Final Project Report

1. Introduction

1.1 Project Overview

The project titled “Global Food Production Analysis (1961–2023)” focuses on analyzing historical global food production data to identify long-term trends, regional contributions, and crop-wise production patterns. With the growing importance of food security and sustainable agriculture, analyzing large volumes of agricultural data has become essential for informed decision-making.

This project uses Power BI as the primary business intelligence tool to transform raw agricultural datasets into meaningful insights through interactive dashboards and reports. The analysis covers major food crops such as rice, wheat, maize, fruits, tea, and coffee across different regions and years.

1.2 Objectives

The key objectives of this project are:

- To collect and analyze global food production data from 1961 to 2023
- To identify trends and growth patterns in major food crops
- To compare crop production across different regions
- To design interactive dashboards using Power BI
- To support data-driven decision-making in the agricultural sector

2. Project Initialization and Planning Phase

2.1 Define Problem Statement

Global food production data is vast, complex, and spread across multiple sources. Traditional methods such as spreadsheets and static reports make it difficult for analysts and decision-makers to understand trends, compare crops, and assess regional contributions.

This lack of interactive visualization and centralized analysis leads to inefficiencies and delays in strategic planning. Therefore, there is a need for a structured, visual, and interactive analytics solution to simplify data interpretation and support informed decisions.

2.2 Project Proposal (Proposed Solution)

The proposed solution is to build an interactive data analytics system using Power BI. The system collects global food production data, preprocesses it for quality and consistency, and presents insights through dashboards and reports. The solution emphasizes clarity, interactivity, and usability to help stakeholders easily explore data and derive insights.

2.3 Initial Project Planning

The project follows an Agile-based approach with defined sprints. Tasks are divided into data collection, preprocessing, visualization, dashboard design, and reporting phases. Each sprint includes user stories, priorities, story points, and timelines to ensure systematic progress and timely completion.

3. Data Collection and Preprocessing Phase

3.1 Data Collection Plan and Raw Data Sources Identified

Data for this project was collected from publicly available global agricultural datasets. These datasets include year-wise and crop-wise production values measured in tonnes. The data sources were selected based on reliability, completeness, and relevance to the project objectives.

3.2 Data Quality Report

During data exploration, several data quality issues were identified, such as missing values, duplicate records, inconsistent naming conventions, and incorrect data types. Each issue was analyzed based on severity and resolved using Power Query techniques such as filtering, standardization, duplicate removal, and data type correction.

3.3 Data Exploration and Preprocessing

Power BI’s Power Query Editor was used extensively to clean and transform the data. Missing values were handled, duplicates were removed, and columns were filtered and sorted. Data types were corrected to ensure accurate calculations. Columns were split and merged where necessary, and calculated columns were created for better categorization. The cleaned data was saved within the Power BI model for further analysis.

4. Data Visualization

4.1 Framing Business Questions

Business questions were framed to guide visualization development. These questions focus on understanding total production, trend analysis, crop comparisons, and regional dominance. Clearly defined business questions help ensure that visualizations are meaningful and actionable.

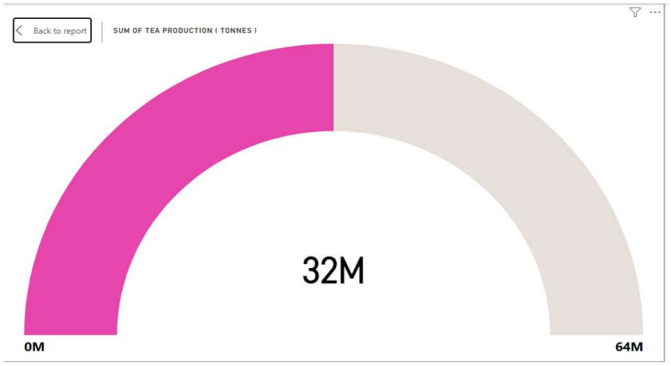
4.2 Developing Visualizations

Multiple visualizations were developed using Power BI, including card visuals, bar charts, area charts, donut charts, stacked bar charts, and gauge charts. Each visualization was selected based on the nature of the data and the business question being addressed. Interactive filters and slicers were applied to enhance user experience.

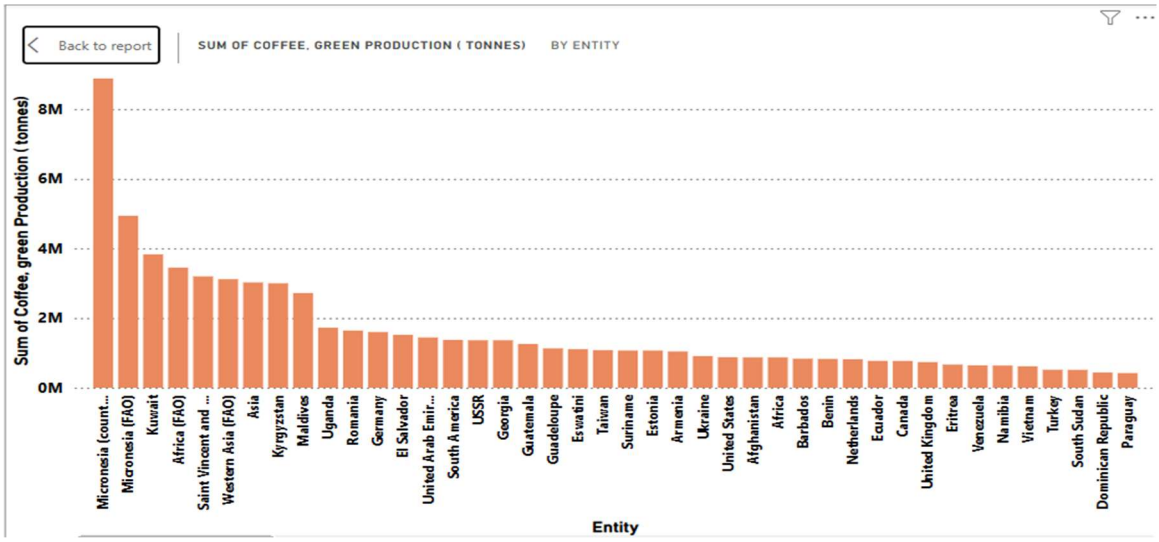
Average of Rice Production

Sum of Wheat Production

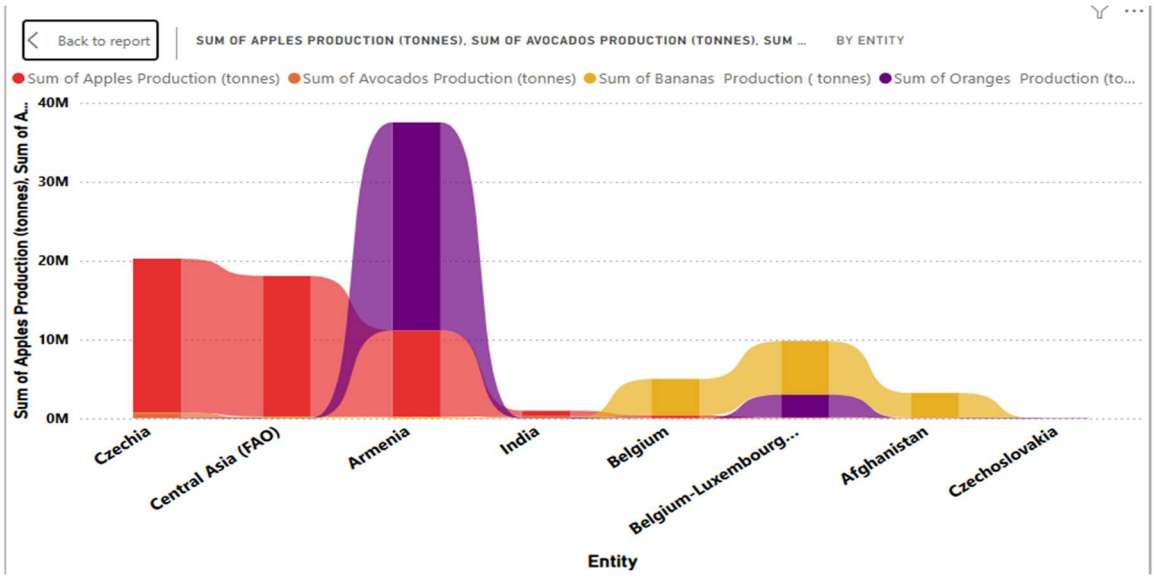
Sum of Tea production



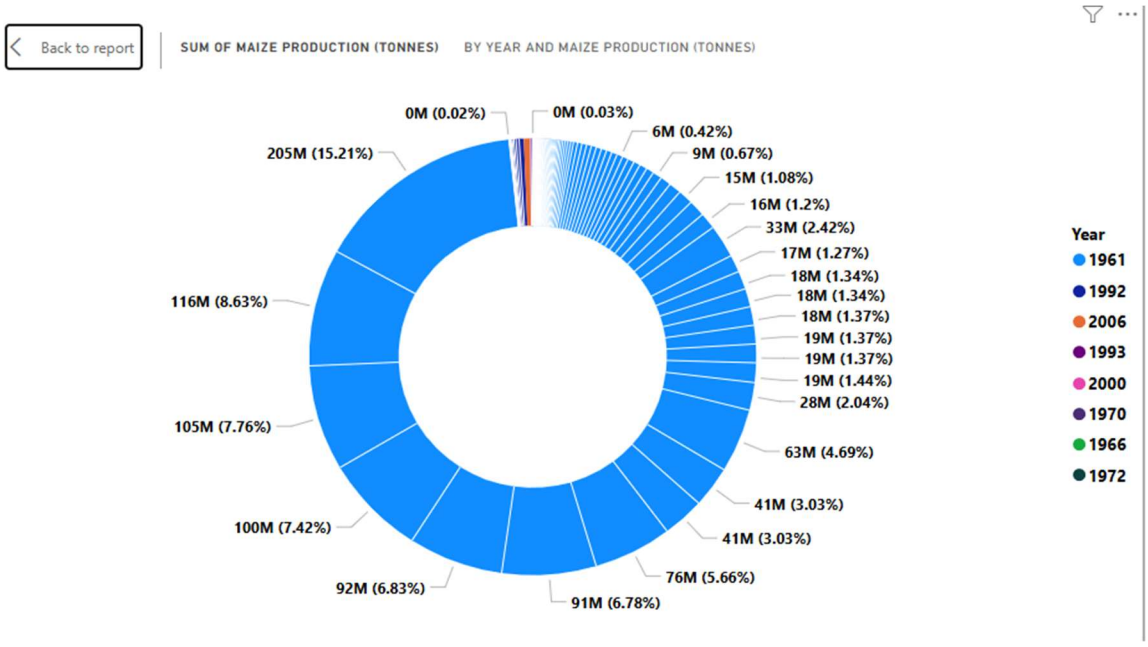
Sum of Coffee, Green Production



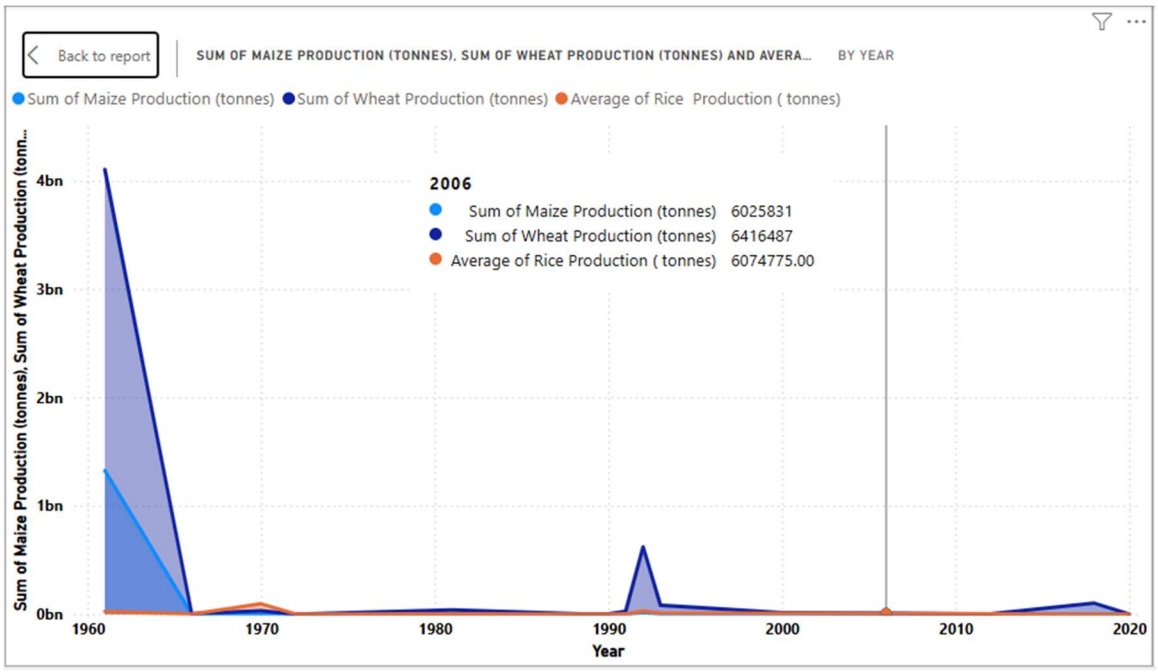
Sum of Apples, Avocados, Banana, Oranges Productions



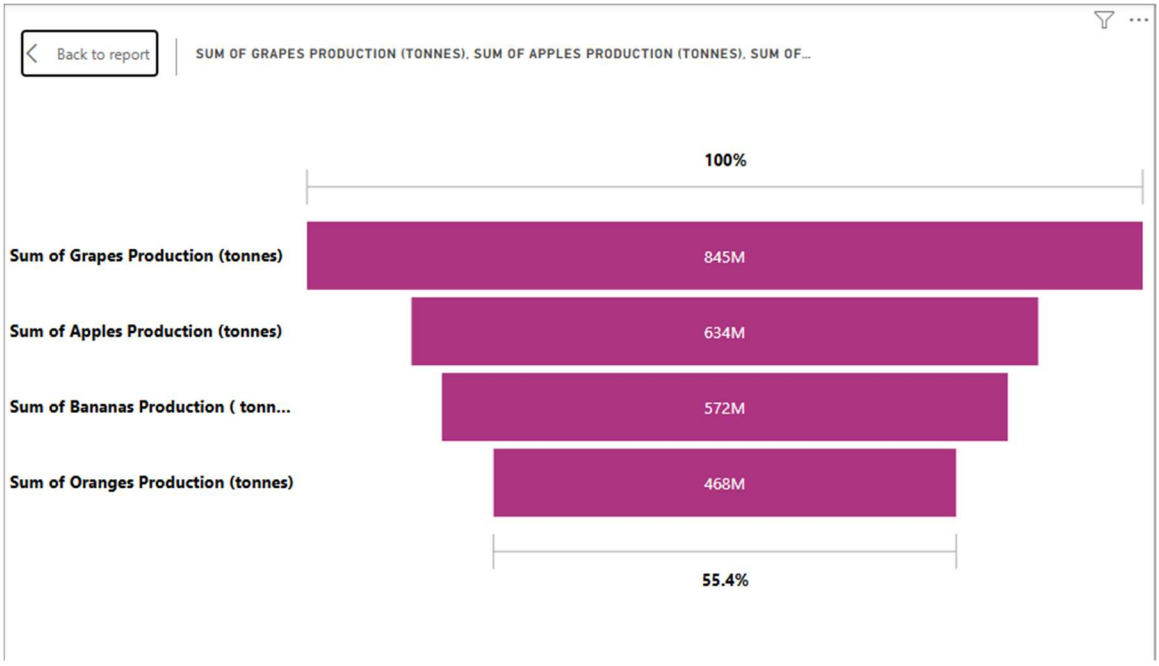
Sum of maize Production by Year



Sum of Maize, Wheat, Rice Productions



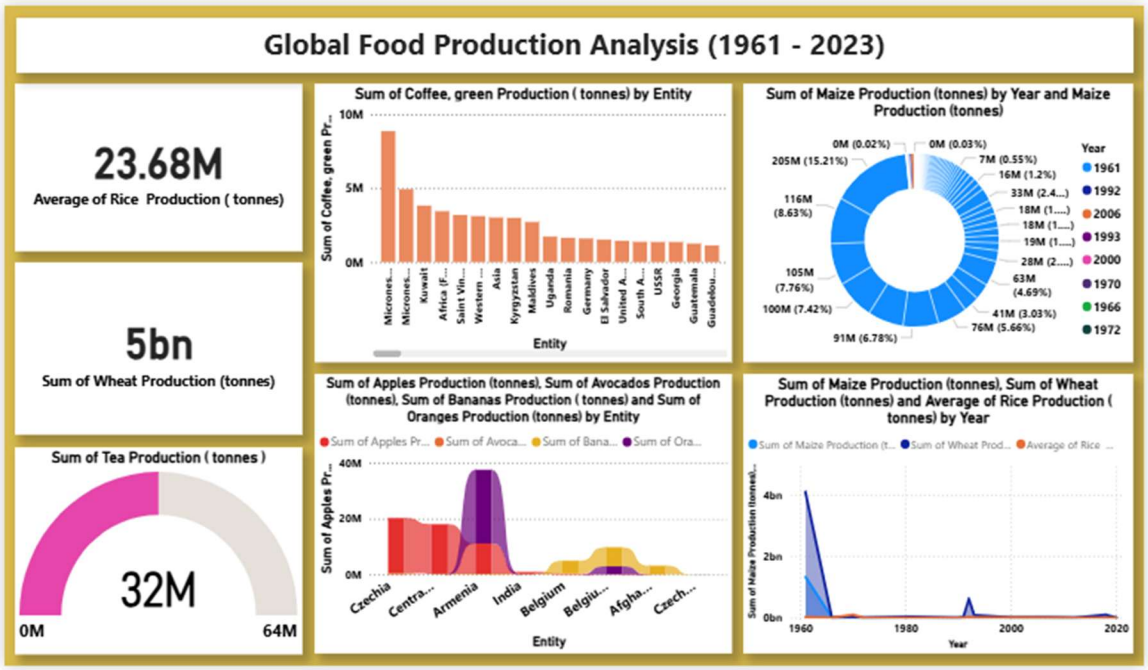
Sum of Grapes, Apple, Bananas, Oranges Productions



5. Dashboard

5.1 Dashboard Design File

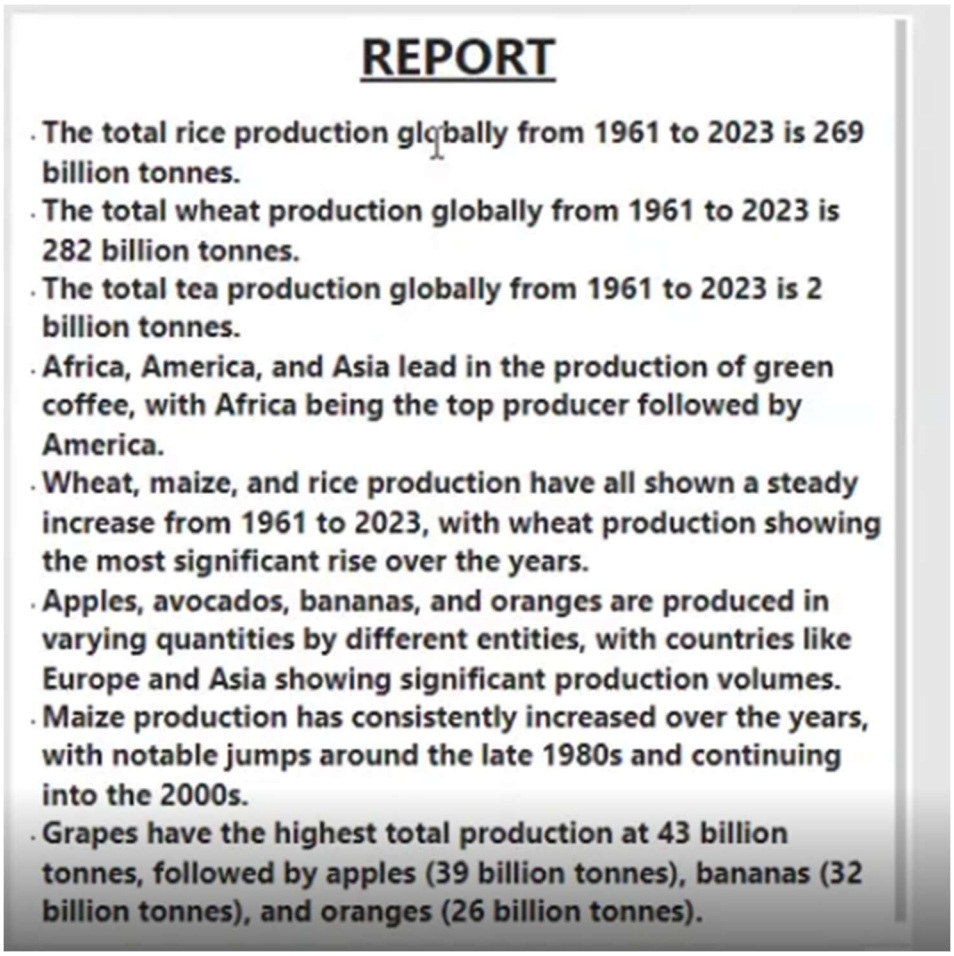
The dashboard was designed with a clear and intuitive layout. Key performance indicators (KPIs) are placed at the top, trend analysis visuals in the center, and comparative charts at the bottom. Consistent color themes, icons, and infographics were used to improve visual appeal. The dashboard is interactive, responsive, and supports drill-down analysis.



6. Report

6.1 Story Design File

The Power BI report presents a narrative view of global food production trends. It combines visuals with insights to tell a clear data story. The report is designed for stakeholders who require detailed analysis and interpretation. Filters allow users to explore data by year, crop, and region.



7. Performance Testing

7.1 Utilization of Data Filters

Slicers and filters for year, crop type, and region were implemented. These filters allow users to dynamically explore the dataset and analyze specific scenarios without performance lag.

7.2 Number of Calculation Fields

A total of 10+ DAX calculation fields were created, including total production measures for rice, wheat, maize, fruits, tea, and coffee. These measures enable efficient aggregation and improve model performance.

7.3 Number of Visualizations

The dashboard contains 8+ visualizations, including KPIs, trend charts, comparative bar charts, and distribution charts. Visual count was optimized to balance performance and clarity.

8. Conclusion / Observations

The project successfully demonstrates how Power BI can be used to analyze large-scale agricultural datasets and derive meaningful insights. The analysis reveals steady growth in staple crops like wheat, maize, and rice, with significant regional contributions. Interactive dashboards and reports enable efficient decision-making and improved understanding of global food production trends.

9. Future Scope

Future enhancements may include:

- Integration of real-time agricultural data
- Inclusion of climate and weather parameters
- Predictive analytics using machine learning
- Expansion to include price trends and demand forecasting

10. Appendix

10.1 Source Code

- Power BI DAX measures
- Power Query transformation steps

10.2 GitHub & Project Demo Link

- GitHub Repository: https://github.com/rohitkumart7795/Global-Food-Production-Trends-and-Analysis-A-Comprehensive-Study-from-1961-to-2023.git

- Project Demo Video: https://drive.google.com/file/d/1JoSMLnBihoMjf1rmUd2TjtAYOXyevX9s/view?usp=sharing