PROJECT REPORT

1. INTRODUCTION

1.1 Project Overview:

Food production is a crucial factor in global sustainability, economic stability, and food security. Over the past six decades, food production patterns have evolved due to technological advancements, climate change, population growth, and shifting dietary preferences. This project aims to analyze global food production trends from 1961 to 2023 using Power BI, providing deep insights into key agricultural sectors, regional contributions, and emerging challenges.

1.2 Purpose:

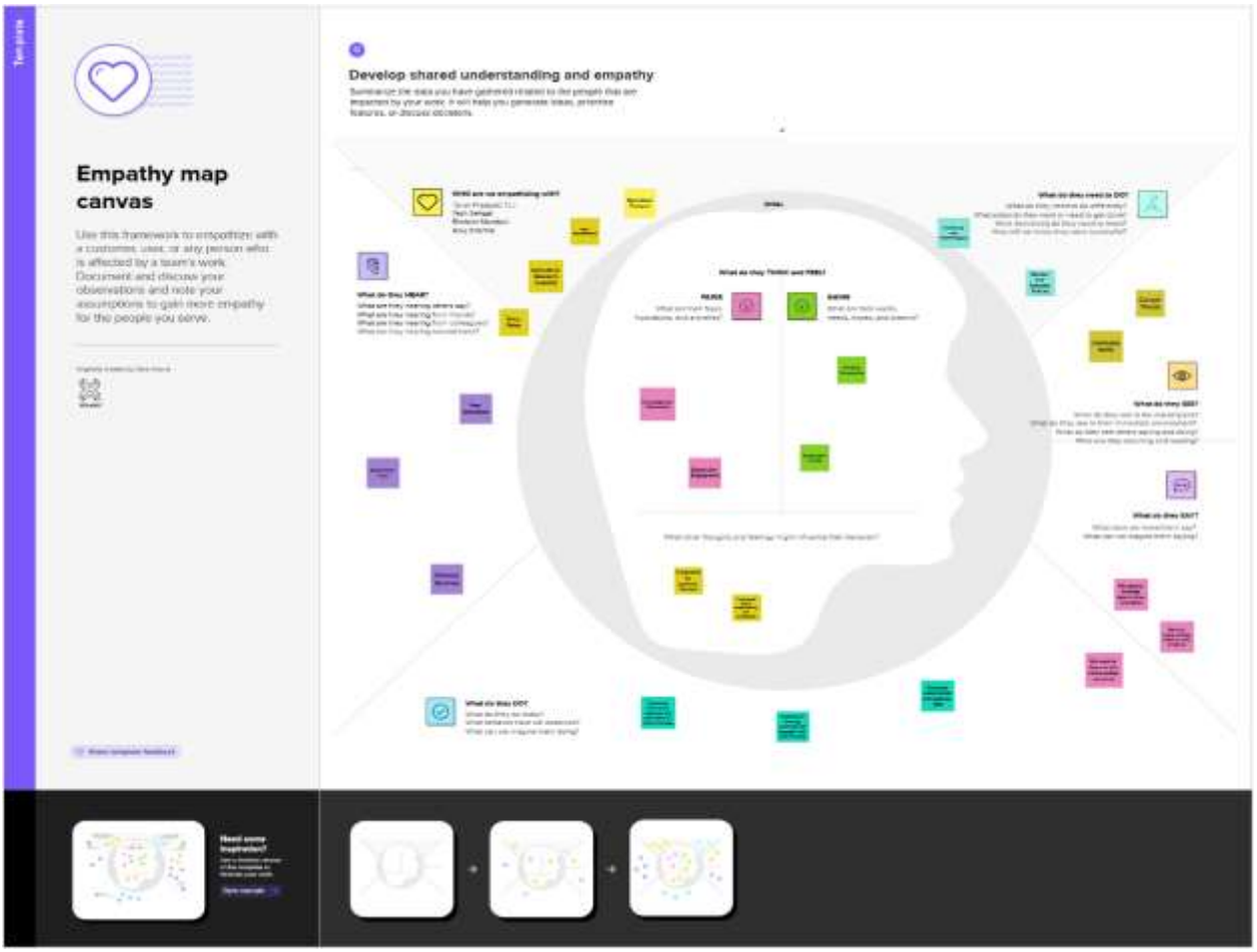
1. **Analyze Long-Term Trends** – Examine food production patterns across different regions and categories from 1961 to 2023.
2. **Identify Leading Producers** – Determine the top food-producing countries and their contributions to global supply.
3. **Explore Crop and Livestock Growth** – Study production changes in major food categories, including cereals, vegetables, fruits, dairy, and meat.
4. **Impact Assessment** – Assess the impact of climate change, population growth, and policies on food production.
5. **Data Visualization** – Leverage Power BI to create interactive dashboards for effective data representation and analysis.

2. IDEATION PHASE

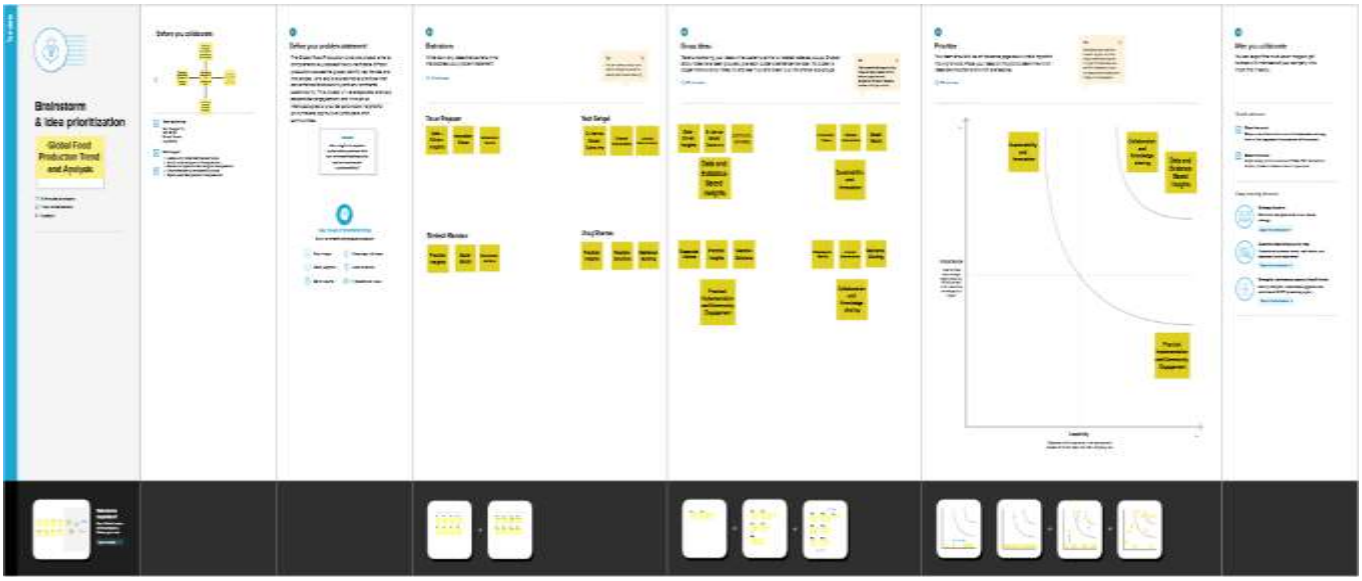
2.1 Problem Statement

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	A farmer	Increase my crop yield	I lack access to modern agricultural technology	I can't afford expensive machinery	Frustrated and helpless
PS-2	A food company executive	Optimize supply chain efficiency	There are unpredictable fluctuations in food production	Weather conditions and demand vary	Stressed and uncertain
PS-3	A policymaker	Ensure food security in my region	Data on food production trends is scattered	I need reliable insights to make informed decisions	Overwhelmed and concerned
PS-4	A coffee producer	Expand my market globally	I struggle to compete with larger brands	I lack marketing resources and international connections	Disheartened and limited
PS-5	A data analyst	Identify key food production trends	The dataset is too large and complex	I need better data visualization tools	Frustrated and inefficient
PS-6	A grocery store owner	Stock the right amount of fresh produce	I can't predict demand accurately	Consumer preferences keep changing	Anxious about losses
PS-7	A consumer	Buy fresh and affordable food	Prices keep increasing	Supply chain disruptions affect availability	Frustrated and worried

2.2 Empathy Map Canvas:



2.3 Brainstorming:



3. REQUIREMENT ANALYSIS

3.1 Customer Journey map

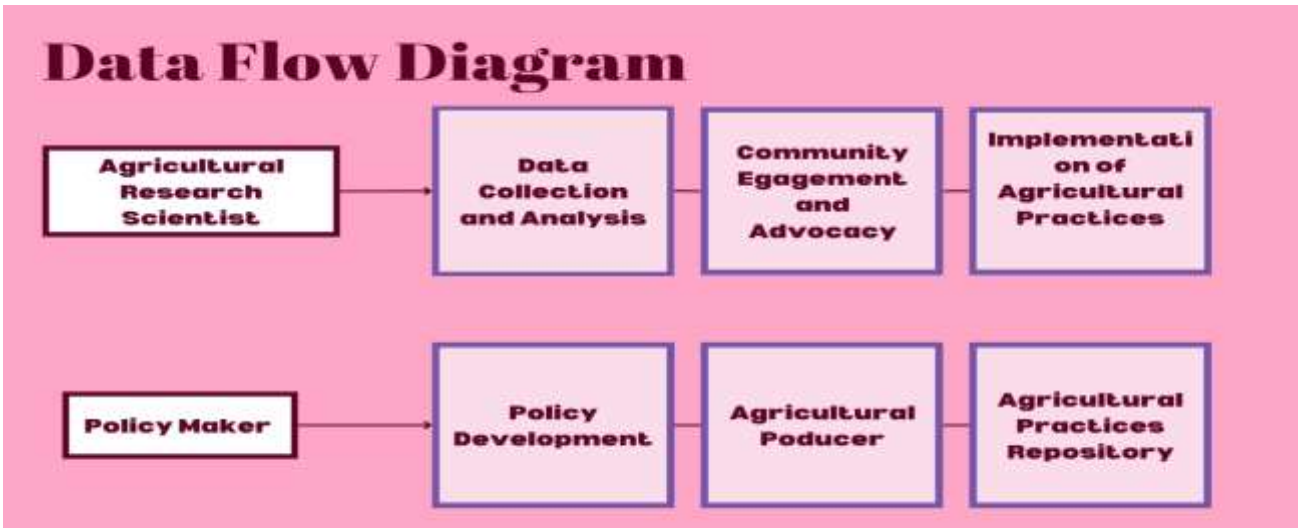
3.2 Solution Requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Data Collection C Cleaning	Gather historical food production data (1961-2023)
		Remove inconsistencies C missing values
		Standardize units C formats for analysis
FR-2	Data Processing C Transformation	Aggregate production data by region and crop type
		Calculate yearly growth trends C anomalies
		Prepare dataset for visualization in Power BI
FR-3	Power BI Report Creation	Design interactive dashboards for food production trends
		Create visualizations for staple crops (rice, wheat, maize)
		Develop regional comparison charts for fruit production

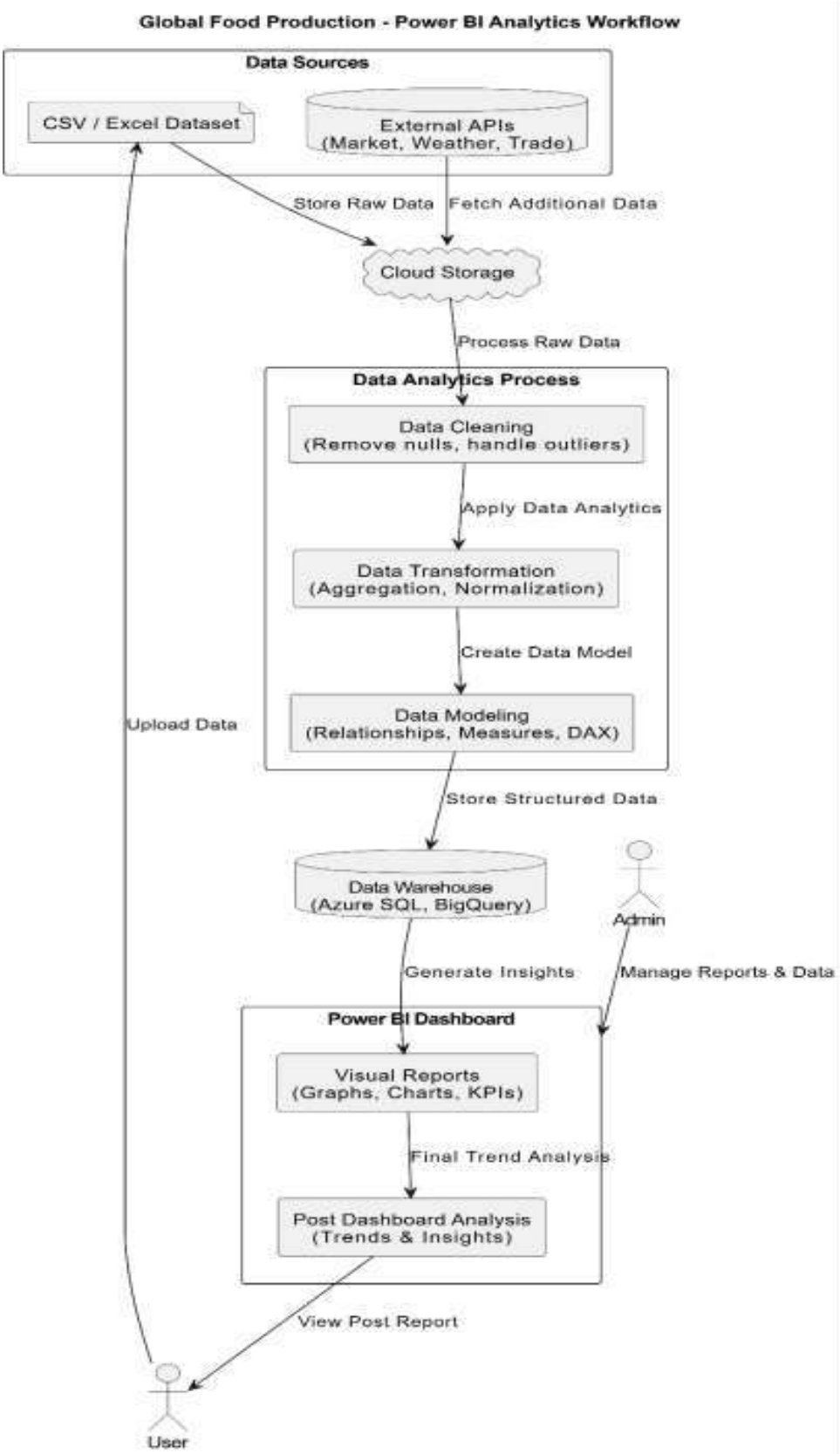
FR-4	Insights C Decision Support	Identify key trends in food security C production growth
		Provide data-driven recommendations for stakeholders
		Enable export of reports for business C policy use

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The Power BI dashboard should have an intuitive and user-friendly interface for analysts, policymakers, and business users.
NFR-2	**Security**	Access control mechanisms should ensure only authorized users can view or modify the dataset and reports.
NFR-3	**Reliability**	The system should ensure consistent and accurate data visualization, with automated alerts for missing or inconsistent data.
NFR-4	**Performance**	Power BI reports should load within 5 seconds for optimal user experience, even when handling large datasets.
NFR-5	**Availability**	The Power BI reports should be accessible 24/7 with minimal downtime, ensuring continuous data availability.
NFR-6	**Scalability**	The solution should handle growing data volumes and support future integration with additional data sources.

3.3 Data Flow Diagram:



3.4 Technology Stack:



Technical Architecture:

S.No	Component	Description	Technology
1	**User Interface**	How users interact with Power BI reports and dashboards (e.g., Web UI, Interactive Reports).	Power BI, Web UI
2	**Data Collection**	Collecting historical food production data from various sources.	Python, Pandas, APIs
3	**Data Cleaning s Preprocessing**	Handling missing values, standardizing formats, and normalizing data.	Python, SQL, Power Query
4	**Data Storage (Local)**	Storing processed data for further analysis.	MySQL, PostgreSQL, CSV, Excel
5	**Cloud Database**	Storing structured data for accessibility and scalability.	AWS RDS, Azure SQL, Google BigQuery
6	**Data Processing s Transformation**	Aggregating data, calculating trends, and structuring for visualization.	Python, Power Query, SQL
7	**Visualization s Reporting**	Creating dashboards and reports with interactive insights.	Power BI, Tableau
8	**External APIs**	Fetching additional data like weather patterns, crop indices, and market prices.	OpenWeather API, FAO API, Market Data APIs
9	**Machine Learning Model (Optional)**	Predicting future food production trends based on historical data.	Scikit-learn, TensorFlow, Azure ML

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1	**Open-Source Frameworks**	List the open-source frameworks used in data processing and visualization.	Power BI, Python (Pandas, NumPy), Excel
2	**Security Implementations**	Basic security measures like role-based access and dataset permissions.	Power BI Row-Level Security (RLS), Power BI Service Permissions

3	**Scalable Architecture**	Ensures scalability for handling large datasets and multiple users.	Power BI Cloud Service, Azure SQL, Google BigQuery
4	**Availability**	Ensuring accessibility of reports through cloud deployment.	Power BI Service, Power BI Embedded, SharePoint Integration
5	**Performance**	Optimizing report load times and data refresh rates.	Power BI Data Modeling, DAX Optimization, DirectQuery vs. Import Mode

4. PROJECT DESIGN

4.1 Problem Solution Fit:

Problem – Solution Fit Template:

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why

Purpose:

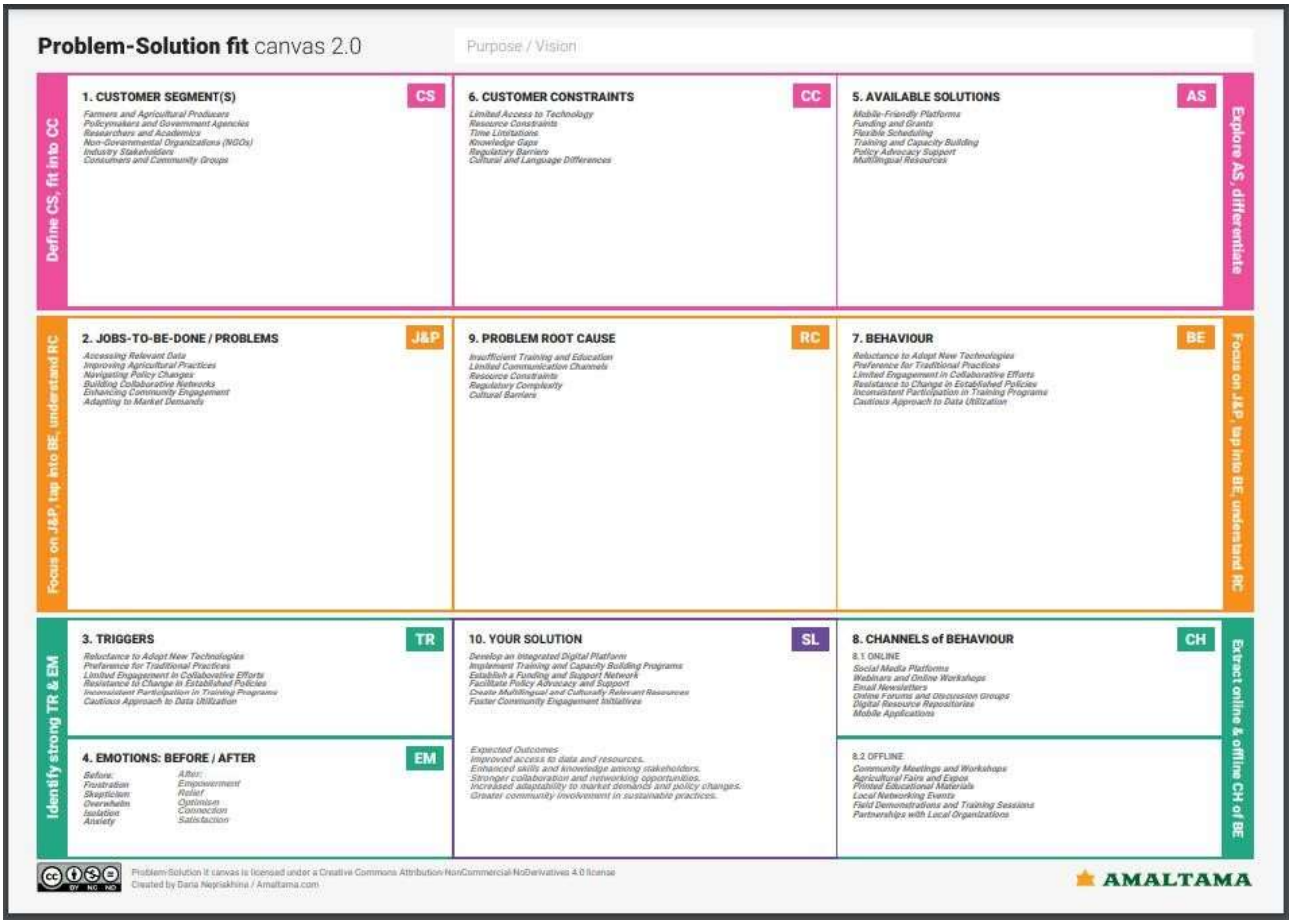
❑ Solve complex problems in a way that fits the state of your customers.

❑ Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behavior.

❑ Sharpen your communication and marketing strategy with the right triggers and messaging.

❑ Increase touch-points with your company by finding the right problem-behavior fit and building trust by solving frequent annoyances, or urgent or costly problems.

❑ Understand the existing situation in order to improve it for your target group.



4.2 Proposed Solution:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	There was a lack of detailed analysis of global food production trends, which is crucial for agricultural decision-making and food security.
2.	Idea / Solution description	Using Power BI, food production data from 1961 to 2023 was analysed, focusing on key commodities such as rice, wheat, maize, coffee, tea, and various fruits like apples, bananas, and grapes. The study provides interactive visualizations to track trends and regional contributions.
3.	Novelty / Uniqueness	This study uniquely leverages Power BI to visualize long-term trends and regional contributions, offering real-time insights and comparative analysis for better decision-making.
4.	Social Impact / Customer Satisfaction	The analysis benefits agricultural decision-makers, policymakers, and farmers by providing **data-driven insights** that can help improve food security and promote sustainable production practices.

5.	Business Model (Revenue Model)	This data analytics solution can be monetized through **subscription-based services**, consultancy for agricultural firms, or by providing insights to policymakers and research institutions.
6.	Scalability of the Solution	The solution can be scaled by integrating **more agricultural commodities**, real-time data updates.

4.3 Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behaviour, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

Architecture Overview:

The project leverages Power BI for data visualization and analytics to study global food production trends from 1961 to 2023. The architecture consists of:

1. Data Sources:
    - FAO and other global food production datasets (CSV, Excel, SQL databases)
    - Public APIs for agricultural production statistics
    - Historical datasets manually processed for trend analysis
2. Data Processing & Transformation:
    - Data cleaning and transformation using **Power Query** in Power BI
    - Creating relationships between various datasets (commodities, regions, years)
    - Aggregating data for insightful reporting
3. Data Modeling & Storage:
    - Data is structured and stored in **Power BI's in-memory model**
    - Measures and calculated columns created using **DAX (Data Analysis Expressions)**
4. Visualization & Reporting Layer:
    - Power BI Dashboards & Reports featuring:
        - Gauge Charts (Tea production analysis)
        - Bar & Stacked Charts (Fruit & coffee production comparison)
        - Area Charts (Trends of wheat, maize, and rice over time)
        - Donut Charts (Maize production distribution)
    - Interactive filtering by year, region, and commodity
5. Deployment & Accessibility:

- Hosted on **Power BI Service** for real-time data access
- Reports shared via **Power BI Embedded & Power BI Mobile** for accessibility

6. Scalability & Future Enhancements:
   - Integration with real-time data sources via **APIs**
   - Expansion to include more agricultural commodities and regional insights

Example - Solution Architecture Diagram:

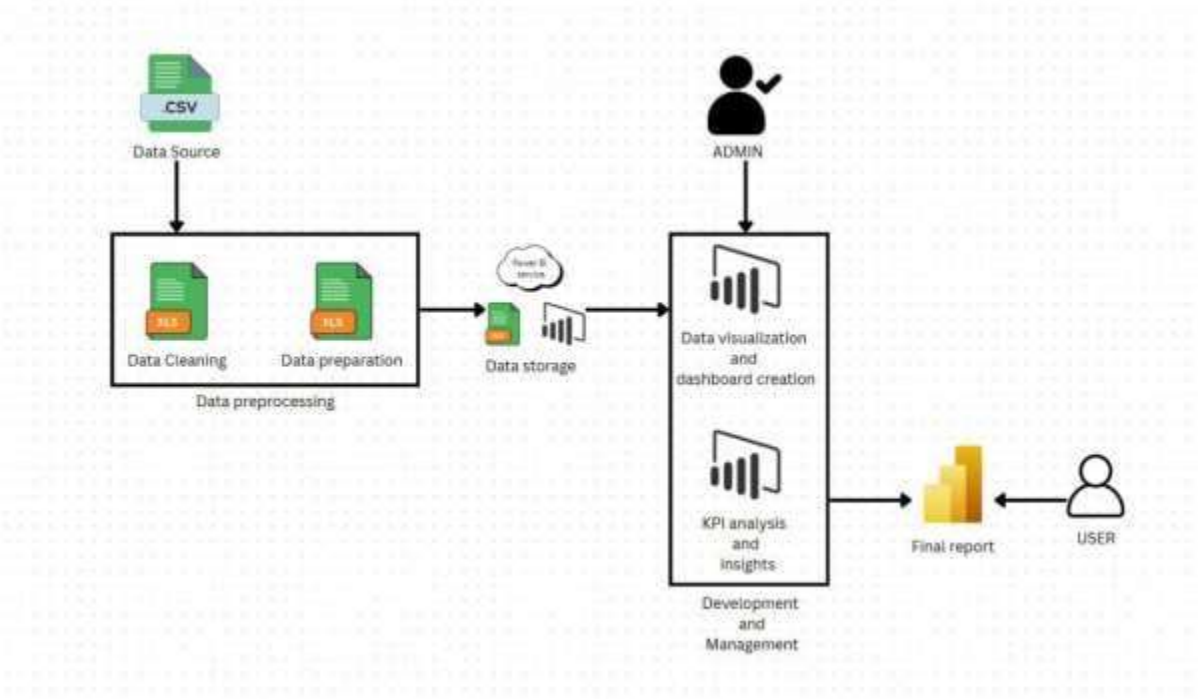


Figure 1: Architecture and data flow of the Global food production analysis system

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning:

Product Backlog, Sprint Schedule, and Estimation:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	Identify and gather data sources for food production.	5	High	Yash Sehgal
	Data Preparation	USN-2	Clean and preprocess collected data for analysis.	8	High	Anuj Sharma
	Dashboard Design	USN-3	Create wireframes for Power BI dashboard layout.	3		Bimlesh Mandavi
		USN-4	Define key metrics and visualizations for the dashboard.	5	High	Tarun Prajapat
Sprint-2	Data Modeling	USN-5	Build data models in Power BI to connect data sources.	8	High	Anuj Sharma Tarun Prajapat
	Visualization Development	USN-6	Create interactive visualizations for key metrics.	8	High	Yash Sehgal Bimlesh Mandavi
	Testing	USN-7	Conduct testing of dashboard functionality and accuracy.	5	Medium	Yash Sehgal

	Feedback Collection	USN-8	Gather feedback from stakeholders on initial dashboard.	3	Medium	Bimlesh Mandavi
Sprint-3	Training and Documentation	USN-9	Develop training materials for stakeholders.	5	High	Anuj Sharma
		USN-10	Conduct training sessions for users on Power BI dashboard.	5	High	Tarun Prajapat
	Launch	USN-11	Officially launch the Power BI dashboard.	3	High	Tarun Prajapat Anuj Sharma Bimlesh Mandavi Yash Sehgal
	Evaluation	USN-12	Evaluate dashboard effectiveness and gather further feedback.	5	Medium	Tarun Prajapat Anuj Sharma Bimlesh Mandavi Yash Sehgal

Project Tracker, Velocity & Burndown Chart:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	21	10 Days	21 Feb 2025	02 March 2025	21	02 March 2025
Sprint-2	20	10 Days	03 March 2025	12 March 2025	21	12 March 2025
Sprint-3	13	2 Days	13 March 2025	14 March 2025	13	14 March 2025

Velocity:

Total Story Points Completed: 58

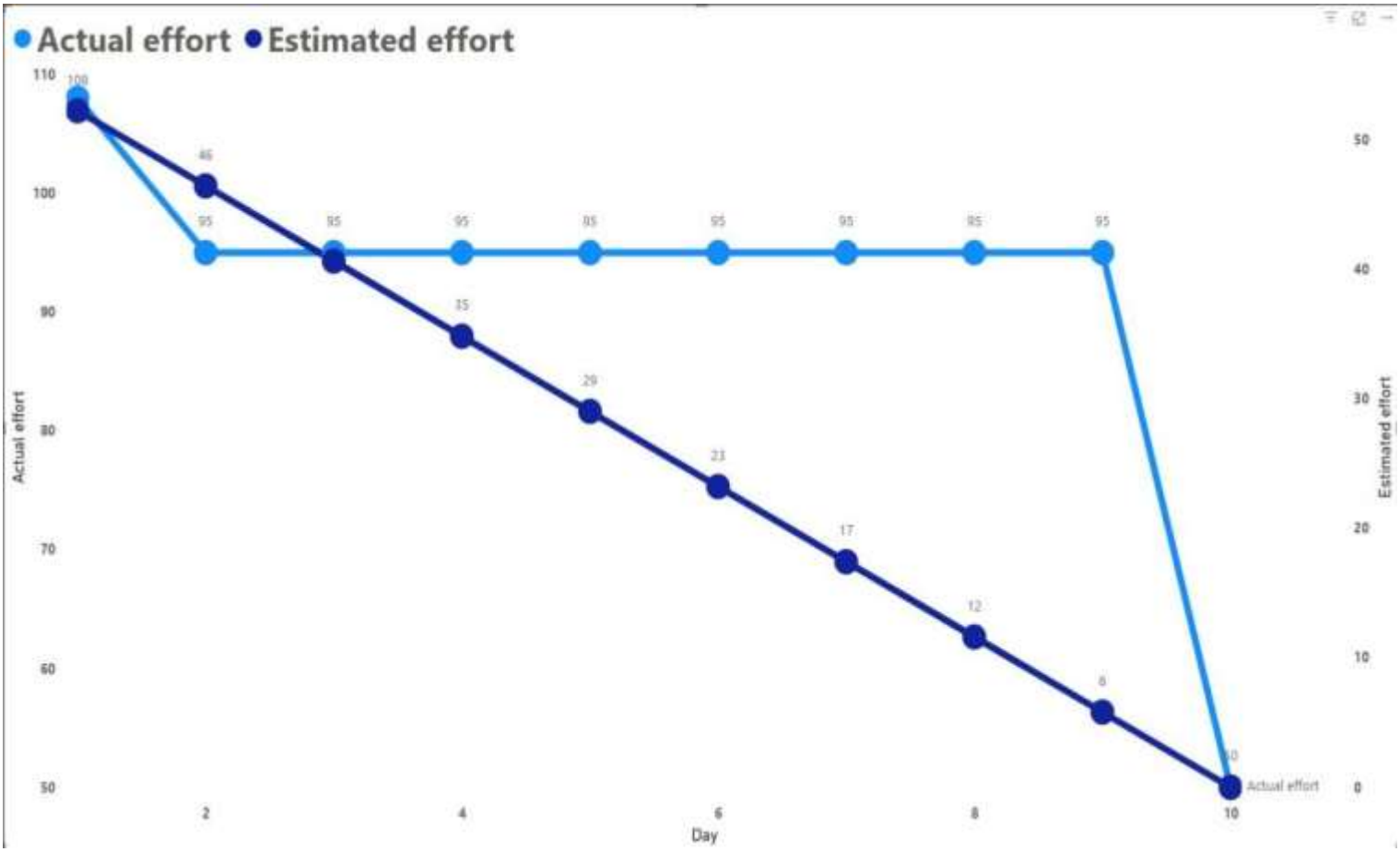
Total Number of Sprints = 3
Velocity = Total Story Points Completed / Number of Sprints
Velocity = 58 / 3 ≈ 19.33

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

Sprint	Day	Total Story Points	Story Points completed	Remaining Story Points
1	1	58	0	58
	2	58	0	58
	3	58	0	58
	4	58	0	58
	5	58	0	58
	6	58	0	58
	7	58	0	58
	8	58	0	58
	9	58	0	58
	10	58	21	37
2	1	58	21	37
	2	58	21	37
	3	58	21	37
	4	58	21	37
	5	58	21	37
	6	58	21	37
	7	58	21	37
	8	58	21	37
	9	58	21	37

	10	58	45	13
3	1	58	45	13
	2	58	58	0



6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing:

Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Screenshot / Values
1.	Data Rendered	No. Of Rows – 11912 No. Of Columns - 25
2.	Data Preprocessing	Fixed column name gaps, Converted numerical columns to Whole Number, Adjusted outliers
3.	Utilization of Data Filters	Year Slicer, Country Slicer

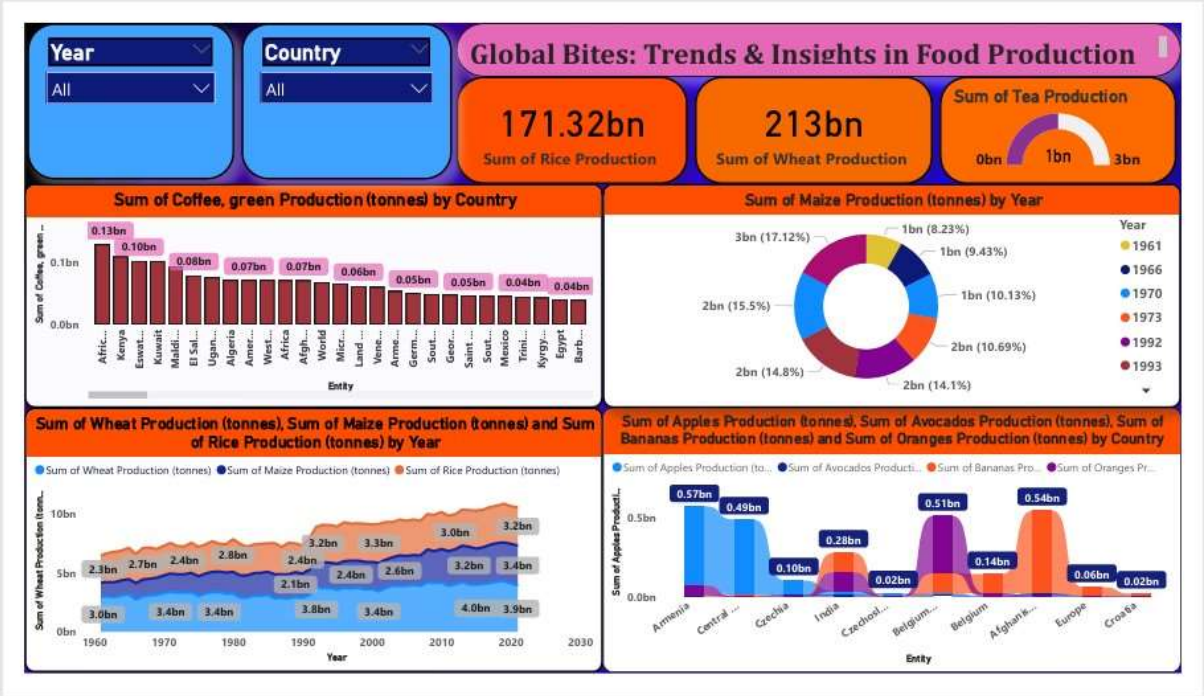
4.	DAX Queries Used	Country Rank =
		RANKX(ALL('world_food_production_cleaned'[Entity]),
		[Total Production], DESC, DENSE)
		
		Production Share % =
		DIVIDE(
		[Total Production],
		CALCULATE([Total Production],
		ALL('world_food_production_cleaned'[Entity
		])), 0
		) * 100
		
		Top Crop =
		VAR CropList = {
		"Apples Production (tonnes)",
		"Bananas Production (tonnes)",
		"Rice Production (tonnes)",
		"Wheat Production (tonnes)"
		}
		
		VAR MaxCrop
		= MAXX(

		ADDCOLUMNS(
		SUMMARIZE('world_food_production_cleaned', 'world_food_production_cleaned'[Entity]),
		"Production",
		VAR CropValues = {
		SUM('world_food_production_cleaned'[Apples Production (tonnes)]),
		SUM('world_food_production_cleaned'[Bananas Production (tonnes)]),
		SUM('world_food_production_cleaned'[Rice Production (tonnes)]),
		SUM('world_food_production_cleaned'[Wheat Production (tonnes)])
		}
		RETURN MAXX(CropValues, [Value])
		),
		[Production]
		)
		
		RETURN MaxCrop
		
		Total Production =
		SUM('world_food_production_cleaned'[Apples Production (tonnes)]) +
		SUM('world_food_production_cleaned'[Avocados Production (tonnes)]) +
		SUM('world_food_production_cleaned'[Bananas Production (tonnes)]) +
		SUM('world_food_production_cleaned'[Cocoa beans Production (tonnes)]) +
		SUM('world_food_production_cleaned'[Coffee, green Production (tonnes)]) +
		SUM('world_food_production_cleaned'[Grapes Production (tonnes)]) +
		SUM('world_food_production_cleaned'[Maize Production (tonnes)]) +
		SUM('world_food_production_cleaned'[Meat, chicken Production (tonnes)]) +
		SUM('world_food_production_cleaned'[Oranges Production (tonnes)]) +
		SUM('world_food_production_cleaned'[Palm oil Production (tonnes)]) +
		SUM('world_food_production_cleaned'[Peas, dry Production (tonnes)]) +
		SUM('world_food_production_cleaned'[Potatoes Production (tonnes)]) +
		SUM('world_food_production_cleaned'[Rice Production
		(tonnes)]) +

		SUM('world_food_production_cleaned'[Rye Production (tonnes)]) + SUM('world_food_production_cleaned'[Soybeans Production (tonnes)]) + SUM('world_food_production_cleaned'[Sugar cane Production (tonnes)]) + SUM('world_food_production_cleaned'[Sunflower seed Production (tonnes)]) + SUM('world_food_production_cleaned'[Sweet potatoes Production (tonnes)]) + SUM('world_food_production_cleaned'[Tea Production (tonnes)]) + SUM('world_food_production_cleaned'[Tomatoes Production (tonnes)]) + SUM('world_food_production_cleaned'[Wheat Production (tonnes)]) + SUM('world_food_production_cleaned'[Yams Production (tonnes)])
5.	Dashboard design	No of Visualizations -8 (1) Slicer (2) Card (3) Guage Chart (4) Bar Chart (5) Area Chart (6) Ribbon Chart (7) Donut Chart (8) Text box
6	Report Design	No of Visualizations – 7 (1) Slicer (2) Card (3) Pie Chart (4) Donut Chart (5) Table (6) Line Chart (7) Text box

7. RESULTS

7.1 Dashboard:



Here are the key observations from the **Power BI dashboard** on **Global Food Production Trends & Analysis**:

1. General Insights

- The dashboard provides insights into **global food production trends**, including **wheat, rice, maize, coffee, tea, apples, avocados, bananas, and oranges**.
- The **total rice production** is **171.32bn tonnes**, while **wheat production** is **213bn tonnes**.
- A **gauge chart** represents the **sum of tea production**, showing a production scale ranging from **0bn to 3bn tonnes**.

2. Coffee Production Trends (Bar Chart)

- **Africa** leads in **green coffee production** with **0.13bn tonnes**, followed by **Europe (0.10bn tonnes)**.
- Other major coffee-producing countries include **Brazil, Algeria, Vietnam, and Morocco**, producing between **0.05bn – 0.08bn tonnes** each.

3. Maize Production Trends (Donut Chart)

- The **highest maize production year** recorded is **1973 (17.12%)**.
- Other significant production years include **1992 (10.69%)**, **1993 (14.1%)**, and **1979 (15.5%)**.

4. Wheat, Maize, and Rice Production Trends Over Time (Area Chart)

- **Wheat production** started at **2.3bn tonnes (1960)** and increased to **3.2bn tonnes (2030, projected)**.
- **Rice production** showed steady growth, from **3.4bn tonnes (1960)** to around **3.8bn tonnes (2030)**.
- **Maize production** has also increased significantly over time.

5. Fruit Production by Country (Bar Chart)

- **Armenia** has the highest **apple production** (**0.57bn tonnes**).
- **Czechia and Bulgaria** also contribute significantly, with **0.49bn tonnes and 0.54bn tonnes**, respectively.
- **India leads in avocado production (0.28bn tonnes)**, while **Banana and Orange production** are more distributed across multiple regions.

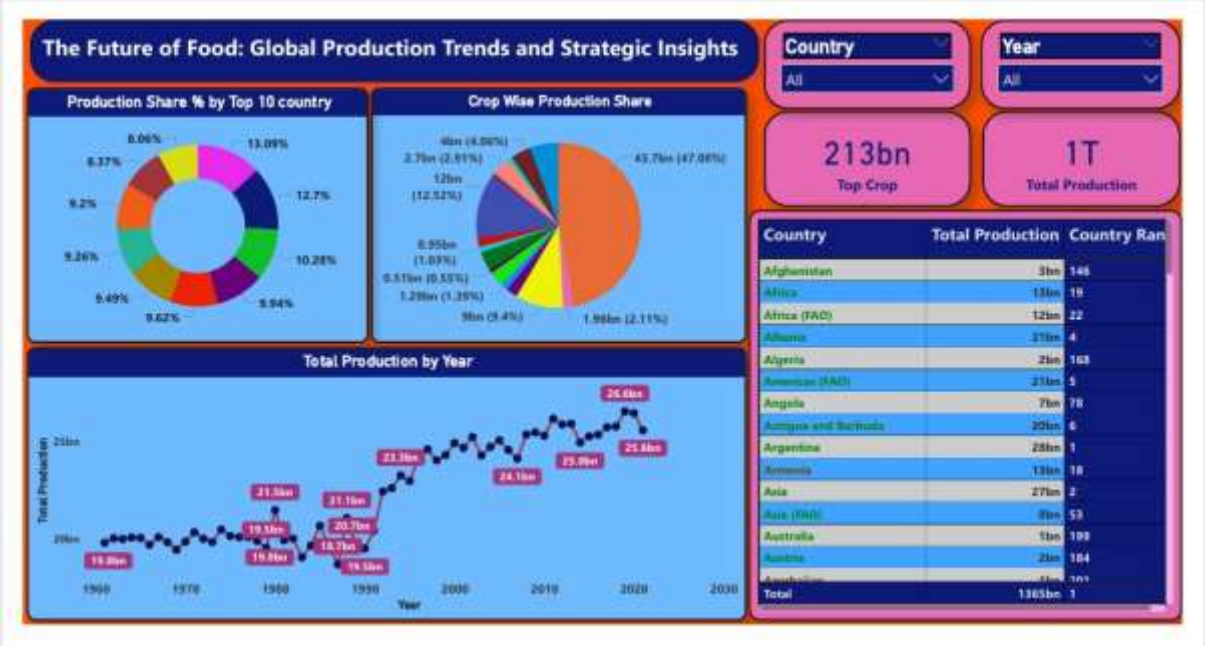
6. Filters for Year & Country

- Users can **filter data based on Year and Country**, allowing dynamic analysis of specific time periods and regions.

Conclusion & Recommendations

- **Maize, wheat, and rice** are the **largest** contributors to global food production.
- Coffee production is **dominated by Africa and Europe**, while **apple and avocado production** is strong in **Armenia, Czechia, and India**.
- The dashboard effectively visualizes food production trends but could be **enhanced** by:
    - Adding **trends over multiple decades**.
    - Comparing production with **consumption or exports**.
    - Including **growth rates** to see which food items are expanding fastest.

7.2 Report:



Observations from the Power BI Report: "The Future of Food: Global Production Trends and Strategic Insights"

1. General Overview

- The dashboard provides a comprehensive analysis of **global food production trends**, focusing on **top crops, regional production, and yearly growth**.
- **Total food production is 1 trillion tonnes**, with the **top crop contributing 213 billion tonnes**.
- Users can filter the data by **Country** and **Year**, allowing for detailed analysis.

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2. Production Share by Top 10 Countries (Donut Chart)

- The **top-producing country** contributes **13.09%** of global production.
- Other key contributors range between **8% to 12%**, indicating a **fairly balanced distribution** of food production among leading nations.
- The smallest share among the top 10 countries is around **8.06%**, showing that multiple countries play a vital role in global food supply.

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3. Crop-Wise Production Share (Pie Chart)

- The **largest crop** accounts for **43.7bn tonnes (47.08%)** of total production.

- Other significant crops include:
    - **9bn tonnes (9.4%)**
    - **12bn tonnes (12.52%)**
    - **4bn tonnes (4.06%)**
- Some crops contribute **less than 3%**, indicating they have a lower global production volume compared to staple crops.

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4. Total Production by Year (Line Chart)

- **Production has grown steadily from 1960 to 2030 (projected)**.
- The lowest recorded production in this period is around **18.7bn tonnes (1970s)**.
- Major growth milestones:
    - **19.8bn tonnes (1960s)**
    - **21.1bn tonnes (1980s)**
    - **23.3bn tonnes (1990s, rapid increase)**
    - **25.6bn tonnes (2020s, peak production)**
    - **26.6bn tonnes (2030, projected highest production level)**
- The growth pattern suggests a **consistent upward trend**, with occasional minor dips.

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5. Country-Wise Production Data (Table)

- **Total food production across listed countries is 1.36T tonnes**.
- Some notable countries:
    - **Africa: 13bn tonnes (Rank 19)**
    - **Argentina: 28bn tonnes**
    - **Armenia: 13bn tonnes**
    - **Australia: 18bn tonnes**
- Some small producers, like **Afghanistan (3bn tonnes, Rank 146)**, have significantly lower food production.

- **Top-producing countries contribute the majority of global food supply**, while smaller nations account for minor shares.

8. ADVANTAGES & DISADVANTAGES

✅ **Advantages:**

1. Comprehensive Global Insights

- The dashboard provides **detailed trends and patterns** for food production across multiple years, regions, and crops.
- Users can analyze **which countries and crops contribute the most** to global food production.

2. Production Growth Analysis

- The **steady increase in food production** from 1960 to 2030 shows positive progress.
- **Projected data for 2030** helps in future planning and policy-making.

3. Top-Producing Countries & Crops Identified

- Users can see **which countries lead in production**, helping with **strategic trade and import/export decisions**.
- **Crop-wise production share** helps in understanding **market demand and supply gaps**.

4. Interactive Filters for Custom Analysis

- The **Country & Year filters** allow users to analyze **specific regions and historical trends**.
- Users can compare production over different periods **for better forecasting**.

5. Easy Visualization & Interpretation

- Pie charts, bar graphs, and line charts **effectively communicate insights**.
- The **trendline in the "Total Production by Year" chart** makes it easy to track **historical progress**.

❌ **Disadvantages:**

1. Lack of External Factors Consideration

- The report does not include factors like **climate change, natural disasters, wars, or economic crises**, which **impact food production**.
- No insights into **how inflation, population growth, or government policies** influence production trends.

2. Over-Reliance on a Few Crops

- **One crop dominates 47% of total production**, making the food system **vulnerable to disease outbreaks or climate impacts**.
- More **diverse crop production insights** would make the report stronger.

3. Limited Information on Food Consumption & Trade

- The report **only focuses on production**; there is **no data on consumption, exports, or imports**.
- Understanding **which countries have food surpluses or shortages** would add more value.

4. Regional Disparities in Production

- Some countries, like **Afghanistan, have very low production**, while others like **Argentina or Australia** produce significantly more.
- There is no **analysis of how production can be improved in lower-producing regions**.

5. No Insights on Food Waste & Supply Chain Issues

- The dashboard does not address **how much food is wasted** or **supply chain challenges**.
- Including data on **losses during transportation, storage, and distribution** would make it more comprehensive.

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9. CONCLUSION

The **Power BI dashboard and report on global food production trends** provide valuable insights into **historical and projected food production** across different countries and crop types. The data highlights a **steady increase in total food production** from **1960 to 2030**, showcasing **growth in agricultural output**. The identification of **top-producing countries and dominant crops** helps in understanding global food distribution patterns.

However, the analysis also reveals some **challenges and limitations**. The **over-reliance on a few major crops (47% by one crop)** poses a potential risk in case of **climate change impacts or supply chain disruptions**. Additionally, the report **does not include external factors** like food consumption patterns, trade dynamics, or food waste, which are essential for a **comprehensive understanding of global food security**.

To enhance the report, **including economic factors, food waste data, and regional production challenges** would provide a more **holistic view of the global food landscape**. Despite its limitations, the report serves as a **strong foundation for policymakers, agricultural experts, and businesses** to strategize and improve global food sustainability.

10. FUTURE SCOPE

1. Integration of Climate and Environmental Factors 🌍

- Analyzing how **climate change, droughts, and extreme weather conditions** impact food production.
- Incorporating **satellite data or AI-based climate predictions** to assess future risks.

2. Food Trade and Consumption Analysis 📊

- Adding **global import-export data** to understand food trade balances.
- Identifying **food surplus and deficit regions** for better supply chain management.
- Tracking **per capita food consumption trends** to predict demand shifts.

3. Supply Chain and Food Waste Insights 🚜

- Measuring **post-harvest losses, transportation challenges, and storage inefficiencies**.
- Analyzing **food waste data** to improve sustainability and reduce global hunger.

4. Impact of Technological Innovations 🔬

- Examining the role of **precision farming, AI, and biotechnology** in boosting crop yields.
- Assessing the impact of **smart irrigation, GM crops, and vertical farming** on future food production.

5. Economic and Policy Influence 💰

- Studying how **government subsidies, trade policies, and inflation** impact food production.

- Comparing the **effectiveness of agricultural reforms in different countries**.

6. Machine Learning & Predictive Analytics 🤖

- Using **AI-driven models** to forecast **future food production trends**.
- Identifying **patterns in crop failures, disease outbreaks, or price fluctuations**.

By incorporating these aspects, the dashboard can become a **comprehensive decision-making tool** for policymakers, researchers, and businesses to **ensure global food security and sustainability**.

11. APPENDIX

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

GitHub Link: https://github.com/Tarun-1435/Global-Food-Production-Trends-and-Analysis

Project Demo Link : https://drive.google.com/file/d/1KuigqMbWR0D2VaYWsu_DXfHgw2IoLGGg/view?usp=sharing