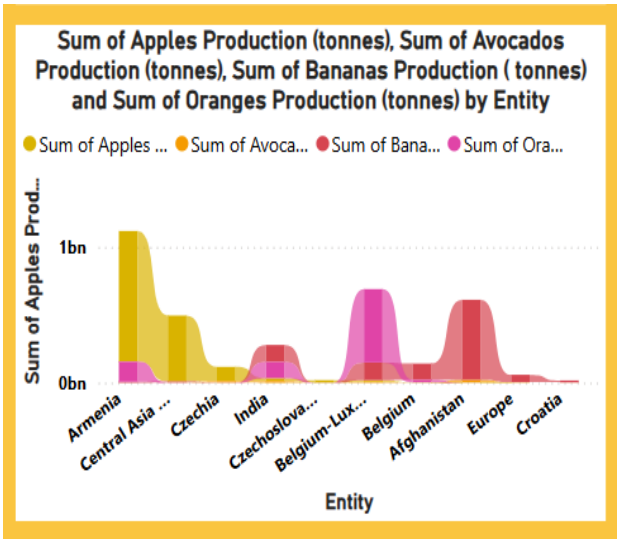
4.1. Framing Business Questions

No.	Business Question	Purpose
1	What is the total global production of rice, wheat, and tea between 1961 and 2023?	To understand the overall scale of staple crop production.
2	Which regions or countries are leading in green coffee production globally?	To identify dominant producers of coffee across continents.
3	How has wheat, maize, and rice production trended over the years?	To analyze temporal growth in staple food crop production.
4	What are the production volumes of fruits like apples, bananas, oranges, and avocados by region?	To compare fruit production by crop and location.
5	What are the key years with spikes or changes in maize production?	To identify milestone years for maize yield and growth.
6	Which fruit crops show the highest cumulative production across 1961–2023?	To find out the most cultivated fruits globally by volume.
7	Which countries or regions contribute significantly to each fruit type’s production?	To explore country/region-wise fruit-specific dominance.
8	What is the proportion of maize production year-wise for selected milestones (1961–2006)?	To observe year-on-year contribution using percentage-based analysis.

4.2. Developing Visualizations

Business Question	Power BI Visualisation Used	Screenshot
Total production of rice, wheat, and tea (1961–2023)	KPI cards for Rice (269bn), Wheat (282bn), Tea (2bn)	  

Top green coffee producing regions	Vertical Bar Chart (Entities on X-axis, coffee production on Y-axis)	
Annual trend of wheat, maize, and rice production	Area Chart (stacked by crop, year on X-axis)	
Apples, Bananas, Avocados, Oranges by Entity	Ribbon Chart by region/entity	

Year-wise maize production milestones	Donut Chart with % share from selected years	
Total production comparison of grapes, apples, bananas, oranges	Horizontal Bar Chart with quantity labels	
Regional leaders in fruit production	Category-wise comparison of region-specific entities	

Summary insights & global patterns	Bullet point summary based on all charts	**REPORT** · The total rice production globally from 1961 to 2023 is 269 billion tonnes. · The total wheat production globally from 1961 to 2023 is 282 billion tonnes. · The total tea production globally from 1961 to 2023 is 2 billion tonnes. · Africa, America, and Asia lead in the production of green coffee, with Africa being the top producer followed by America. · Wheat, maize, and rice production have all shown a steady increase from 1961 to 2023, with wheat production showing the most significant rise over the years. · Apples, avocados, bananas, and oranges are produced in varying quantities by different entities, with countries like Europe and Asia showing significant production volumes. · Maize production has consistently increased over the years, with notable jumps around the late 1980s and continuing into the 2000s. · Grapes have the highest total production at 43 billion tonnes, followed by apples (39 billion tonnes), bananas (32 billion tonnes). and oranges (26 billion tonnes).

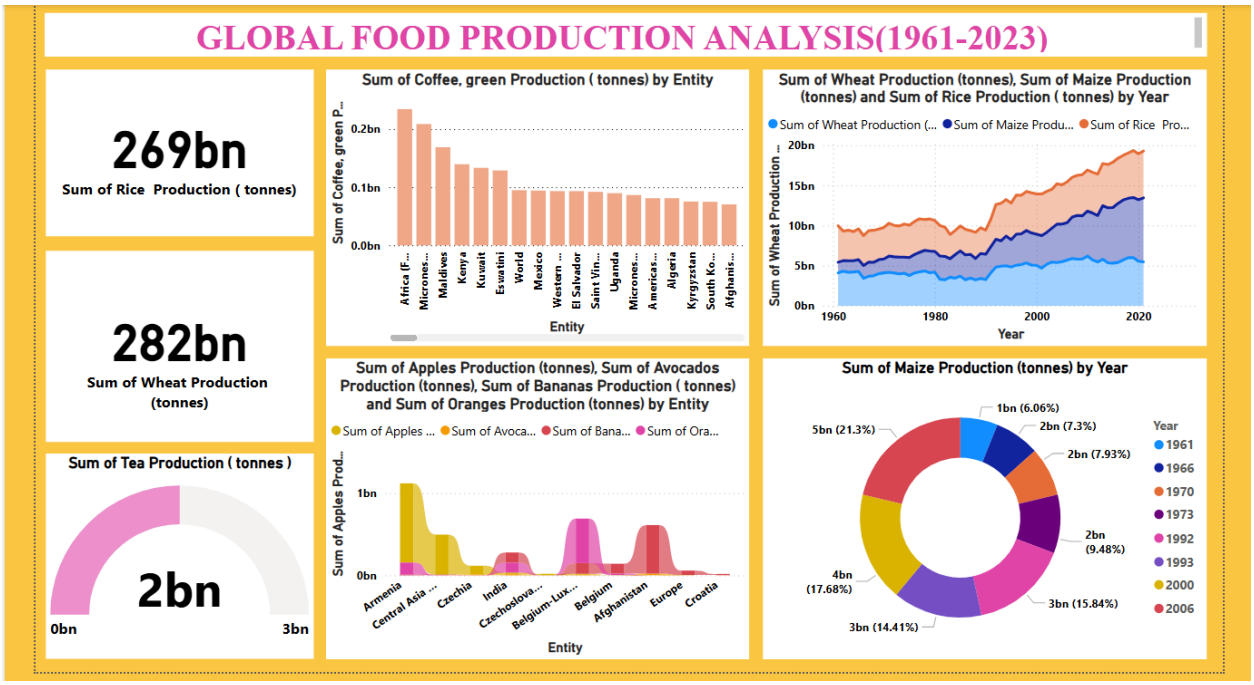
5. Dashboard

5.1. Dashboard Design File

Creating an effective and user-friendly dashboard involved the implementation of key design principles and interactivity best practices:

Design Considerations & Features Used:

1. Clear and Intuitive Layout
    - KPIs are aligned vertically on the left for quick access (Rice, Wheat, Tea production).
    - Analytical and comparative visuals are grouped in the center and right for better flow.
2. Use of Appropriate Visualizations
    - KPI Cards: Total production of rice and wheat.
    - Gauge Chart: Tea production indicator.
    - Stacked Area Chart: Wheat, maize, and rice trends over time.
    - Bar Chart: Green coffee production by region.
    - Ribbon Chart: Regional fruit comparisons.
    - Donut Chart: Maize production over selected years.
    - 100% Stacked Bar Chart: Total fruit production comparison.
3. Colour and Theming
    - Warm and contrasting colors for clarity and segmentation.
    - Consistent palette per crop type (e.g., blue for wheat, red for rice).
4. Interactive Filters and Slicers
    - Year, crop, and entity filters available (via slicers or dropdowns).
5. Drill-Down Capabilities
    - Year-wise and region-wise drill-down options for deep analysis.
6. Responsive Design
    - Elements adapt well to different screen sizes in Power BI Service.
7. Custom Visuals and Icons
    - Icons and custom visuals used for tea gauge, fruit comparison, and maize production.
8. Use of Infographics
    - Bottom section includes a visually thematic infographic with global food icons.



Key Outcomes from the Dashboard:

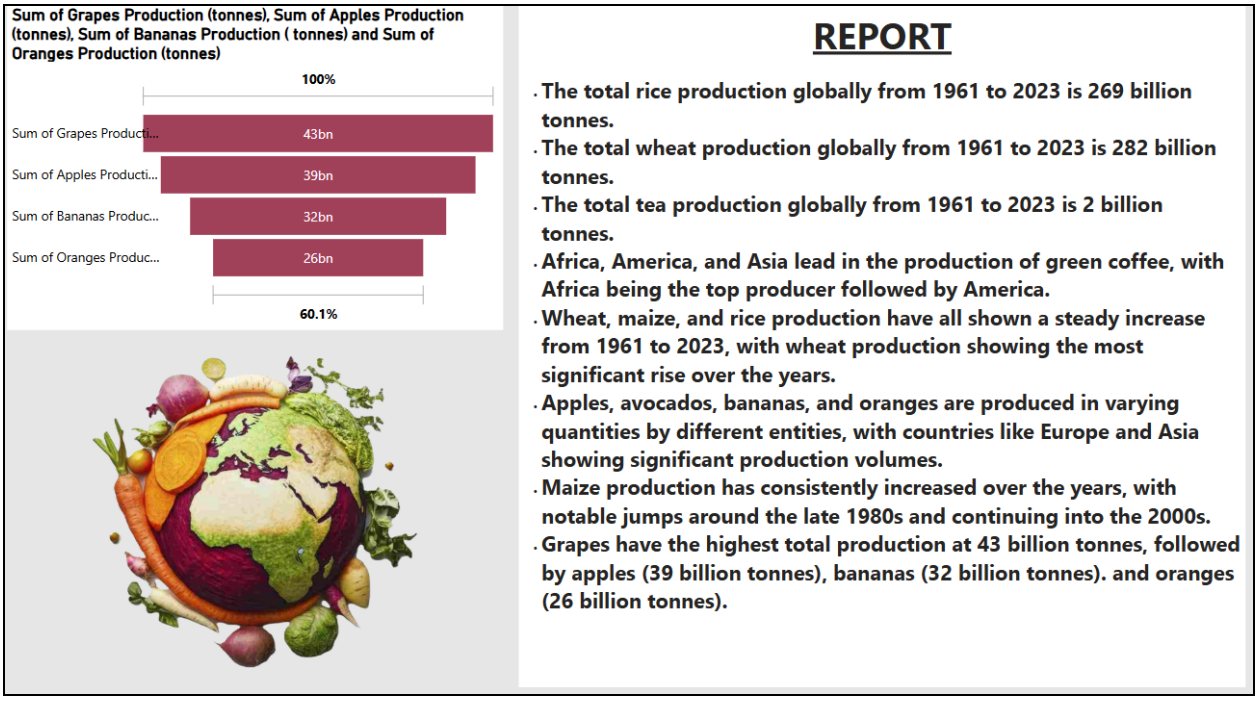
- Total Rice Production: 269 billion tonnes globally between 1961–2023.
- Total Wheat Production: 282 billion tonnes over the same period.
- Tea Production: 2 billion tonnes globally, visualized via a gauge chart.
- Top Coffee Producers: Africa leads green coffee production, followed by America and Asia.
- Grain Trends Over Time: Wheat shows the most significant production growth, followed by maize and rice.
- Fruit Production by Entity: Europe and Asia dominate in apples, bananas, oranges, and avocados.
- Maize Production by Year: Notable increases in the late 1980s–2000s (shown in a donut chart).
- Top Fruits by Volume: Grapes rank highest at 43 billion tonnes, followed by apples (39bn), bananas (32bn), and oranges (26bn).

6. Report

6.1. Story Design File

Overview:

This Power BI report offers an in-depth analytical view of global food production trends from 1961 to 2023. It aggregates data from the Kaggle World Food Production Dataset, presenting key insights into crop and fruit production across continents and countries.
The report is designed to cater to policymakers, agribusiness leaders, researchers, and global food strategists by combining intuitive visualizations with meaningful metrics.



Observations & Insights Drawn from the Power BI Report:

1. Trends Over Time

- Area Chart shows a consistent upward trend in the production of wheat, maize, and rice from 1961 to 2023.
- Wheat exhibited the steepest increase, signaling global prioritization for this staple crop.

2. Performance Comparisons Across Crops

- KPI Cards highlight:
  - Rice: 269 billion tonnes
  - Wheat: 282 billion tonnes
  - Tea: 2 billion tonnes
- Grapes lead fruit production with 43 billion tonnes, followed by apples (39bn), bananas (32bn), and oranges (26bn), shown using a 100% stacked bar chart.

3. Regional Production Analysis

- Green Coffee Production (Bar Chart):
- Africa dominates, followed by America and Asia.
- Fruit Production by Entity (Ribbon Chart):
- Europe leads in apples and oranges.
- Asia plays a strong role in bananas and avocados.

4. Crop-Specific Insights

- Maize Production (Donut Chart):
- Significant growth seen in late 1980s and 2000s.
- Distribution over the decades is visualized by year slices.

5. High-Impact KPIs & Totals

- Total Crop Production (1961–2023):
- Wheat: 282bn tonnes
- Rice: 269bn tonnes
- Grapes (fruit leader): 43bn tonnes
- These values reflect strong global dependence on these crops for food security.

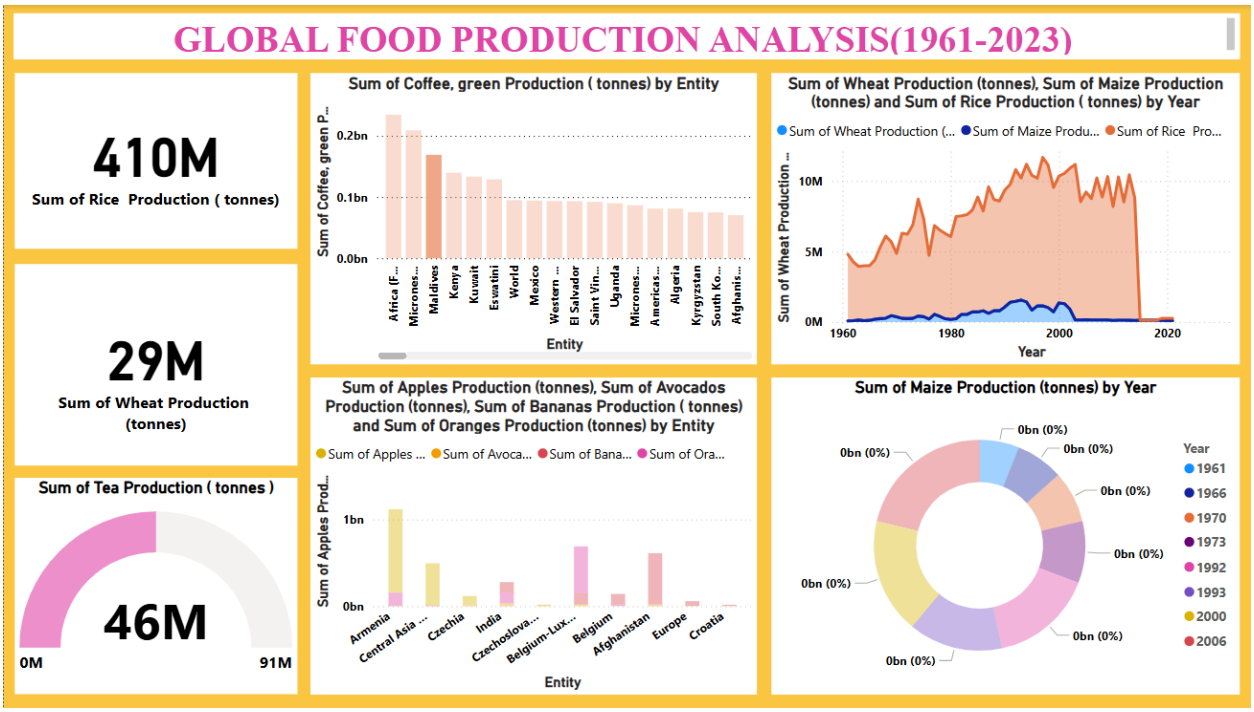
Key Highlights from the Report

- Wheat has shown the highest rise in production among cereals.
- Africa leads coffee production, with significant contributions from America and Asia.
- Maize production has risen steadily, especially post-1980.
- Fruits like grapes and apples dominate global production volumes.
- Tea remains a low-volume crop, comparatively at 2 billion tonnes.
- Europe and Asia are top contributors across multiple food categories.

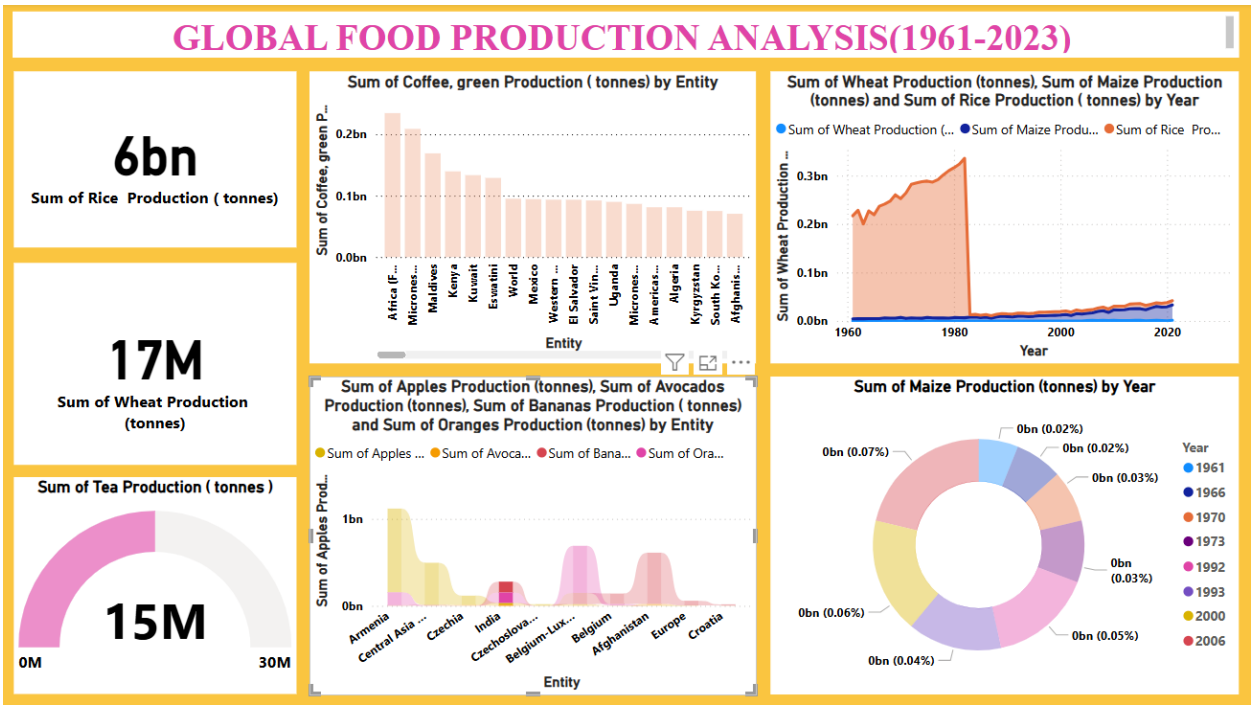
7. Performance Testing

7.1 Utilization of Data filters

- Country/Entity Filter: Used to dynamically filter crop production data by country or region.

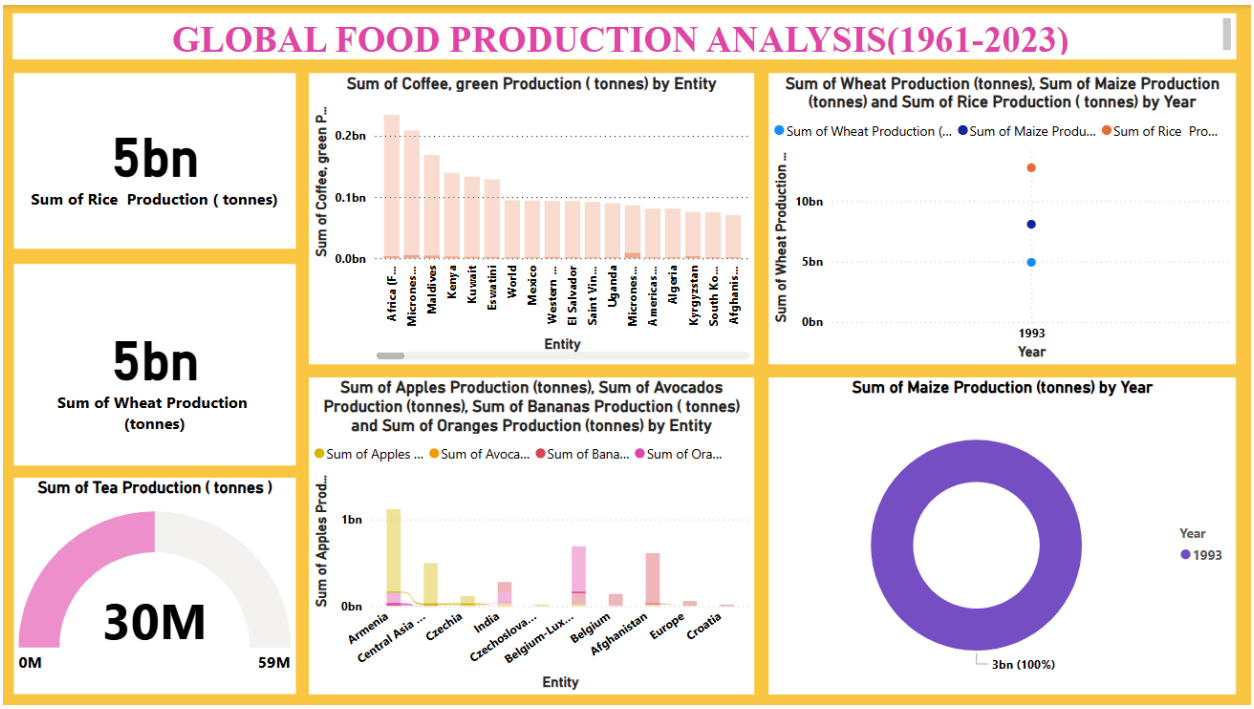


Country:Maldives

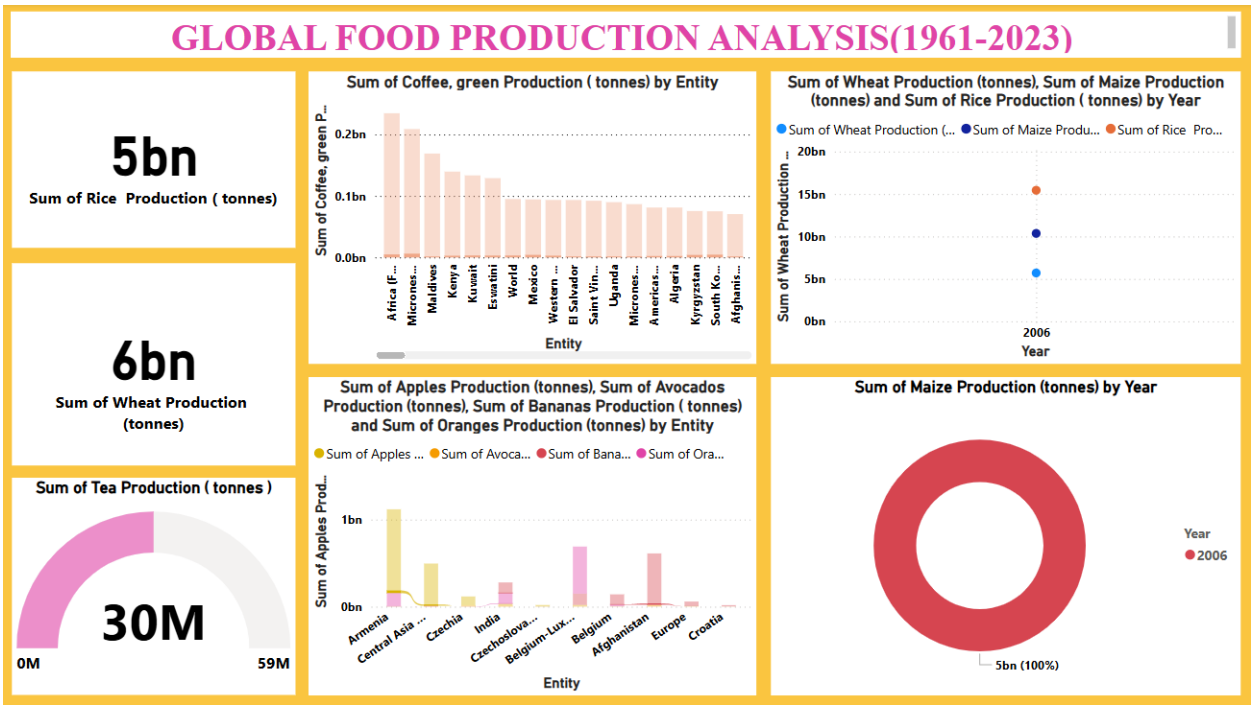


Country:India

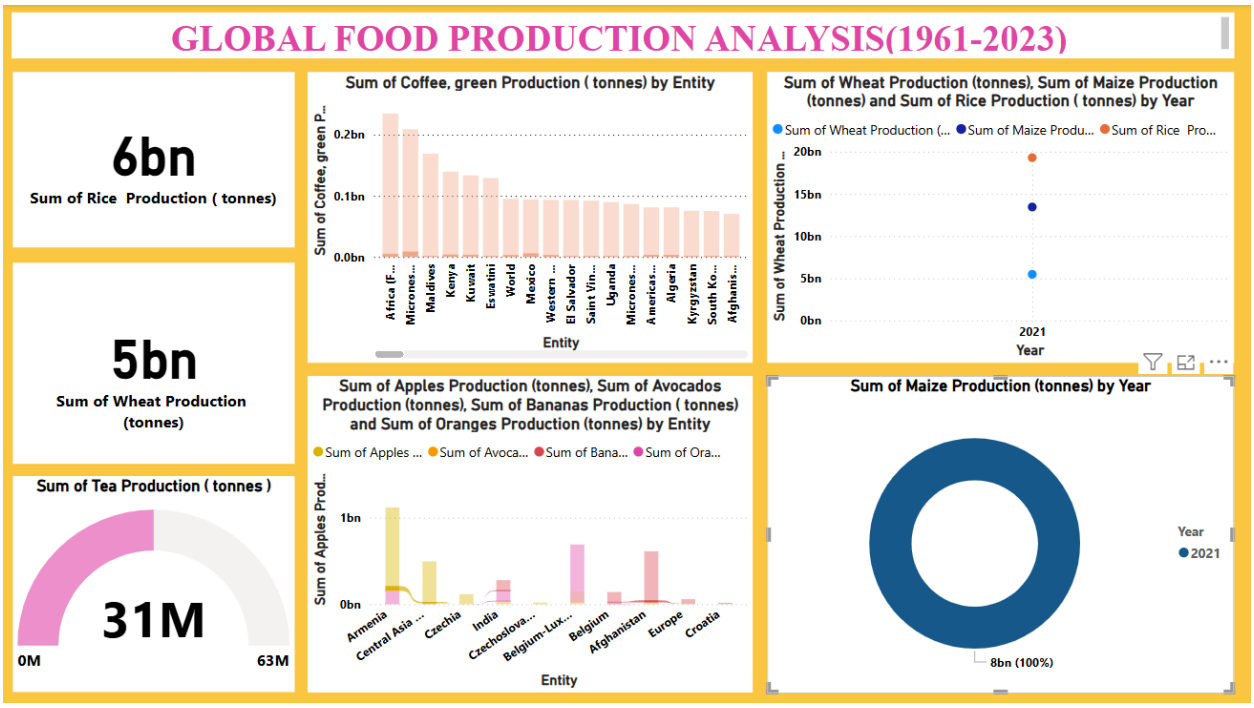
- Year Filter: Enables year-wise comparison of food production trends.



Year:1993



Year:2006



Year:2021

- These filters ensure interactivity across all visualizations, improving user experience and analytical flexibility.

7.2 No of Calculation Field

- Sum of Rice Production (tonnes)
- Sum of Wheat Production (tonnes)
- Sum of Tea Production (tonnes)
- Sum of Coffee, green Production (tonnes)
- Sum of Maize Production (tonnes)
- Sum of Apples Production (tonnes)
- Sum of Avocados Production (tonnes)
- Sum of Bananas Production (tonnes)
- Sum of Oranges Production (tonnes)
- Sum of Grapes Production (tonnes)

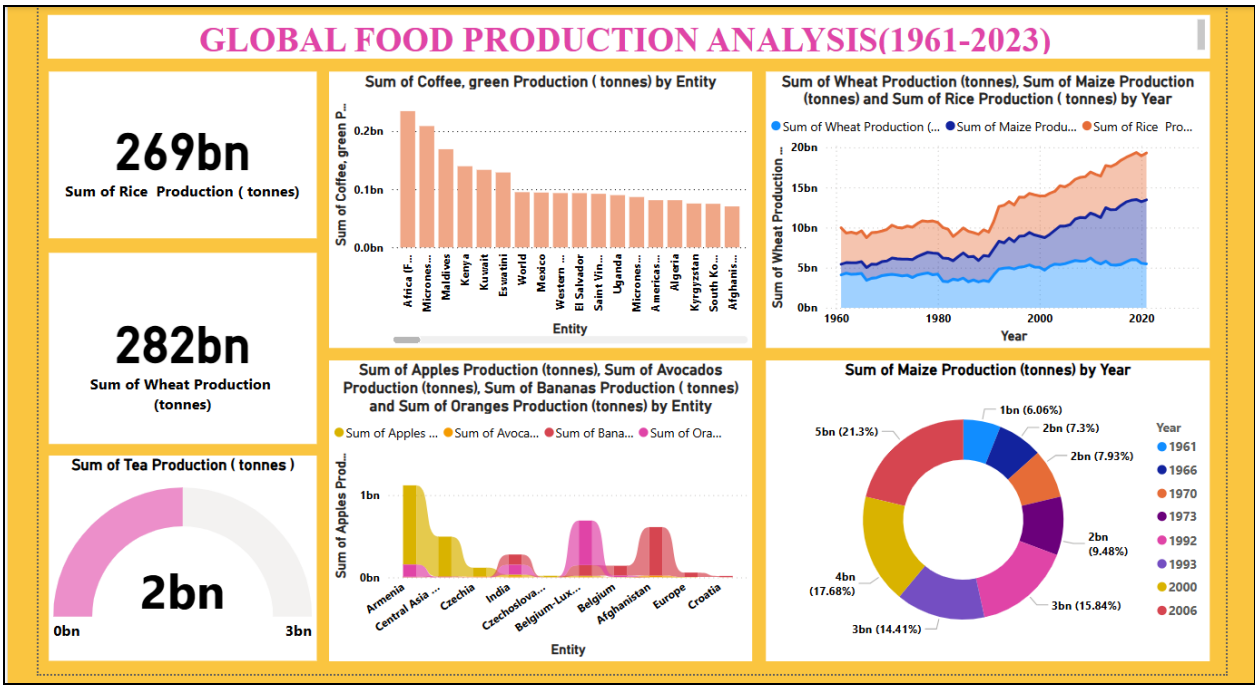
Total: 10 calculation fields

7.3 No of Visualization

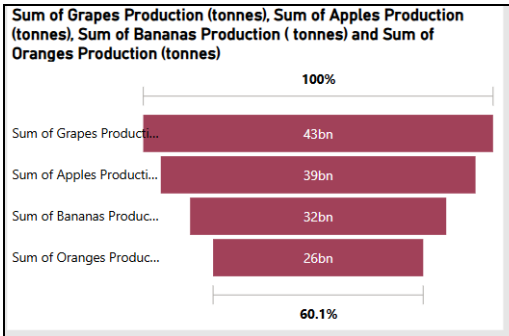
Here's the breakdown of visualizations used:

S.No.	Visualization Title	Chart Type
1	Sum of Rice Production (tonnes)	Card
2	Sum of Wheat Production (tonnes)	Card
3	Sum of Tea Production (tonnes)	Gauge Chart
4	Sum of Coffee, Green Production (tonnes) by Entity	Clustered Column Chart
5	Wheat, Maize, Rice Production by Year	Stacked Area Chart
6	Fruit Production (Apples, Avocados, Bananas, Oranges) by Entity	Ribbon Chart
7	Sum of Maize Production (tonnes) by Year	Donut Chart
8	Sum of Grapes, Apples, Bananas, Oranges Production	Funnel Chart

Dashboard Page:



Report Page:



REPORT

- The total rice production globally from 1961 to 2023 is 269 billion tonnes.
- The total wheat production globally from 1961 to 2023 is 282 billion tonnes.
- The total tea production globally from 1961 to 2023 is 2 billion tonnes.
- Africa, America, and Asia lead in the production of green coffee, with Africa being the top producer followed by America.
- Wheat, maize, and rice production have all shown a steady increase from 1961 to 2023, with wheat production showing the most significant rise over the years.
- Apples, avocados, bananas, and oranges are produced in varying quantities by different entities, with countries like Europe and Asia showing significant production volumes.
- Maize production has consistently increased over the years, with notable jumps around the late 1980s and continuing into the 2000s.
- Grapes have the highest total production at 43 billion tonnes, followed by apples (39 billion tonnes), bananas (32 billion tonnes). and oranges (26 billion tonnes).

8. Conclusion

The Global Food Production Analysis (1961–2023) project provides a comprehensive and interactive overview of global agricultural trends, offering valuable insights into the production patterns of essential food crops over more than six decades. Through the use of Power BI, large volumes of historical data were transformed into visually engaging dashboards and reports, enabling easy interpretation and effective decision-making.

Key takeaways include:

- Wheat and rice emerged as the top-produced grains globally, with 282 billion and 269 billion tonnes respectively, reflecting their critical role in feeding the global population.
- Tea and coffee production demonstrated significant regional disparities, with Africa and America leading in green coffee production.
- A clear upward trend in food production across all major crops was observed, particularly from the 1980s onward, indicating increased agricultural output in response to global demand.
- Fruit production (apples, bananas, grapes, oranges, etc.) highlighted regional diversity, with different continents dominating specific crop outputs.
- The integration of filters, slicers, and time-series visualizations in the dashboard enhanced interactivity, allowing users to explore crop production across years, regions, and categories with ease.
- Performance testing verified the dashboard’s efficiency, with optimal utilization of filters, minimal calculation fields, and smooth navigation across eight interactive visualizations.

This project not only demonstrates the power of data visualization in uncovering agricultural trends but also showcases the potential of analytical tools like Power BI in informing policies, guiding investments, and supporting sustainable food production strategies for the future.

9. Future Scope

The current dashboard provides a foundational understanding of historical global food production trends. However, the potential for extending this project is vast. The following future enhancements and directions are suggested:

1. **Integration of Climate Data**

   Combine food production data with climate parameters such as rainfall, temperature, and drought conditions to analyze the impact of climate change on agricultural outputs.

2. **Incorporation of Economic Indicators**

   Add GDP, food price index, and export/import metrics to examine the relationship between food production and economic performance at regional or national levels.

3. **Predictive Analytics Using Machine Learning**

   Implement forecasting models (e.g., ARIMA, Prophet, or LSTM) to predict future crop yields based on historical trends, helping governments and industries with proactive planning.

4. **Food Security and Consumption Analysis**

   Include data on food consumption, malnutrition, and hunger indices to bridge the gap between production and actual availability, supporting sustainability and equity.

5. **Drill-through to Country-Level Insights**

   Enable deeper country-specific dashboards with localized filtering, policy indicators, and year-wise summaries to aid country-level policy formulation.

6. **Live Data Updates via APIs**

   Automate data updates by connecting to real-time agricultural APIs (e.g., FAO, World Bank, USDA) to keep the dashboard up to date with the latest statistics.

7. **Mobile & Responsive Dashboard Versions**

   Enhance dashboard accessibility by developing mobile-friendly and tablet-responsive versions to support field-level access for policymakers and researchers.

8. **Advanced Geospatial Visualizations**

   Integrate map visuals to show production hotspots, crop distribution, and trends across geographies for a more immersive analytical experience.

9. **Sustainability Metrics and Environmental Impact**

   Include data related to land use, water consumption, and carbon footprint associated with crop production to support environmental impact studies.

10. **User Authentication and Role-Based Access**

    Implement security features to allow customized dashboard access for different stakeholders like farmers, analysts, NGOs, or policymakers.

10. Appendix

10.1. Source Code

All development was done using Power BI desktop. The .pbix file includes all DAX measures,calculated columns and visuals in the project.

10.2. Project Links

- Github Repository:https://github.com/Anshika-Gupta05/Global-Food-Production-Analysis-1961-2023-
- Video Demonstation: https://drive.google.com/file/d/1VYd0O1rf2KIfXnhyxigAR8ZitFaX1o_h/view?usp=sharing