A Project Report
On
Power BI Inflation Analysis: Journeying Through Global Economic Terrain Submitted for fulfilment of Experiential Project Based Learning (EPBL)

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This project is a result of collective efforts, and I sincerely appreciate everyone's contributions in making it a meaningful and insightful study.

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ABSTRACT

Inflation is a key economic indicator affecting economies worldwide, impacting purchasing power, economic growth, and financial stability. This project, "Power BI Inflation Analysis: Journeying Through Global Economic Terrain", aims to analyze inflation trends across various countries and economic classifications.

The project leverages Power BI to visualize inflation rates, historical trends, and country-wise comparisons using interactive dashboards. The dataset was collected from credible sources such as World Bank, IMF, and National Statistical Agencies and underwent extensive data cleaning and transformation to ensure accuracy and consistency.

Key insights were derived using DAX calculations, enabling an understanding of inflation trends across different periods, income classifications, and global regions. Various visualization techniques such as line charts, bar charts, and geographical heat maps were used to present insights dynamically.

The findings highlight the regional disparities in inflation rates, with some economies experiencing hyperinflation while others maintaining stable economic conditions. The study also examines the correlation between inflation and macroeconomic factors such as GDP growth and employment rates.

This project serves as a decision-support tool for economists, policymakers, and financial analysts, enabling them to make data-driven economic interventions. Future enhancements could include predictive modeling and real-time data integration to improve forecasting and economic planning.

Keywords: Inflation, Power BI, Data Visualization, Economic Trends, Global Finance, Macroeconomics.

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1. INTRODUCTION

Project Overview

The primary objective of this project is to build a comprehensive analytical framework that allows for seamless data collection, preparation, and modeling to analyze global inflation data. The Power BI dashboard will serve as a dynamic platform to visualize trends, identify patterns, and make data-driven predictions. The analysis will encompass key economic factors, such as inflation rates, consumer price indices, and exchange rate fluctuations across various countries and regions.

Our approach involves the following steps:

1. Data Sourcing and Integration: Collecting inflation data from reputable sources like World Bank, International Monetary Fund (IMF), and Kaggle.

2. Data Transformation and Cleaning: Standardizing data formats, handling missing values, and ensuring consistency.

3. Building Visualizations: Utilizing Power BI's interactive charts, graphs, and slicers to present inflation trends and comparisons.

4. Forecasting and Predictive Analysis: Applying statistical models to forecast future inflation trends and identify potential risks.

5. Generating Insights and Recommendations: Providing actionable insights for policymakers, businesses, and investors to make informed decisions.

Purpose

The core purpose of this project is to address the existing challenges in inflation analysis by offering a data-driven solution through Power BI. Specifically, the project aims to:

- Enhance Decision-Making: Empower policymakers and businesses with real-time insights to make informed economic decisions.

- Identify Regional Disparities: Highlight inflation trends and patterns across different regions to understand the impact of economic policies and market conditions.

- Predict Future Trends: Utilize predictive analytics to forecast inflation rates and prepare for potential economic shifts.

- Improve Data Accessibility: Provide a user-friendly, interactive dashboard that enables stakeholders to access and analyze data efficiently.

By achieving these objectives, this project aspires to bridge the gap between traditional static analysis and modern, interactive visualization, ultimately facilitating better strategic planning and risk management in the global economic landscape.

2. IDEATION PHASE

2.1 Problem Statement

Inflation poses significant economic challenges, affecting purchasing power, interest rates, and economic stability. Despite extensive research, real-time insights on inflation trends remain limited. The primary challenges include:

Complex and Vast Data: Multiple sources, requiring cleaning and standardization.

Comparative Limitations: Lack of a unified platform to compare inflation across countries and regions.

Economic Policy Decisions: Policymakers need reliable insights to make informed economic decisions.

2.2 Empathy Map Canvas

Stakeholders: Economists, policymakers, financial analysts, business leaders.

Needs: A dynamic, data-driven approach to monitoring inflation trends.

Usage: Interactive dashboard for filtering data based on country, income level, and inflation rate.

3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map

Understanding the customer journey is crucial for identifying pain points, enhancing user experience, and ensuring the effectiveness of the Power BI Inflation Analysis dashboard. By mapping the customer journey, we aim to visualize the end-to-end experience of stakeholders, including policymakers, businesses, and investors, as they interact with the dashboard to gain valuable insights into global inflation trends. This process helps in aligning the dashboard's functionalities with user expectations and decision-making needs.

Stage	Entice (How does the user initially become aware?)	Enter (What do people experience as they begin?)	Engage (What happens in core moments?)	Exit (What happens as the process finishes?)	Extend (What happens after the experience?)
Steps	Reads reports on inflation, searches for tools	Loads dataset into Power BI	Uses slicers & charts to explore trends	Saves reports & exports insights	Shares insights with teams, applies findings
Interactions	Online articles, economic reports	Power BI interface, data transformation	Slicers, line charts, filters, trend analysis	Export reports to Excel/PDF	Presentations, collaboration tools
Goals & Motivations	Understand global inflation trends	Load & clean data effectively	Identify inflation patterns by country & time	Generate meaningful insights	Use insights for business/economic decisions
Positive Moments	Finds relevant data	Smooth Power BI import	Charts provide clear trends	Report is informative & well-structured	Insights help in strategic decision-making
Negative Moments	Difficulties finding reliable data	Struggles with data cleaning	Charts lag with large datasets	Report export is limited	Lack of automated updates for new data
Areas of Opportunity	Provide a pre-processed dataset	Offer guided data transformation	Optimize Power BI performance	Improve report formatting options	Enhance automation & sharing capabilities

In conclusion, the customer journey map serves as a foundation for improving the overall user experience, ensuring the dashboard is intuitive, user-friendly, and capable of delivering actionable insights that support better decision-making in an ever-changing economic environment.

3.2 Solution Requirement

The **Solution Requirement** phase plays a vital role in defining the functional and non-functional aspects necessary for building an effective Power BI dashboard to analyze global inflation trends. It serves as a bridge between the problem statement and the final solution, ensuring that the dashboard meets user expectations and business objectives.

3.2.1 Functional Requirement:

- User Registration :- Registration through Form, Gmail, LinkedIn.
- User Confirmation :- Confirmation by sending login link on Email.
- User Login & Authentication :- Multi-Factor Authentication can be implemented for more security.
- User Roles & Permissions :- Define roles (e.g., Admin, Analyst, Viewer)
- Data Collection & Integration :- The system must ingest data from multiple sources (eg World Bank Open Data, FRED, IMF, RBI etc.).
- Data Cleaning & Processing :- The system must remove duplicates and missing values.

3.2.2 Non-functional Requirements:

- Usability :- The system should have an intuitive and user-friendly interface, requiring minimal training.
- Security :- Data must be encrypted using AES-256 for storage and TLS 1.2+ for transmission.
- Reliability :- Data integrity should be ensured, with daily automated backups stored securely.
- Performance :- Queries on large datasets should execute within 3-5 seconds for optimal efficiency.

3.3 Data Flow Diagram

The Data Flow Diagram (DFD) represents how the data flow from the input of raw dataset to the output of the visualization.

This diagram shows each steps from the data has flown.
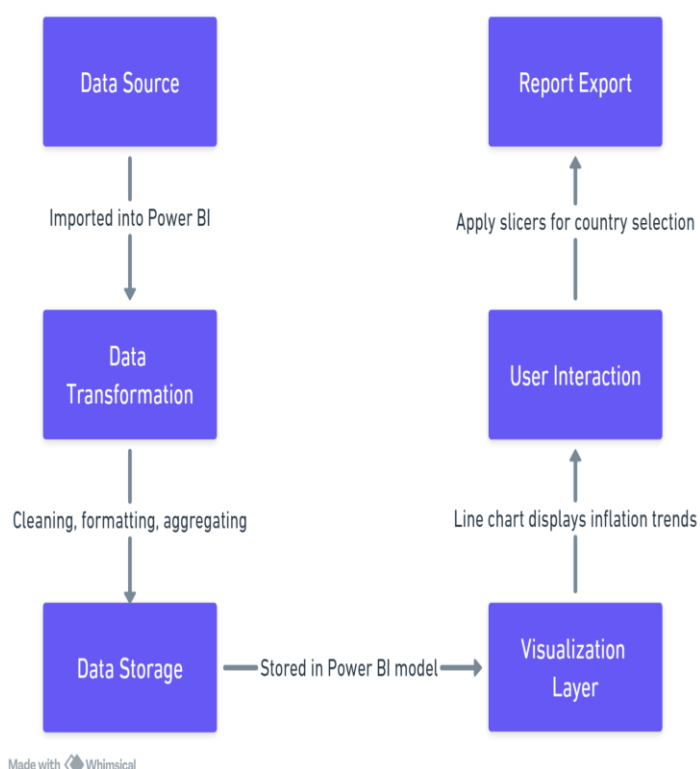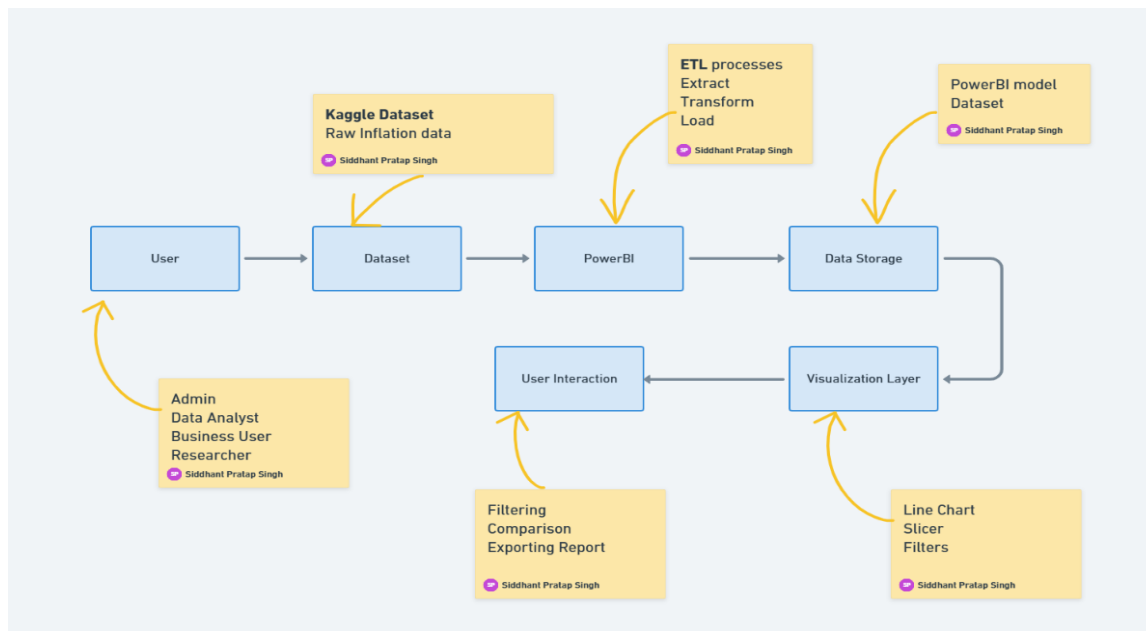
Detailed Data Flow:

1. Data Source:
   - Data has been taken from the Kaggle.

2. Data Transformation:
   - Cleaning of data.
   - Handling missing values from the data.
   - Implementing DAX queries.

3. Data Storage:
   - Processed data is stored in the PowerBI model.

4. Visualization:
   - User interact with Charts, KPI , Cards , Slicers etc.

This data flow establishes a streamlined process for efficient data handling and visualization. By integrating data from multiple sources, cleaning and standardizing it, and presenting it through interactive Power BI dashboards, the system ensures accurate analysis and meaningful insights. Additionally, maintaining data integrity and usability throughout the process enhances decision-making for policymakers, businesses, and investors.

3.4 Technology Stacks

S.No	Component	Description	Technology
1.	Data Source Layer	Source of raw inflation data	Kaggle Dataset (CSV, Excel, SQL)
2.	ETL Layer	Extract, clean, and transform data	Power Query in Power BI
3.	Storage Layer	Stores processed data for visualization	Power BI Data Model
4.	Analytics Layer	Performs calculations and analysis	DAX (Data Analysis Expressions)
5.	Processing Engine	Processes queries and optimizes performance	Power BI Engine
6.	Visualization Layer	Displays insights using charts and filters	Power BI Dashboard (Line Charts, Slicers, Reports)
7.	User Interface	Provides access to dashboards and reports	Power BI Desktop, Power BI Service (Web), Power BI Mobile

4.PROJECT DESIGN

The design phase plays a crucial role in building an effective and user-friendly Power BI dashboard for global inflation analysis. It involves structuring the system to handle complex datasets, perform accurate analysis, and provide interactive visualizations. The design focuses on data integration from multiple sources, data transformation, and the development of meaningful dashboards that offer actionable insights.

4.1 Problem Solution Fit

The primary challenge in global inflation analysis is managing diverse data sources, handling inconsistencies, and providing real-time insights for decision-makers. Traditional methods often lack the capability to offer interactive visualizations and deep data-driven insights.

The Power BI dashboard addresses these issues by:

- Integrating data from multiple global sources like World Bank, IMF, and RBI.

- Cleaning and standardizing data to remove duplicates and inconsistencies.

- Offering dynamic filters and slicers for real-time data analysis.

- Providing interactive visualizations for better understanding of inflation trends and forecasts.

This solution aligns perfectly with the problem, enabling policymakers, businesses, and investors to make informed decisions.

4.2 Proposed Solution

The proposed solution leverages Power BI's advanced data analytics and visualization capabilities to create an interactive dashboard that provides comprehensive insights into global inflation patterns.

Key Features of the Proposed Solution:

1. **Data Collection & Integration:** Aggregating data from multiple sources for a holistic view.

2. **Data Cleaning & Transformation:** Removing errors and standardizing data formats.

3. **Interactive Visualizations:** Line charts, bar graphs, and slicers for country-wise and time-based analysis.

4. **Real-Time Monitoring:** Tracking inflation trends and identifying potential risks.

5. **User Access Control:** Secure login with role-based access for different users.

By implementing this solution, stakeholders can efficiently navigate inflation-related challenges, identify market trends, and make data-driven decisions for future planning.

4.3 Solution Architecture
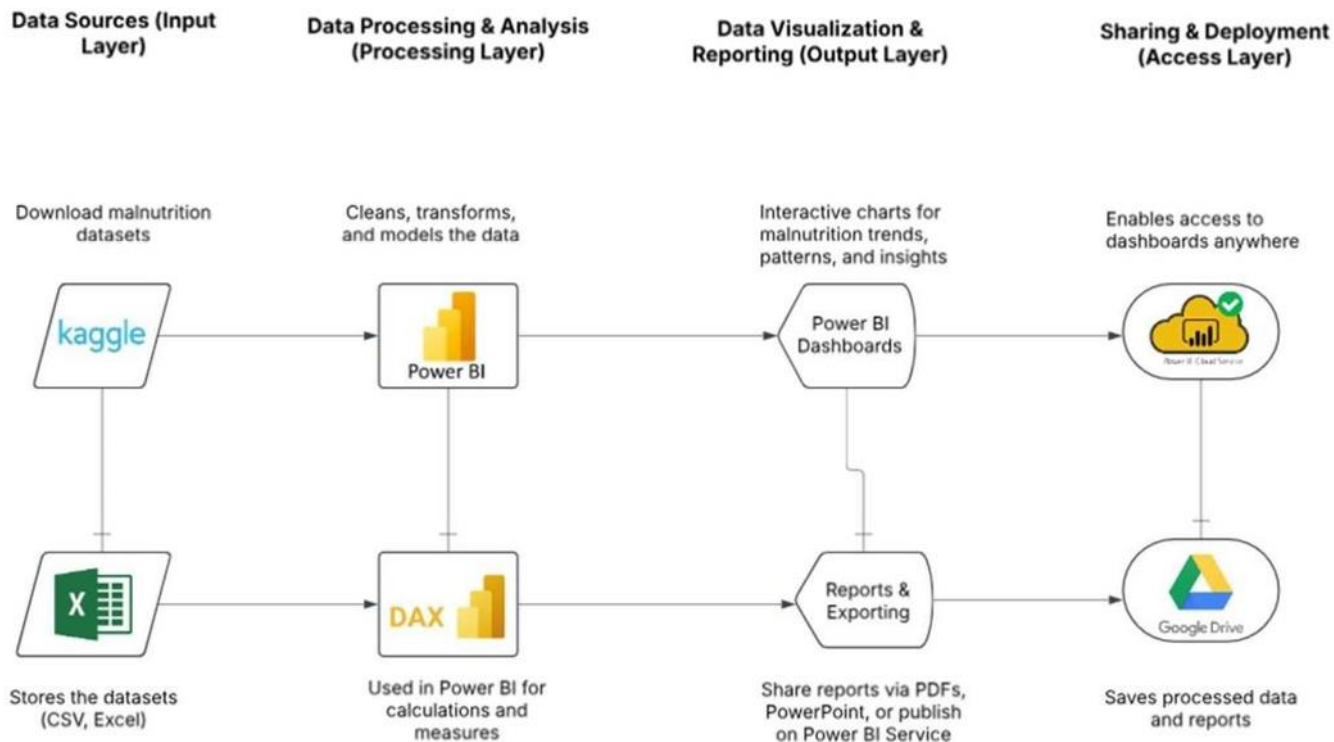
- Smooth data flow from multiple sources.
- Improved data accuracy and consistency.
- Real-time monitoring and forecasting of inflation trends.
- Secure access control and data protection.
- User-friendly and interactive interface for better decision-making.

5. PROJECT PLANNING & SCHEDULING

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	Registration	2	High	Nitish Kumar Singh
Sprint-1	Data Collection	USN-2	Collect the data Loading Data	1	High	Siddhant Pratap Singh
Sprint-2	Data Processing	USN-3	Transforming of data	2	Low	Priti Singh
Sprint-1	Data Visualization and Development	USN-4	Visualization of data Creating Interactive Dashboards	3	Medium	Saloni
Sprint-1	Project Documentation and Demonstration	USN-5	Record explanation Video for project end to end solution	1	High	Siddhant Pratap Singh
Sprint-2	Project Documentation and Demonstration	USN-6	Project Documentation/Report Creation	4	High	Nitish Kumar Singh

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	9	3 Days	07 Feb 2025	10 Feb 2025	9	10 Feb 2025
Sprint-2	7	1 Days	10 Feb 2025	11 Feb 2025	7	11 Feb 2025
Sprint-3	13	2Days	11 Feb 2025	13 Feb 2025	13	13 Feb 2025

Velocity:

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

3. Velocity Calculation:

Sprint 1 = 9 Story Points

Sprint 2 = 7 Story Points

Sprint 3 = 13 Story Points

Total Story Points = 9 + 7 + 13 = 29

Number of Sprints = 3

Velocity = Total Story Points Completed / Number of Sprints

14

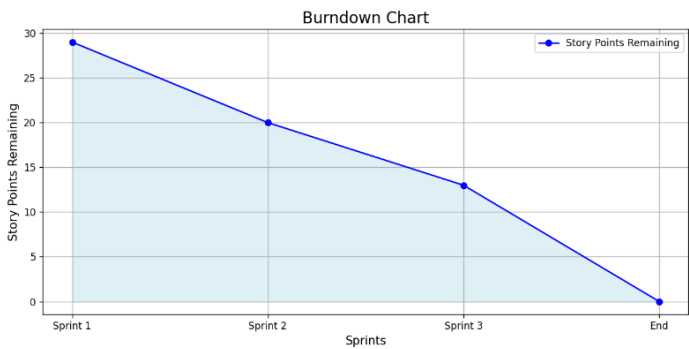Velocity = 29 / 3 ≈ 9.67 Story Points per Sprint

4. Burndown Chart:

This should reflect the completion of story points over time for each sprint. Based on the data:

Sprint 1: Story points completed: 9

Sprint 2: Story points completed: 7
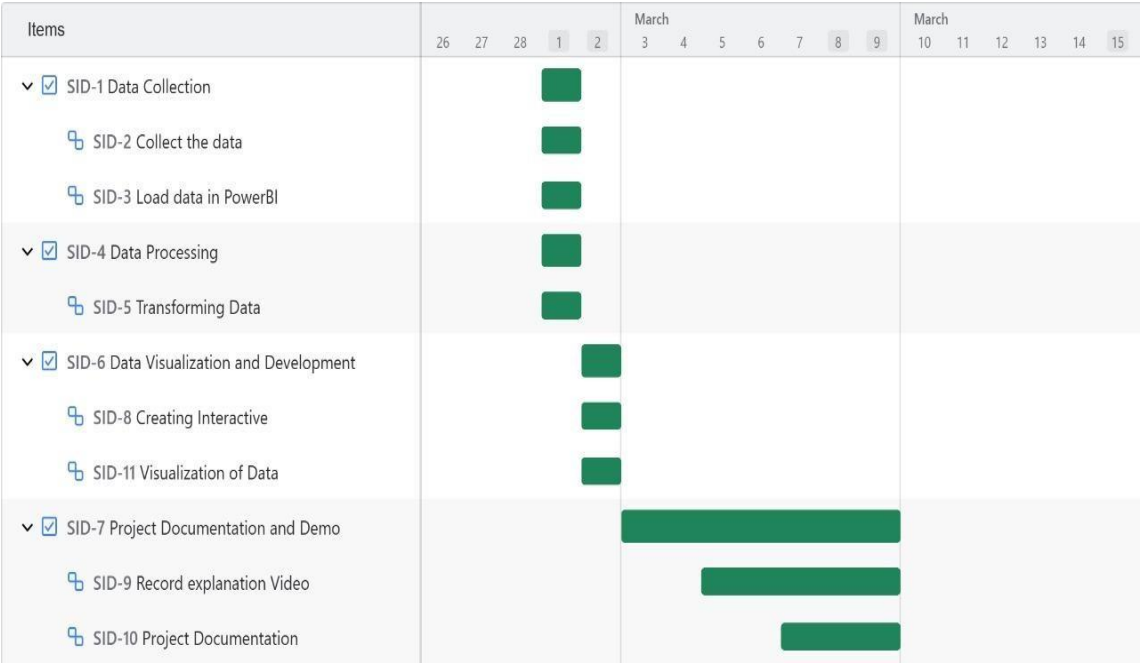
Sprint 3: Story points completed: 13

5. Timeline:

The timeline of the project runs as follows:

Sprint 1: 07 Feb 2025 - 10 Feb 2025

Sprint 2: 10 Feb 2025 - 11 Feb 2025

Sprint 3: 11 Feb 2025 - 13 Feb 2025

6.FUNCTIONAL & PERFORMANCE TESTING

S.No.	Parameter	Screenshot / Values

1.	Data Rendered	Tables Taken:
		
		• Global Inflation Data Table:
		
		  - Columns: 10
		
		  - Rows: 1500
		
		• Country Inflation Analysis Table:
		
		  - Columns: 15
		
		  - Rows: 800

2.	Data Preprocessing	• Error Handling: Replaced missing or erroneous inflation rates with a default value (0 or mean). • Data Types: Changed data types for columns like inflation rate, GDP growth,unemployment rate, etc., in both tables.
3.	Utilization of Data Filters	Filters Used:- • Top N: Top 5 countries by inflation in a clustered bar chart. • Date Range: Filter for Yearly inflation rate trends.

4.	DAX Queries Used	Here are some relevant DAX queries for inflation data analysis:
		
		• Average_Inflation = AVERAGE('Global Inflation Data'[Inflation Rate])
		
		• Total_Unemployment = SUM('Country Inflation Analysis'[Unemployment Rate])
		
		• YoY_Inflation_Change = VAR PrevYear = CALCULATE(AVERAGE('Global Inflation Data'[Inflation Rate]),
		
		  PREVIOUSYEAR('Global
		
		  Inflation Data'[Year]))

		RETURN AVERAGE('Global Inflation Data[Inflation Rate]) – PrevYear • GDP_Per_1000 = ([GDP] / 1000) * [Inflation Rate] * 1000

5.	Dashboard design	• Number of Visualizations / Graphs:
		
		  - Card – Sum of Global GDP
		
		  - Card – Average Global Inflation Rate
		
		  - Line Chart – Top 5 Countries by Annual Inflation Rate
		
		  - Clustered Bar Chart – Yearly Inflation Rate by Region
		
		  - Map – Global Inflation Rates by Country
		
		  - Slicer – Year and Country for deeper analysis.

6.	Report Design	• Visualizations / Graphs:
		
		  - Card – Sum of Global Inflation
		
		  - Card – Average Unemployment Rate
		
		  - Line Chart – Inflation Trends Over Time
		
		  - Clustered Bar Chart – Inflation vs Unemployment Rate
		
		  - Map – Country-wise Inflation Distribution
		
		  - Slicer – Year and Country
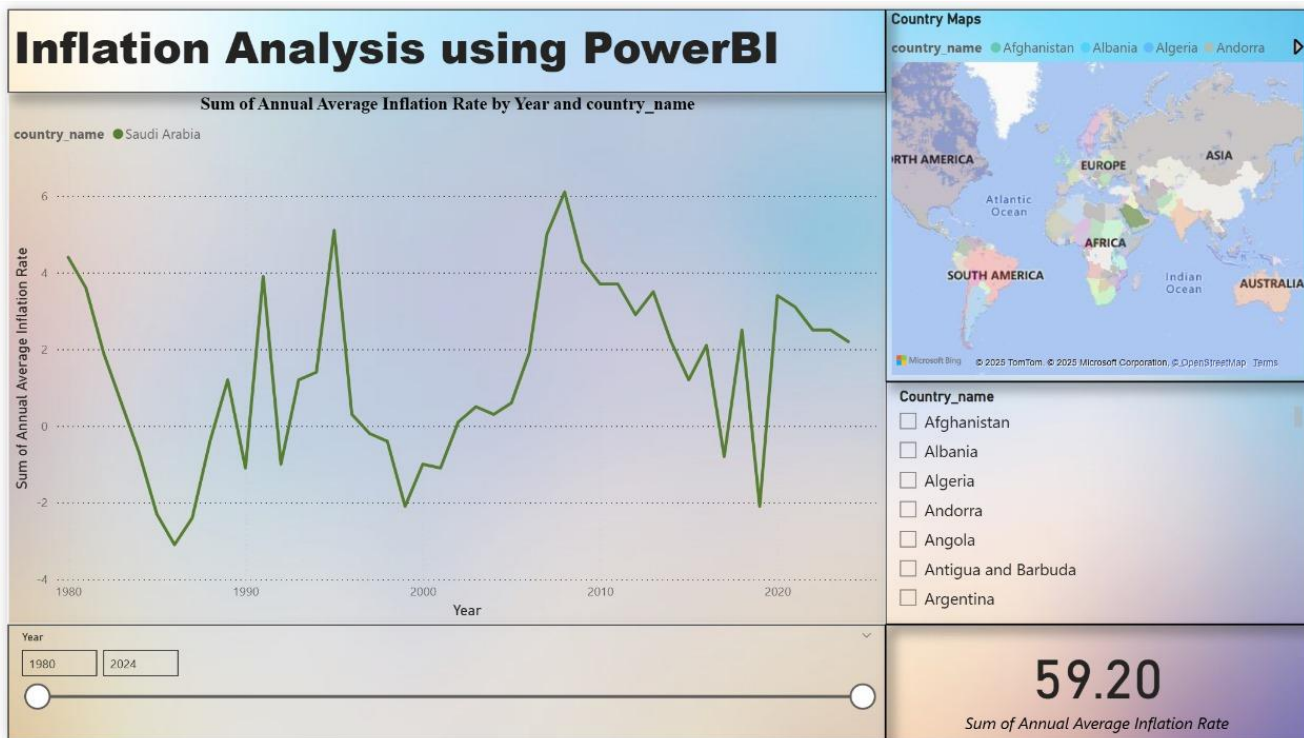
Key Insights:

1. **Inflation Trend Analysis:**

    o   The line chart shows the fluctuation in the **Annual Average Inflation Rate** for **Saudi Arabia** from **1980 to 2024**.

    o   The trend indicates periods of high inflation spikes followed by a decline, reflecting economic instability at certain intervals.

2. **Geographical Insights:**

    o   The **Country Map Visual** allows for selecting and comparing inflation rates across multiple countries like Afghanistan, Algeria, and Angola.

    o   This feature helps in identifying regional inflation patterns and economic conditions.

3. **Total Inflation Rate:**

    o   The **Total Inflation Rate** across the selected period and regions is **59.20%**, which is a cumulative metric indicating the overall inflation impact.

4. **Time-Specific Analysis:**

    o   The **Year Slicer** enables selecting specific years or a range of years for detailed analysis, helping policymakers and analysts focus on specific economic events.

5. **Predictive Modelling Opportunity:**

   o With historical data from 1980 to 2024, machine learning models can be integrated to forecast future inflation trends.

6. **Policy Impact Measurement:**

   o By correlating inflation rates with policy changes, tax reforms, or interest rate adjustments, governments can assess the effectiveness of economic strategies.

8. Advantages and Disadvantages

Advantages

1. Enhanced Decision-Making: Provides actionable insights for policymakers, businesses, and investors.

2. Comprehensive Data Visualization: Offers an interactive dashboard for better understanding of inflation trends.

3. Real-Time Analysis: Supports live data integration for timely decision-making.

4. User-Friendly Interface: Simplifies complex data for easy interpretation.

5. Scalability: Can be expanded to incorporate additional data sources and regions.

Disadvantages

1. Data Standardization Issues: Inconsistent reporting methods across regions can affect accuracy.

2. Limited Historical Data: Scarcity of past data may hinder long-term trend analysis.

3. Complex Economic Interdependencies: Analyzing global economic relationships can be challenging.

4. Dependency on Data Sources: Quality and availability of data from external sources may impact performance.

5. Technical Expertise Required: Users need knowledge of Power BI for effective use.

9. CONCLUSION

The "Power BI Inflation Analysis: Journeying Through Global Economic Terrain" project successfully leverages Power BI's analytical capabilities to provide comprehensive insights into global inflation trends. Through data collection, transformation, and visualization, the dashboard enables policymakers, businesses, and investors to make informed decisions. The project addressed key challenges such as data standardization, historical data accessibility, and complex economic interdependencies. The interactive dashboard effectively visualizes inflation rates, allowing for regional comparisons and future forecasting. Additionally, the project has paved the way for identifying critical inflation patterns and their impact on various economies, helping stakeholders navigate inflation-related challenges with greater confidence. The seamless integration of data from diverse sources and the use of advanced visualizations have significantly enhanced the analytical process, ensuring that users can make data-driven decisions with clarity and precision.

10. FUTURE SCOPE

1. **Advanced Predictive Analytics**: Incorporating machine learning models for more accurate inflation forecasting.

2. **Real-time Data Integration**: Enabling live data feeds to provide up-to-date analysis for immediate decision-making.

3. **Enhanced Geographical Analysis**: Adding more granular data at the city or regional level to understand local economic conditions.

4. **User-Centric Features**: Implementing personalized dashboards for different stakeholders, such as policymakers and business analysts.

5. **Collaboration with Global Institutions**: Partnering with organizations like the IMF and World Bank to access more diverse datasets.

6. **Mobile Compatibility**: Developing a mobile-friendly version of the dashboard for accessibility on the go.

11. Appendix

- **Dataset Link**

  https://www.kaggle.com/datasets/sazidthe1/global-inflation-data

- **Github Link**

  https://github.com/nitishxyt/EPBLProject

- **Project Demo Link**

  https://github.com/nitishxyt/EPBLProject