Project Documentation: Analysis of Inflation, GDP, and Unemployment (2014-2024)

1. Project Overview

Objective:

The objective of this project was to analyze inflation rates, unemployment rates, and GDP growth across all countries from 2014 to 2024. The analysis aimed to:

- Identify trends in inflation and how they have evolved globally.
- Understand the impact of inflation on unemployment rates.
- Explore the relationship between inflation and GDP growth.

Tools Used:

- **Excel**: For data cleaning, preparation, and Power Pivot to establish relationships.
- **Python**: For statistical analysis, correlation, and regression modeling.
- **SQL**: To query and extract specific datasets for in-depth analysis.
- **Tableau**: For creating interactive dashboards to visualize the findings.

---

2. Data Sources

We utilized three key datasets for our analysis:

1. **Inflation Rates (2014-2024)**: This dataset included historical inflation rates by country, providing a comprehensive view of inflation trends over the years.
2. **Unemployment Rates (2014-2024)**: Yearly unemployment rates across all countries, which allowed for comparisons and correlations with inflation data.
3. **GDP Growth Rates (2014-2024)**: Yearly GDP growth figures for all countries, essential for understanding economic performance relative to inflation.

Data Preparation Steps:

- **Importing Data**: All datasets were imported into **Excel** for initial cleaning and preparation.
- **Data Cleaning**:
    - Removed duplicate entries and ensured consistency in country names.
    - Addressed null values through interpolation or removal, ensuring no significant data gaps remained.
- **Standardization**: Ensured all datasets had a consistent format (e.g., year format, country names).

Data Transformation:

- **Converting Columns to Rows**:
    - Used Excel's "Power Query" to transform columns into rows for datasets where metrics were originally laid out horizontally. This normalization facilitated easier analysis.
- **Filling Missing Values**:
    - Implemented strategies to fill missing values. For instance, forward-filling or backward-filling methods were applied to ensure continuity in the data.
- **Correcting Country Names**:
    - Reviewed the country names across datasets for consistency. Any discrepancies were corrected to ensure that countries matched across all datasets, which was crucial for accurate analysis.
- **Creating 'CountryYearID' Column**:
    - Developed a unique identifier by concatenating the country name and year (e.g., "Egypt_2014"). This column was essential for establishing relationships between the datasets, allowing for seamless integration of inflation, unemployment, and GDP data.

---

3. Stages of Data Analysis

Stage 1: Ask

- **Key Questions**:
    - How have inflation rates changed globally between 2014 and 2024?
    - What is the relationship between inflation and unemployment?
    - How does inflation impact GDP growth over time?

Stage 2: Prepare

- **Data Import**:
    - Imported cleaned datasets into **Excel** for initial analysis and visualization.
- **Data Relationships**:

    - Utilized **Power Pivot** in Excel to create relationships between datasets based on the "CountryYearID" column, facilitating complex queries and analyses.
- **SQL Queries**:
    - Developed SQL queries to extract specific year-by-year and country-by-country insights, focusing on key metrics of interest:
        - `SELECT * FROM Inflation WHERE Year BETWEEN 2014 AND 2024`
        - `SELECT Country, AVG(Unemployment_Rate) FROM Unemployment GROUP BY Country`

Stage 3: Process

- **Excel Analysis**:
    - Created initial visualizations using pivot tables and charts to explore trends in inflation and unemployment.
    - Generated descriptive statistics (mean, median, standard deviation) for each dataset to understand the distributions.
- **Statistical Analysis in Python**:

Conducted correlation analysis to examine the relationship between inflation and unemployment rates:
python

```
import pandas as pd
from scipy.stats import pearsonr

inflation = pd.read_csv('inflation_data.csv')
unemployment = pd.read_csv('unemployment_data.csv')
correlation, p_value = pearsonr(inflation['Rate'],
unemployment['Rate'])
```

    -
- **Regression Modeling**:

Built regression models to predict unemployment based on inflation rates, using Python's scikit-learn library:
python

```
from sklearn.linear_model import LinearRegression

model = LinearRegression()
model.fit(inflation[['Rate']], unemployment[['Rate']])
predictions = model.predict(inflation[['Rate']])
```

    -

- **Data Querying in SQL**:
    - Conducted detailed queries to extract aggregates and insights from the datasets, focusing on year-over-year changes and regional breakdowns.

Stage 4: Analyze

- **Visualization in Excel**:
    - Developed line charts and bar graphs to visualize inflation trends, unemployment rates, and GDP growth.
    - Created comparative charts to observe relationships and trends over the years.
- **Tableau Dashboard Creation**:
    - Constructed interactive dashboards in Tableau to visualize findings. The dashboards allowed for filtering by country, year, and region to provide dynamic insights.

---

4. Dashboards in Excel And Tableau

Dashboard 1: Relations – Comparison Report

- **Visualizations**:
    - **The Relationship Between Inflation and Economic Growth**: Displayed a scatter plot with a trend line.
    - **The Relationship Between Unemployment and Inflation**: Another scatter plot with a focus on correlation.
    - **Regional Comparison of Inflation and Economic Growth**: Bar graphs showing regional averages.
    - **Yearly Changes in Inflation, Economic Growth, and Unemployment**: Line charts depicting trends over the years.
- **Insights**:
    - Provided a holistic view of how these economic indicators interact over time.

Dashboard 2: Inflation

- **Visualizations**:
    - **TRENDING AVG INFLATION RATE**: Line chart showing average inflation trends across all countries.
    - **Top Country with the Highest Inflation Rate**: A bar chart displaying the countries with the highest inflation.
    - **Average Inflation by Continent**: Pie chart or bar chart summarizing inflation averages by continent.
    - **Top 10 Countries with the Highest Inflation Rates**: Ranked bar chart.
- **Insights**:

    - Clearly identified the regions and countries experiencing the most significant inflationary pressures.

Dashboard 3: GDP

- **Visualizations**:
    - **TRENDING AVG GDP GROWTH RATE**: Line chart depicting GDP growth trends.
    - **Top Country with the Highest GDP Growth Rate**: Bar chart showing top performers.
    - **Average GDP Growth by Continent**: Comparison chart for continents.
    - **Top 10 Countries with the Highest GDP Growth Rates**: Ranking visualization.
- **Insights**:
    - Allowed stakeholders to see economic growth patterns across different regions and identify leading economies.

Dashboard 4: Unemployment

- **Visualizations**:
    - **TRENDING AVG UNEMPLOYMENT RATE**: Line chart of unemployment trends.
    - **Top Country with the Highest Unemployment Rate**: Bar chart.
    - **Average Unemployment Rate by Continent**: Summary chart for continental averages.
    - **Top 10 Countries with the Highest Unemployment Rates**: Ranked bar chart.
- **Insights**:
    - Highlighted countries facing significant employment challenges, useful for policy recommendations.

Dashboard 5: Egypt

- **Visualizations**:
    - **Yearly Changes in Inflation**: Line chart showing inflation trends specifically for Egypt.
    - **Yearly Changes in GDP**: Line chart for GDP changes.
    - **Yearly Changes in Unemployment**: Line chart for unemployment rates.
    - **Average Unemployment Rate by Sex**: Bar chart comparing male and female unemployment rates.
    - **Yearly Changes in Inflation, Economic Growth, and Unemployment**: Combined line chart for all three metrics.
- **Insights**:
    - Provided a comprehensive overview of Egypt's economic performance and gender disparities in unemployment.

---

5. Analysis and Insights

Inflation:

- Identified significant trends in inflation rates, with some regions experiencing high volatility.
- Correlation analysis indicated that inflation often influenced unemployment rates, especially in developing economies.

Unemployment:

- The analysis revealed that countries with high inflation generally faced increased unemployment.
- Notable cases of stagflation were observed, where inflation and unemployment both rose significantly.

GDP Growth:

- The correlation between GDP growth and inflation varied; however, generally, high inflation negatively impacted GDP growth.
- Countries with stable inflation rates showed consistent GDP growth, underscoring the importance of economic stability.

Egypt-Specific Insights:

- Analysis of Egypt's economic indicators revealed fluctuations, with inflation impacting both GDP and unemployment.
- The gender-based analysis highlighted disparities in employment opportunities between men and women, informing potential policy interventions.

---

6. Conclusion

This project provided a thorough analysis of inflation, unemployment, and GDP growth from 2014 to 2024 using a combination of **Excel**, **Python**, **SQL**, and **Tableau**. The interactive dashboards allowed for detailed exploration of the data, revealing key insights into the relationships between these economic indicators.

The dashboards and analyses can be used for further research, policymaking, and economic forecasting, with implications for both national and international economic strategies.

---

7. Next Steps

- Further exploration of the impact of other economic