PROJECT REPORT

Title: Global Food Production Trends (1961-2023)

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1. Introduction

The study of global food production trends from 1961 to 2023 provides valuable insights into the agricultural sector's growth and key commodity production patterns. Using Power BI, this project analyses significant trends in food production, focusing on staple crops such as wheat, rice, maize, and key fruits like grapes, apples, and bananas. The data-driven approach helps in understanding production growth, regional contributions, and strategic decision-making for agricultural stakeholders.

2. IDEATION PHASE

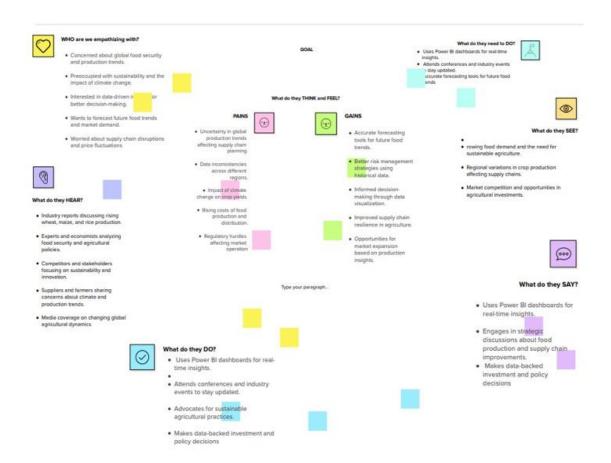
2.1Problem Statement

Problem	I am	I'm trying to	But	Because	Which makes me
Statement (PS)	(Customer)				feel
PS-1 Lack of real	Agriculture	Gain accurate	Data is	I need proper	Frustration due to
time data insights	analyst	data	insatiable it	visualization	difficulties in
			creates	for decision	consolidating and
			difficulty	making	interpreting data.
PS-2 Data	Variability in	Identify key	Difficulty in	Uneven	Concern over the
Integration	data sources	contributors to	consolidating	distribution	challenges of global
and Cleaning	and reporting	the production	and analysing	of resources	food security and
Challenges	standards	of major	large datasets	and	resource allocation.
	across regions	agricultural	spanning	cultivation	
		commodities	multiple	practices	
		and fruits	decades	across	
				different	
				regions	
PS-3 Regional and	Understanding	The data is to	Data	Effective	Disappointment in
Commodity-	And making	segmented	segmentations	planning	the production
Specific Analysis	polices	and properly	is not easy	require for	disparities among
		aligned		polices	regions, leading to
					unequal access to
					food

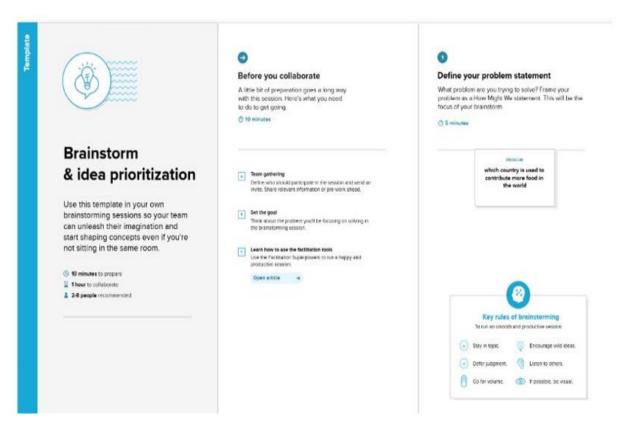
PS-4 Time-Series Analysis and seasonal analysis	Understanding which is contributing more food from which state and item specific	strategic decision by providing actionable insights into crop growth commodity demands	Fluctuations in crop production due to environment and climate factors.	The lack of standardized methodologi es for global data collection and reporting in the agricultural	A sense of urgency to address climate and sustainability issues affecting production
				sector	

2.2 Empathy Map Canvas

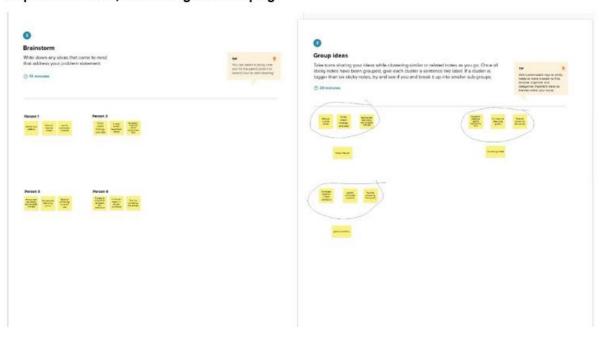




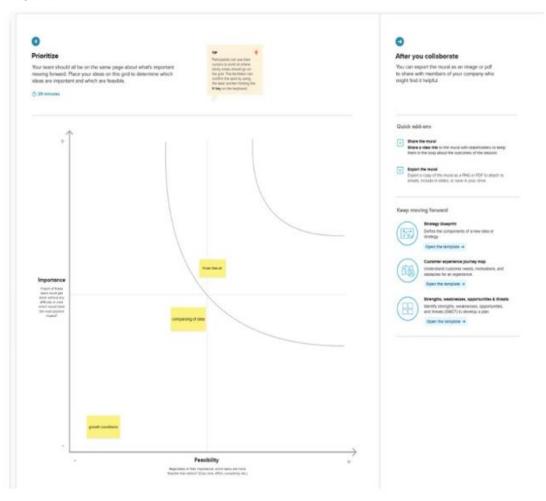
2.3 Brainstorming



Step-2: Brainstorm, Idea Listing and Grouping



Step-3: Idea Prioritization



3. REQUIREMENT ANALYSIS

3.1Customer Journey map

Historical food production dat trends, optimis agricultural stand visual insi-	a to te rategies, En	tice w Users Discover the Project	Enter Setting Up the Data	Engage Core Process in Power BI	Exit Expanding the Project's Scope	Extend What happens after the experience is over?
Experience st What does the cus of this scenario tyl in each step?	tomer at the center reed to	are diswer by the consistency gradual structured data for structured data for effective temples.	They upload CSV, Cook yelloges data into unable to		They willinke and they remain date described the date of considering and further analysis.	Shern might add onwer distances over their for standardisation tracking. See distance the date of the standard tracking.
Interactions What interactions step along the wa People: What to Places: Where	do they have at each y? hey see or talk to?	orta analysts, Graine data nasarches, especialment es Egyption de Regionalers (Egyption de Regio	Users intersect with Population per formation or system guides. as system guides. as system guides.		Users finalize reports and distribution and distribution legisless and distribution and dis	orn there lengths with the profess with other profess to mark the profess of the
Goals & motivate at each step, what primary goal or m ("Help me" or "H	t is a person's can produce the can produce th	to want, the droplane CLEFOOR'S about transit, The process and p	Users want an earn-to- use system to analyze fixed productive data.		Users alon to generate consumers of the decision of supers for decision among the decisio	Upon week to to the property of with endowing to the property of the producing production of the property of the producing producing the water and the property of the producing producing the water and the producing the water and the producing the produci
Positive mom What steps does a enjoyable, product and exciting?	typical person find	men hert ellend persollelliger i men personnelliger	orticating with the equipment of the pullback of the equipment of the equi		Users greenate well: tractioned opports the excurrence of the control of the con	Users approximate the shifting to soft new about to a soft new analysis over time. Analysis over time.
Negative mor What steps does a frustrating, confusi consuming?	typical person find me	ack of clear sougher about benefits				
Areas of opportion of the others sugges	ke each step better? under have? What are	witherdomax or men trials to classification of see participations.	Implement data validation to admiratically owned formatting boson.	Toughts and to part of the Control o	Covered on a comments Covered on the	Provide premisits synthetic manufacture of the contract production to activate production activately.

3.2 Solution Requirement Functional Requirements:

Following are the functional requirements of the proposed solution.

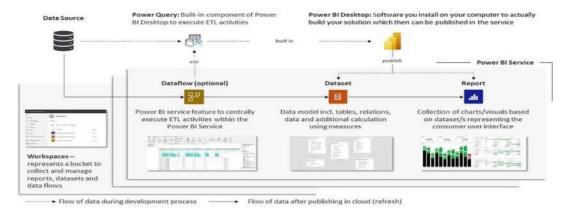
FR No.	Functional Requirement	Sub Requirement
FR-1	Data Input & Management	Users can upload food production datasets in CSV or Excel format. The system validates the format and structure of uploaded data.
FR-2	Data Preprocessing & Cleaning	The system should clean, normalize, and structure data for consistency and accuracy.
FR-3	Feature Selection & Model Training	The system identifies the most relevant features affecting food production.
FR-4	Prediction & Recommendations	The system predicts future food production trends based on historical data. It provides recommendations for improving yield (e.g., soil health, climate impact).
FR-5	Visualization & Insights	Users can view interactive dashboards with trends and reports.
FR-6	Model Updates	Admins can retrain models with new data for improved accuracy.

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Dashboards should be user-friendly and accessible.
NFR-2	Security	Users must authenticate via email & password before accessing data.
NFR-3	Reliability	The system should work accurately and without failures.
NFR-4	Performance	The system should process large data records Predictions should be generated quickly for standard queries.
NFR-5	Availability	The system should be accessible in all of the time.
NFR-6	Scalability	System should handle large datasets efficiently with the data growth

3.3 Data Flow Diagram



User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement	User Story Number	Acceptance criteria	Priority	Release
Data Analyst	Analyse global food consumption trends over time	USN-1	Data should include per capita consumption of key food groups	High	Sprint-1
Data Engineer	Collect and preprocess food production and trade data	USN-2	Data should be cleaned, normalized, and structured for analysis	High	Sprint-1
BI Developer	Develop interactive dashboards for food trends visualization	USN-3	Dashboards should show trends by region, food type, and time period.	High	Sprint-2
Policy Maker	Assess the impact of food trends on nutrition and health	USN-4	Reports should highlight dietary shifts and health correlations	High	Sprint-1

User Type	Functional Requirement	User Story Number	Acceptance criteria	Priority	Release
Farmer	Access insights on crop demand and price trends	USN-5	Reports should provide forecast data on crop prices and demand	High	Sprint-1
Admin	Manage data access, permissions, and updates	USN-6	Admin should have control over user access, data refresh, and security	Medium	Sprint-2

3.4Technology Stack

Technical Architecture:

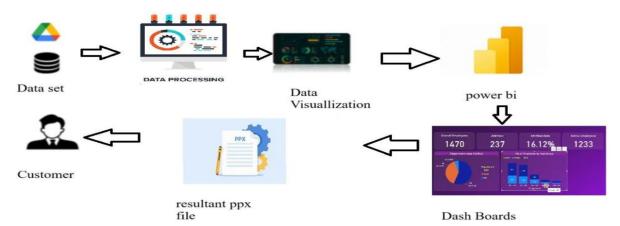


Table 1: components and Technologies

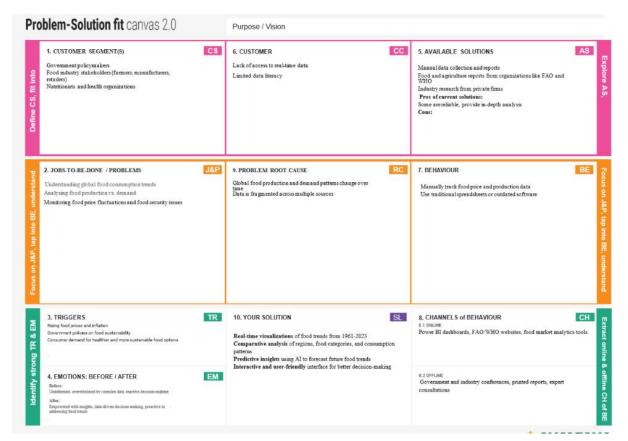
S. No	Component	Description	Technology
1.	Data Source	Historical food production dataset (1961-2023)	CSV, Excel, SQL Database
2.	Data Processing	Cleansing, transforming, and preparing data	Power Query (Power BI), Python (Pandas)
3.	Data Visualization	Graphical representation of data trends and insights	ableau, Power BI, Python
4.	Power BI D	BI tool used to create interactive reports & dashboards	Power BI
5.	Dashboards	Visual representation of key metrics and reports	Power BI Visuals (Line charts, Bar charts, Heatmaps)
6.	Resultant File	Exported presentation or report file	PowerPoint, PDF

Table-2: Application Characteristics:

S. No	Characteristics	Description	Technology
1	Data Processing	Handling the large sets and transforming raw data	Power BI, Python
2	Security Implementations	Implements role-based access and authentication.	Power BI Security, Row- Level Security
3	Visualization & Reporting	Graphical and tabular representation of data	Power BI,
4	Availability	Accessible through cloud- based Power BI reports	Power BI Service
5	Performance	Optimized report generation and fast loading	Power BI Data Model, DAX Optimization

4. PROJECT DESIGN

4.1 Problem Solution Fit

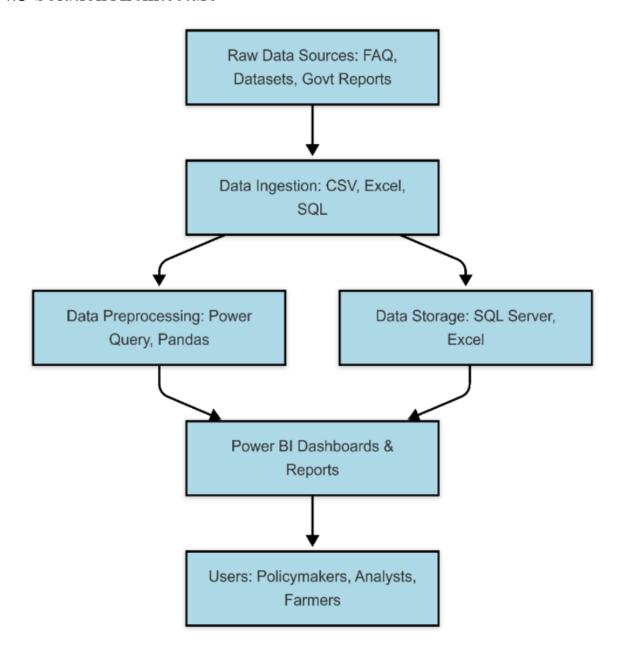


4.2 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Global food production has seen significant growth, yet challenges remain in distribution, sustainability, and accessibility. While total production of staple crops like wheat (282 billion tonnes) and rice (269 billion tonnes) has increased, food insecurity persists. Additionally, climate change and regional disparities in production affect food availability and affordability
2.	Idea / Solution description	Leveraging historical data from 1961 to 2023, this project aims to develop data-driven insights for optimizing food production, reducing waste, and improving distribution channels. Using Power BI visualizations, the solution will identify key production trends, predict future demands, and propose policies for sustainable agriculture.
3.	Novelty / Uniqueness	 Utilization of over 60 years of historical data to create predictive analytics for future food production. Regional insights into key contributors like Africa (green coffee leader) and Asia/Europe (fruit production hubs).
4.	Social Impact / Customer Satisfaction	 Enhanced food security by identifying gaps in production and distribution. Support for farmers and policymakers in making informed decisions. Contribution to reducing food waste and promoting efficient resource utilization.
5.	Business Model (Revenue Model)	 Subscription-based data analytics platform: Farmers, governments, and businesses subscribe to access detailed insights. Consulting services: Providing insights to policymakers and organizations for agricultural strategy development.

		 Collaboration with Agri-tech firms: Selling data-driven solutions to optimize agricultural supply chains.
6.	Scalability of the Solution	 Regional Adaptability: The model can be tailored for specific countries based on their agricultural production trends Expansion to other commodities: Beyond staple crops, this approach can be applied to livestock and fisheries.

4.3 Solution Architecture



5.1 PROJECT PLANNING & SCHEDULING

5.1 Project Planning

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection & Preprocessing	USN-1	Collect food production datasets from 1961- 2023	2	High	Aguan
Sprint-1	Data Collection & Preprocessing	USN-2	Clean and handle missing data values	3	High	Aguan
Sprint-1	Data Collection & Preprocessing	USN-3	Standardize categorical values for analysis	2	Medium	Reshma
Sprint-2	Data Modelling & Visualization	USN-4	Develop predictive models for food production trends	5	High	Avinash
Sprint-2	Data Modelling & Visualization	USN-5	Create Power BI dashboards for data visualization	4	High	Avinash
Sprint-2	Data Modelling & Visualization	USN-6	Test and validate predictive models	3	Medium	Avinash
Sprint-3	Insights & Deployment	USN-7	Develop insights and recommendations for policymakers	5	High	Kalyan
Sprint-3	Insights & Deployment	USN-8	Deploy interactive dashboards for stakeholders	5	High	Kalyan
Sprint-3	Insights & Deployment	USN-9	Conduct review and refine insights based on feedback	3	Medium	Kalyan

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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	7	3 Days	18 March 2025	20 March 2025	7	29 Oct 2022
Sprint-2	12	3 Days	20 March 2025	23 March 2025	12	
Sprint-3	13	3 Days	23 March 2025	26 March 2025	13	

Velocity Calculation

Total Story Points = 7 + 12 + 13 = **32**

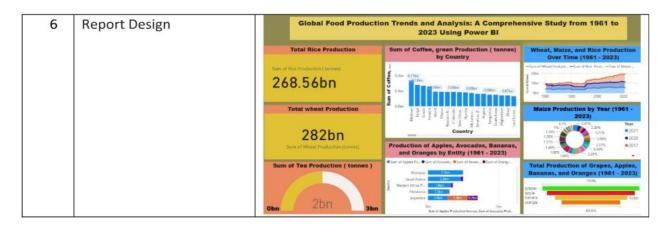
Number of Sprints = 3

Velocity = 32 / 3 = 10.67

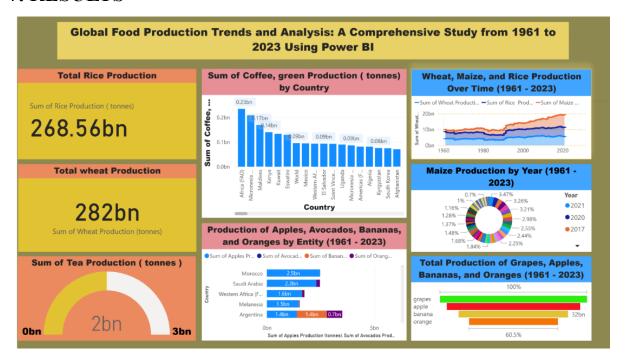
6 FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

S.No.	Parameter	Screenshot / Values				
1.	Data Rendered	11913 Rows and 25 Columns				
2.	Data Preprocessing	Removing null values. Standardizing column names.				
3.	Utilization of Data Filters	Year, Country and crop type filters are used				
4.	DAX Queries Used					
5.	ashboard design Global Food Production Trends and Analysis: A Comprehensive Study from 2023 Using Power BI					
		Total Rice Production Sum of Coffee, green Production (tonnes) by Country Sum of Rice Production (tonnes) Lear of Rice Production (tonnes) Lear of Rice Production (tonnes)				
		268.56bn				
		282bn Sam of Wheel Production of Apples, Avocados, Bananas, and Oranges by Entity (1961 - 2023) Production of Apples, Avocados, Bananas, and Oranges by Entity (1961 - 2023)				
		Sum of Tea Production (tonnes) **Form of Igans No. ** June of Isaacs . ** June of Isa				



7. RESULTS



8. ADVANTAGES & DISADVANTAGE

ADVANTAGES

- Power BI enables dynamic charts and dashboards, making trend analysis more insightful.
- It is easily to connect with multiple data sources for a comprehensive analysis.
- Power BI allows real-time data refresh, ensuring up-to-date analysis.
- It functionality makes it accessible for non-technical users.

DISADVANTAGE

• Power BI face performance issues with extremely large datasets.

• Preprocessing data is time-consuming.

9. CONCLUSION

This analysis of global food production from 1961 to 2023 provides essential insights into agricultural growth patterns and key commodity trends. It shows us resource for policymakers, agribusinesses, and researchers in strategic decision-making for food security and global trade. The study highlights the increasing demand for staple foods like wheat, maize, and rice, emphasizing the need for sustainable farming practices. Additionally, the rise in fruit and beverage crop production reflects shifts in global consumption patterns. Power BI analysis has given a clear understanding of food production trends, which can be used for the future agricultural investments and innovations to ensure food sustainability.

10. APPENDIX

Dataset& Project Demo Link:

https://drive.google.com/drive/folders/1rx5gbQ9 2AUJq43HVWnO UTUmvGHyLPR

GitHub link: https://github.https://github.com/avinash0546/global-food-trend-powerbi-dashboard.git.