# DYNAMIC VISUAL ANALYTICS ON INFLATION USING TABLEAU

Submitted in partial fulfillment of the
requirements for the award of
Bachelor of Engineering degree in Computer Science and Engineering

By

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**SCHOOL OF COMPUTING**

# SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY**
**(DEEMED TO BE UNIVERSITY)**
**Accredited with Grade "A" by NAAC | 12B Status by UGC | Approved by AICTE**
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**BONAFIDE CERTIFICATE**

This is to certify that this Project Report is the bonafide work of **S Joshi V V Satyanarayana Murthy (Reg.No - 39110911) and Divvela Krishna Chaitanya (Reg.No - 39110282)** who carried out the Project Phase-2 entitled **"DYNAMIC VISUAL ANALYTICS ON INFLATION USING TABLEAU"** under my supervision from January 2023 to April 2023.

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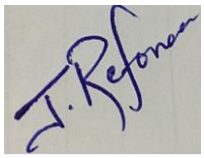
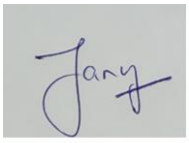
**Submitted for Viva voce Examination held on 19.4.2023**





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## DECLARATION

I, **S Joshi V V Satyanarayana Murthy (Reg.No- 39110911) & Divvela Krishna Chaitanya (Reg.No- 39110282),** hereby declare that the Project Phase-1 Report entitled "**DYNAMIC VISUAL ANALYTICS ON INFLATION USING TABLEAU"** done by me under the guidance of **Mr. SATHIYA PRASAD** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in **Computer Science and Engineering**.

**DATE: 19.4.2023**

**PLACE: Chennai** **SIGNATURE OF THECANDIDATE**

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## ABSTRACT

This Project surveys the existing literature on the relationship between inflation and economic growth in developed and developing countries, highlighting the theoretical and empirical indications. The study finds that the impact of inflation on economic growth varies from country to country and over time. The study also finds that the results from these studies depend on country-specific characteristics, the data set used, and the methodology employed. On balance, the study finds overwhelming support in favour of a negative relationship between inflation and growth, especially in developed economies. However, there is still much controversy about the specific threshold level of inflation that is appropriate for growth. Most previous studies on this subject just assume a unidirectional causal relation- ship between inflation and economic growth. To our knowledge, this may be the first review of its kind to survey, in detail, the existing research on the relationship between inflation and economic growth in developed and developing countries.

The US and world have experienced soaring inflation for many months. What caused such excessive inflation and how should it be managed? Will current high inflation destroy the US and world economies and lead to a great depression? This Project provides the comprehensive review and analysis of inflation and its effects to answer these questions. Economic and finance theories are applied to explain how the equilibrium prices of products and services are determined and then changed to lead to inflation or deflation and why the currency exchange rate must be adjusted when an economy's relevant inflation rate is changed. The Project theoretically and empirically discusses the relationship of inflation with economic growth, unemployment, international trade, interest rates, and exchange rates, and explores the effects of inflation on individuals and investments. In addition, it examines whether government inflation targeting has been effective. The Project uses the latest US and world data in the analysis to support the relevant conclusions; the correlations of some variables from the US are calculated and significance tests are conducted. The paper projects that there may be a minor economic recession if the current high inflation lasts extensively but the US and world can avoid an economic crisis if take strong and effective actions to control and reduce the present high inflation. More importantly, it is essential that the world learns and knows how to prevent and avoid the next high inflation cycle. Particularly, the world should aim at reforming the existing economic and financial systems to be more inclusive and sustainable, solving the rising income and wealth inequality problem and better developing and using the new technologies that can benefit all more equally, improve environment, further enhance efficiency and continuously raise productivity.

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# CHAPTER 1

# INTRODUCTION

Inflation is a dangerous disease that can destroy society as Nobel Economics Laureate Milton Friedman (1942, 1969) repeatedly warned. High inflation is more harmful to consumers and the whole economy because it will significantly raise the product and service prices and lowers the people's purchasing power so considerably below their current living standards. Sharp inflation also causes higher interest rates that may further lead to slower economic growth. Historically, excessive inflation and especially extremely abnormal inflation often triggered social unrest and even led to dramatic regime changes. Currently, the world has experienced soaring inflation. In the US, its monthly Consumer Price Index (CPI) was 8.3% in August, following 8.5% in July, 9.1% in June 2022, highest since 1981, 8.6% in May, 8.3% in April and 8.5% in March. Figure 1 is the monthly US inflation rates from January, 2000 to August 2022. Many developed economies had inflation rates of above 8% while average inflation of emerging and developing economies was 8.7%, according to the International Monetary Fund (IMF). Such wide, persistent and excessive inflation is grave. More troubling is that the trend of dark inflation will not disappear soon.

What are the effects of high inflation on individuals and the whole economy? What causes abnormal inflation? When should inflation be defined as high versus extremely high? For example, will 5% or 8% be considered too high? Are government inflation targeting and its relevant policies effective in controlling dramatic price rises? What are the possible solutions to reduce the current accelerating prices? These are important questions and issues. Particularly, people are worried whether the current high inflation will destroy the US and world economies and lead to a great depression. Although the US has had two consequent quarters with negative GDP growth, -1.6% in the first quarter and-0.9% in the second quarter in 2022, the National Bureau of Economic Research (NBER) has not officially declared recession since the process for declaring the U.S. economy does not fall simply on negative GDP reports. Instead, the NBER defines recession as "a significant decline in economic activity that is spread across the economy and that lasts more than a few months." Furthermore, an economic crisis is a more serious economic deterioration, a drastic fall in the economic performance with a decline in production and demand, rising unemployment and bankruptcy of businesses (Chen 2019). This paper conducts comprehensive reviews of theoretical and empirical studies on inflation and its effects to answer these questions. Instead of giving a general review of literature in one section, all relevant previous studies are reviewed in different sections, based on the subject. Besides discussions of previously published studies, the paper also uses the US and world's latest data in the analysis to support relevant conclusions, the correlations of some variables from the US are calculated

and significance tests are conducted This project is different from other similar ones. Previous inflation review projects mostly focused on the relationship between inflation and economic growth. This review is more comprehensive and it in addition examines its relationship with unemployment, interest rates, international trade, and exchange rates, and explores its effects on individuals and investments. Moreover, it discusses whether government inflation targeting and its relevant policies have been effective, what caused recent high inflation, and how to better control it. The paper concludes that it is confident to say that the US and world will be able to control and reduce the present sharp inflation. However, it is essential that the world learns and knows how to prevent and avoid the next high inflation cycle.

# CHAPTER 2

# LITERATURE SURVEY

Driffill, Mizon and Ulph (1990) and Woodford (1990) provide surveys of the theoretical and empirical literature on the costs and benefits of inflation. Unfortunately, the only conclusion that comes close to achieving a consensus is that inflation variability per se is harmful and that central banks should stabilise the inflation rate to the extent that they can without inducing costly variability in other economic variables. No consensus exists on the optimal steady-state rate of inflation.

Fischer (1990) surveys the literature on the institutional framework of monetary policy and the determination of the long-run inflation rate. The treatment is purely theoretical and focuses on the issue of 'rules versus discretion'. A basic conclusion is that a pure rule-based policy has not existed since the Gold Standard, and many would argue that even under the Gold Standard there was a substantial discretionary aspect to monetary policy. One drawback of discretionary policy setting is that no one has designed an institutional framework that indisputably avoids the potential inflationary bias created by the time inconsistency problem.

More recently, attention has focused on the adoption of explicit inflation targets by a number of central banks. Walsh (1995) discusses the circumstances under which explicit inflation targets and enforcement clauses in the central bank governor's contract are optimal. For a brief review of the international policy debate, see International Monetary Fund (1996). At this stage it appears to be too soon to conclude much about the desirability and durability of inflation targeting.

Empirical analyses of the long-run properties of inflation rates have generally occurred in the context of the real interest rate literature. See, for example, Rose (1988) and Mishkin (1992). Using data from the entire post war period, one cannot reject a unit root in inflation for most industrial countries using standard Augmented Dickey-Fuller tests. However, for many countries one can reject non-stationarity of the inflation rate in certain subsamples.

Hassler and Wolters (1995) and Baillie, Chung and Tieslau (1996) use the Phillips-Perron test and the KPSS test on post war monthly inflation rates and reject both a unit root and stationarity for several countries. To reconcile these conflicting findings they turn to models with 'fractional integration' and find that they are strongly supported by the data. Fractional integration allows for slow mean reversion that

does not decay as rapidly as the asymptotically exponential pattern associated with standard autoregressive-moving average models. This slow mean reversion is termed ‘long memory’.

Other researchers have sought to explain the apparent non-stationarity of inflation as the result of regime shifts in the mean and variability of the inflation rate. Chapman and Ogaki (1993), Bai and Perron (1995) and Hostland (1995) find significant evidence of regime shifts in US, UK, and Canadian inflation. Evans and Lewis (1995), Ricketts and Rose (1995) and Simon (1996) estimate Markov-switching models for inflation in the G7 countries and Australia. At least two regimes are significant in all countries except Germany.

Occasional shifts in the inflation regime are more economically interpretable than fractional integration. Moreover, if there are only a small number of regimes that cycle back and forth, or if the regime-generating process is stationary, inflation rates will appear to have long memory, which is consistent with the fractional integration literature.

Investor Words 2015 stated that inflation is the increase in the general price level of goods and services in economy, normally caused by excess supply of money. Inflation usually measured by the Consumer Price Index (CPI). When the cost of producing goods and services goes up, the purchasing power of dollar will decrease. A customer will not be able to purchase the same goods and services as he/she previously could. Inflation rate of 1-2% per year are acceptable and even desirable in some ways (Investopedia, 2015). If the inflation rate goes up higher than 3% per year, it might be dangerous as the currency will devalue. According to (Forbes, 2014) the country with the highest rate of inflation is Venezuela, with current inflation rate of 57.30%. There are different types of inflation which are cost-push and demand-pull inflation (Investopedia, 2015). Cost-push inflation happens when we face higher prices due to the increase in cost of production and higher costs of raw materials. It is determined by supply side factors. Cost-push inflation can be caused by higher price of commodities, imported inflation, higher wages, higher taxes and higher food prices (EconomicsHelp,2011).

## 2.1 INFERENCES FROM LITREATURE SURVEY

It may be one of the most familiar words in economics. Inflation has plunged countries into long periods of instability. Central bankers often aspire to be known as “inflation hawks.” Politicians have won elections with promises to combat inflation, only to lose power after failing to do so. Inflation was even declared Public Enemy No. 1 in the United States—by President Gerald Ford in 1974. What, then, is inflation, and why is it so important?

Inflation is the rate of increase in prices over a given period of time. Inflation is typically a broad measure, such as the overall increase in prices or the increase in the cost of living in a country. But it can also be more narrowly calculated—for certain goods, such as food, or for services, such as a haircut, for example. Whatever the context, inflation represents how much more expensive the relevant set of goods and/or services has become over a certain period, most commonly a year.

Research exploring the existence of significant macroeconomic effects induced by the shift to the new monetary policy rule. The distinctive feature of this literature is the lack of a direct credibility assessment, while no explicit theoretical framework underlies the empirical analysis.

Contributions focusing more directly on the assessment of inflation targeting credibility. Differently from the former group, this research usually relies on some relevant theoretical relationship such as the Fisher equation, the term structure of interest rates, or the “marginal credibility concept as defined in Cukierman-Meltzer (1986).

## 2.2 OPEN PROBLEMS IN EXISTING SYSTEM

The main causes of inflation can be grouped into three broad categories:

1.demand-pull,

2.cost-push,

3.inflation expectations.

As their names suggest, ‘demand-pull inflation’ is caused by developments on the demand side of the economy, while ‘cost-push inflation’ is caused by the effect of higher input costs on the supply side of the economy. Inflation can also result from ‘inflation expectations’ – that is, what households and businesses think will happen to prices in the future can influence actual prices in the future. These different causes of inflation are considered by the Reserve Bank when it analyses and forecasts inflation.

**1.Demand-pull inflation**

Demand-pull inflation is a type of inflation that occurs when the total demand for goods and services, known as aggregate demand, exceeds the supply of goods and services that can be sustainably produced, known as aggregate supply. When this happens, the excess demand puts upward pressure on prices across a broad range of goods and services, leading to an increase in inflation. Hence, it "pulls" inflation higher.

Aggregate demand can increase for several reasons, such as an increase in spending by consumers, businesses, or the government, or an increase in net exports. This increase in demand for goods and services, relative to their supply, provides scope for firms to increase prices and their margins, which is their mark-up on costs. At the same time, firms will need to hire more workers to meet this extra demand. With increased demand for labor, firms may have to offer higher wages to attract new staff and retain their existing employees. In turn, firms may also increase the prices of their goods and services to cover their higher labor costs.

When more jobs are created and wages increase, household incomes also rise, which leads to a rise in consumer spending, further increasing aggregate demand and the scope for firms to increase the prices of their goods and services. When this

happens across a large number of businesses and sectors, it leads to an increase in inflation.

On the other hand, when aggregate demand decreases, firms facing lower demand may either pause hiring or make staff redundant, which means that fewer workers are required. This puts upward pressure on the unemployment rate. With more workers searching for jobs, firms can offer lower wages, putting downward pressure on household incomes, consumer spending, and the prices of their goods and services. As a result, inflation decreases.

The supply of goods and services that can be sustainably produced is also known as the economy's potential output or full capacity. At this level of output, factors of production, such as labor and capital, which includes the machines and equipment firms use to produce their goods and services, are being used as intensively as possible without putting upward pressure on inflation.

When aggregate demand exceeds the economy's potential output, this will put upward pressure on prices. Conversely, when aggregate demand is below potential output, this will put downward pressure on prices. Therefore, it is important to balance the level of aggregate demand with the economy's potential output to avoid demand-pull inflation.

**2.Cost-push inflation**

Cost-push inflation occurs when the total supply of goods and services in the economy which can be produced (aggregate supply) falls, often caused by an increase in the cost of production. When aggregate supply falls but aggregate demand remains unchanged, there is upward pressure on prices and inflation – that is, inflation is ‘pushed’ higher.

One of the key causes of cost-push inflation is an increase in the price of domestic or imported inputs such as oil or raw materials. When the cost of these inputs increases, it raises the cost of production for firms. As a result, firms tend to produce a lower level of output and raise the prices of their goods and services. This can lead to flow-on effects by pushing up the prices of other goods and services. For example,

if there is an increase in the price of oil, which is a major input in many sectors of the economy, this will initially lead to higher petrol prices. However, higher petrol prices will also make it more expensive to transport goods from one location to another, which, in turn, will result in increased prices for items like groceries.

Another factor that can lead to cost-push inflation is supply disruptions in specific industries. For example, natural disasters or unusual weather can damage large volumes of agricultural produce, resulting in significant increases in the price of processed food and both takeaway and restaurant meals. This can lead to temporary periods of higher inflation.

In addition, changes in taxes and government regulations can also contribute to cost-push inflation. For example, an increase in taxes on businesses can raise their costs and reduce their profits, which may lead to a reduction in output and an increase in prices. Similarly, government regulations such as minimum wage laws or environmental regulations can increase the costs of production for firms, which may result in higher prices for consumers.

Finally, cost-push inflation can also arise from supply-side shocks such as wars, political instability, or trade disruptions. These shocks can lead to a reduction in the supply of goods and services, which can increase prices and lead to inflation. For example, a trade war between two countries can lead to tariffs and other trade barriers, which can increase the cost of production for firms and lead to higher prices for consumers.

In summary, cost-push inflation is a type of inflation that is caused by a decrease in aggregate supply due to an increase in the cost of production or other supply-side factors. It can have significant effects on the economy, including higher prices for consumers, reduced output and profits for businesses, and potentially higher levels of unemployment.

**3.Inflation expectations**

Inflation expectations play a crucial role in determining the inflation rate of an economy. Essentially, these are the anticipated future price increases that

households and firms expect to occur over time. Since people's expectations of future price movements can significantly influence current economic decisions that can impact actual inflation outcomes, it is important to understand and manage inflation expectations.

For instance, if households and firms expect inflation to rise in the future, they may take actions such as hoarding goods, buying assets like gold or property, or demanding higher wages. These behaviours, which are collectively known as "inflation psychology," can lead to higher inflation rates, and inflation expectations become self-fulfilling. As a result, it is essential to anchor inflation expectations so that they remain aligned with the central bank's inflation target.

Inflation expectations are particularly significant for central banks, as they can impact monetary policy decisions. If inflation expectations are well-anchored, monetary policymakers can use various tools to maintain stable inflation, such as adjusting interest rates or using quantitative easing to stimulate the economy.

On the other hand, if inflation expectations become unanchored, and people expect inflation to remain high in the future, it can be much harder for the central bank to manage inflation. For example, if households and firms expect inflation to remain high for an extended period, they may demand higher wages and increase their prices, leading to a persistent inflationary spiral.

Therefore, central banks must monitor inflation expectations closely and strive to keep them well-anchored to their inflation targets. If households and firms believe that the central bank will keep inflation low, they will be less likely to engage in inflationary behaviours, and inflation will remain stable. Hence, anchoring inflation expectations is essential for promoting price stability, which is an important goal of any central bank.

# CHAPTER 3
# REQUIREMENT ANALYSIS

## 3.1 FEASIBILITY STUDIES/RISK ANALYSIS OF THE PROJECT

Feasibility studies and risk analysis are critical components of any project, and they are particularly important when undertaking a project that involves dynamic visual analytics, such as the development of a Tableau dashboard to analyze inflation data. A feasibility study involves assessing the viability of a project, taking into account factors such as technical, economic, social, and environmental considerations. A risk analysis, on the other hand, involves identifying potential risks and developing strategies to mitigate or manage them.

The first step in conducting a feasibility study for a project involving dynamic visual analytics on inflation using Tableau is to identify the project goals and objectives. This will involve determining what types of data will be analyzed, what visualizations will be created, and what insights will be gained from the analysis. Once the project goals and objectives have been established, it will be necessary to determine the technical feasibility of the project. This will involve assessing the availability and quality of the data, as well as the technical capabilities of the software and hardware that will be used to develop the Tableau dashboard.

In addition to technical feasibility, economic feasibility will also need to be considered. This will involve conducting a cost-benefit analysis to determine whether the benefits of the project will outweigh the costs. The cost-benefit analysis will need to take into account factors such as the cost of acquiring and analyzing the data, the cost of developing the Tableau dashboard, and the potential economic benefits of the insights gained from the analysis.

Social and environmental considerations will also need to be taken into account during the feasibility study. For example, it will be important to consider whether the analysis of inflation data could have any unintended consequences, such as exacerbating income inequality or environmental degradation. Strategies to mitigate these risks may need to be developed as part of the project plan.

Once the feasibility study has been completed, a risk analysis will need to be conducted. The risk analysis will involve identifying potential risks that could impact the success of the project, such as data quality issues or technical problems with the software. Strategies to manage or mitigate these risks will need to be developed, such as developing contingency plans or implementing quality control measures.

In conclusion, conducting a feasibility study and risk analysis is crucial when undertaking a project involving dynamic visual analytics on inflation using Tableau. By carefully assessing the technical, economic, social, and environmental feasibility of the project, and identifying and managing potential risks, the project team can increase the likelihood of success and achieve the desired outcomes.

## 3.2 SOFTWARE REQUIREMENTS SPECIFICATION DOCUMENT

**Microsoft Excel**:

Microsoft Excel is a spreadsheet software developed by Microsoft for Windows, macOS, Android, and iOS. It is commonly used for data analysis, calculation, and organization of numeric and textual data. The software allows users to create spreadsheets, which are organized in rows and columns, and perform various operations on the data within them, such as mathematical calculations, sorting, filtering, and charting. Excel also provides tools for data visualization, such as graphs, charts, and tables, which allow users to easily interpret and analyze the data. Additionally, Excel can be used to automate repetitive tasks and create macros using Visual Basic for Applications (VBA). It is widely used in many fields, including business, finance, engineering, and research. Enables users to format, organize and calculate data in a spreadsheet. By organizing data using software like Excel, data analysts and other users can make information easier to view as data is added or changed. Excel contains a large number of boxes called cells that are ordered in rows and columns.

**Tableau**:

Helps organizations be more data-driven As the market-leading choice for modern business intelligence, this analytics platform makes it easier for people to explore and manage data, and faster to discover and share insights that can change businesses

and the world

Tableau is a powerful data visualization and business intelligence software that allows users to easily connect, visualize, and share data in a way that makes it easier to understand and analyze. Tableau enables users to create interactive dashboards, charts, graphs, and maps, among other data visualizations, to help make better data-driven decisions.

Tableau provides a wide range of features and capabilities that make it suitable for a variety of use cases, including data discovery and exploration, data analysis, and reporting. It can connect to a wide range of data sources, including spreadsheets, databases, and cloud-based data services, and allows users to blend data from different sources to create a complete view of their data.

One of the key features of Tableau is its drag-and-drop interface, which allows users to easily create visualizations without requiring any coding or programming skills. Tableau also provides a range of built-in charts and graphs, as well as the ability to create custom visualizations using JavaScript and other programming languages.

In addition to its visualization capabilities, Tableau also provides advanced analytics features, such as data forecasting, statistical analysis, and machine learning. It also includes features for collaboration and sharing, such as the ability to publish dashboards to the web or embed them in other applications.

Overall, Tableau is a highly versatile and powerful tool for data visualization and analysis, with a user-friendly interface and a range of features that make it suitable for a wide range of users, from beginners to advanced analysts and data scientists.

# CHAPTER 4

# DESCRIPTION OF PROPOSED SYSTEM

The proposed system for the project of dynamic visual analytics on inflation using Tableau is a comprehensive data analysis and visualization tool designed to help users understand the complex trends and patterns in inflation. The system is built using Tableau, a powerful data visualization software that enables users to create interactive and dynamic dashboards, reports, and charts that are easy to understand and interpret.

The proposed system will consist of several components, including data sources, data processing, and data visualization. The data sources will include historical and current data on inflation rates from various sources, such as government agencies, central banks, and financial institutions. The data processing component will involve cleaning and transforming the data to prepare it for analysis and visualization.

The core of the proposed system is the data visualization component, which will utilize the full capabilities of Tableau to create dynamic and interactive visualizations that enable users to explore and analyze inflation trends in real-time. The system will allow users to customize their visualizations based on their specific needs and preferences, such as selecting different time periods, regions, and inflation measures.

The proposed system will also feature several advanced analytical tools that will allow users to conduct in-depth analysis of inflation trends. These tools will include forecasting models, trend analysis, and correlation analysis, among others.

One of the key advantages of the proposed system is its user-friendliness. The system will be designed to be intuitive and easy to use, even for users who do not have a background in data analysis or visualization. The system will feature a simple and user-friendly interface, and the visualizations will be presented in an easy-to-understand format that can be accessed by users with different levels of expertise.

Overall, the proposed system for dynamic visual analytics on inflation using Tableau

is a powerful tool that will enable users to gain valuable insights into inflation trends and patterns. The system will provide users with the ability to make informed decisions based on real-time data and analysis, which can have significant impacts on their business or investment strategies.

Tableau Dashboards are a collection of various views or visualizations, each of which displays a distinct type of data at the same time. It provides customers with a comprehensive picture of all data on a single screen. It's as simple as dragging views from the sheets section to the visualization area to create a dashboard.i

Creating or building a dashboard entails more than just including Tableau's visualization tools. A dashboard should have the most relevant data that is suited for a user's rapid intake of information. Tableau includes several interactive techniques, like as tooltips and filters. Using these without cluttering the viewable area will result in a nice dashboard experience. The Tableau Dashboard tab is the default, and it allows you to alter the majority of the dashboard. Using the layout tab, we can change the proportions and positioning of individual dashboard components. All sizes on the Layout tab are in pixels.

The Device Preview option allows you to see how the dashboard will appear on different devices, and you can even save alternate versions of the dashboard that look different depending on the device.

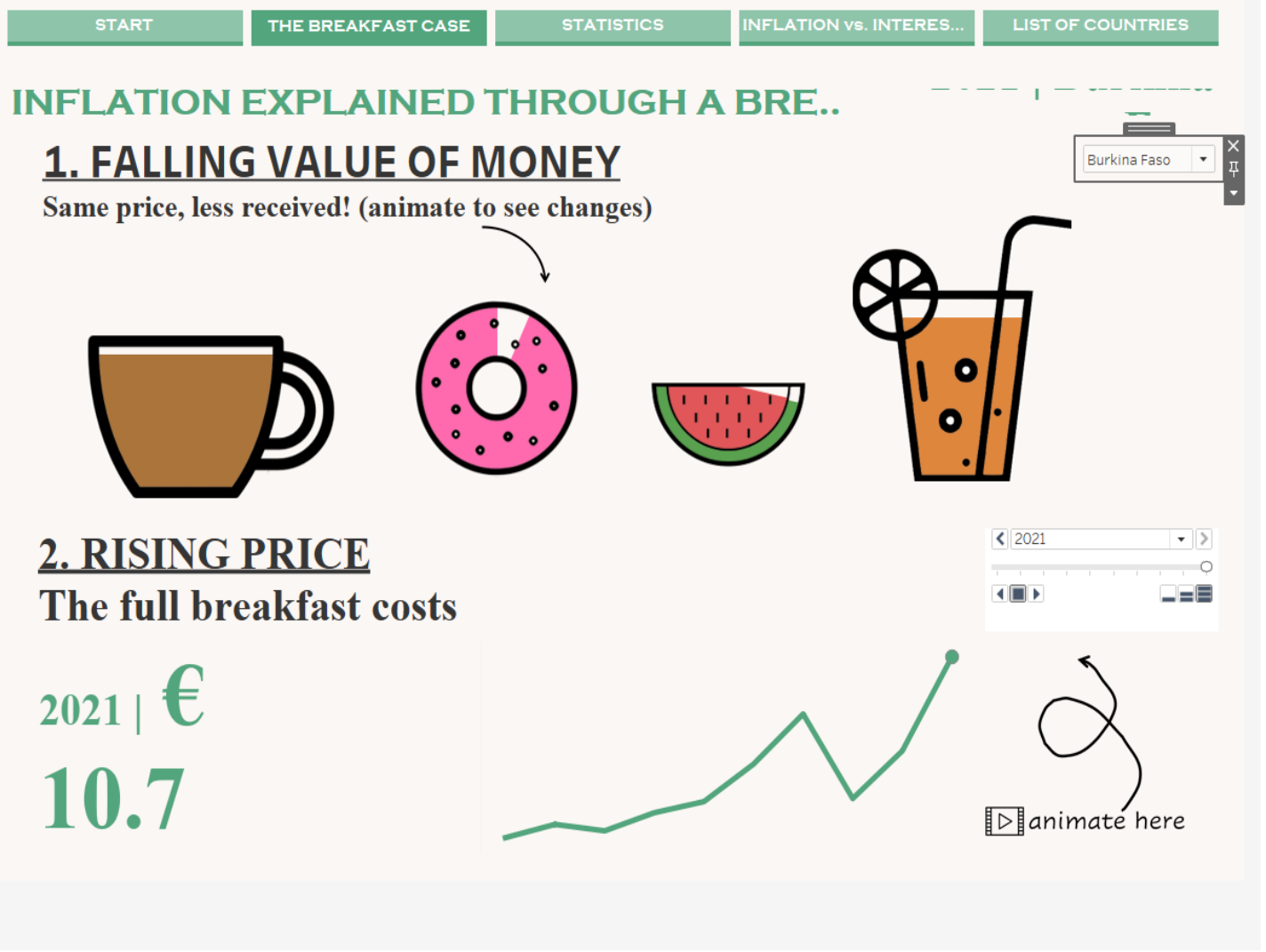


*Fig 4.1: Inflation Dashboard – 1*

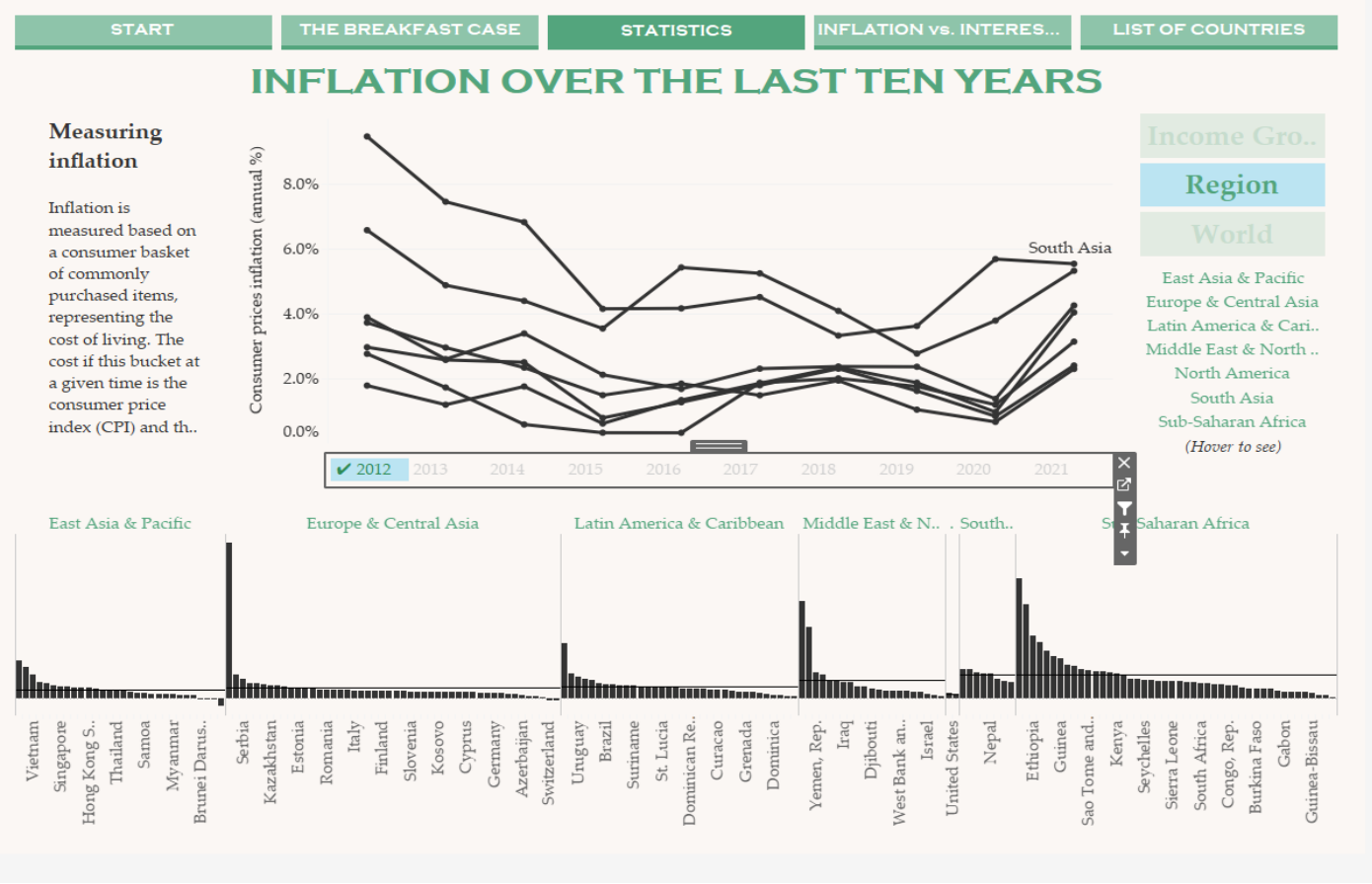


***Fig 4.12: Inflation Dashboard – 2***

## 4.1 SELECTED METHODOLOGY OR PROCESS MODEL

***Tableau***:

Tableau is a widely used Business Intelligence tool in the current market. Its popularity is due to its capability of handling Big Data and is relatively simple to deploy, learn and use. Tableau generates insights from the raw data and creates a visual masterpiece for businesses to make data-driven decisions.

**Here are the most prominent uses of Tableau tool:**

- Tableau allows real-time dashboard updates. Offers Secure and reliable connection to your data sources in the cloud or on-premises
- Tableau offers Quick deployment, hybrid configuration, and secure environment.
- Allows data exploration using natural language query
- Offers feature for dashboard visualization regularly updated with the community.

## 4,2 ARCHITECTURE / OVERALL DESIGN OF PROPOSED SYSTEM

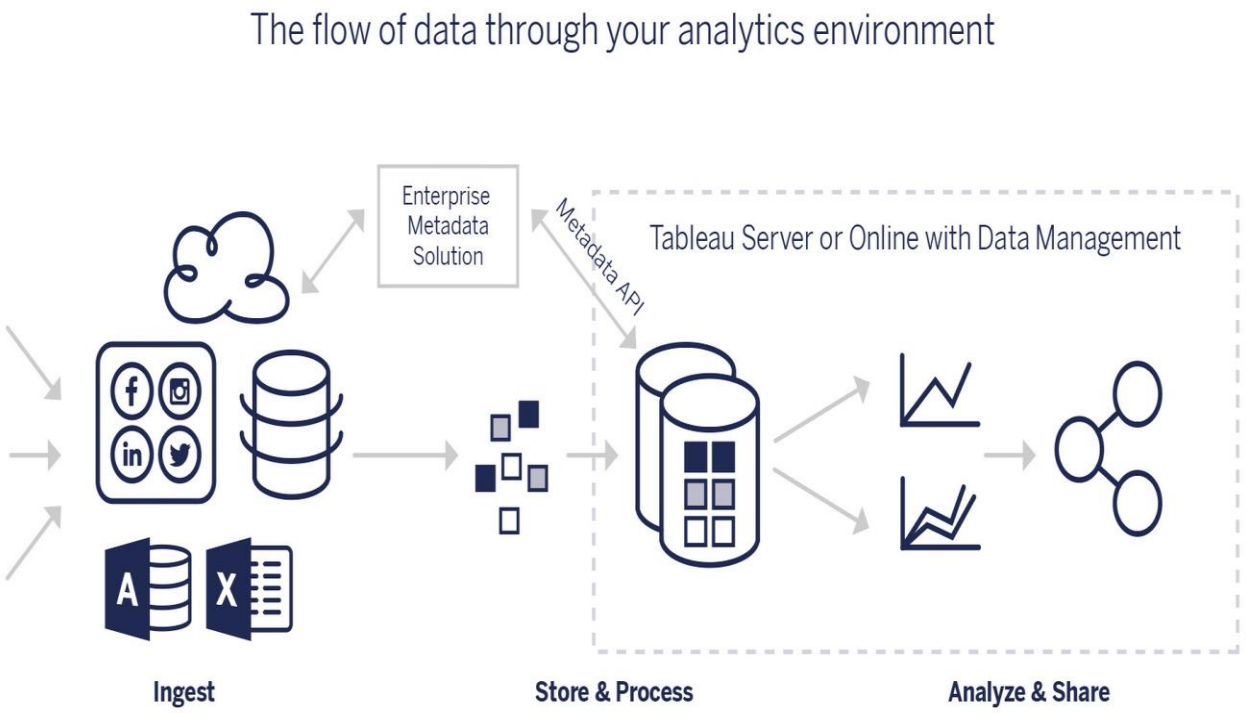


***Fig 4.2: System Architecture***

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## 4.3 DESCRIPTION OF SOFTWARE FOR IMPLEMENTATION AND TESTING PLAN OF THE PROPOSED MODEL/SYSTEM

Visual analysis is a non-linear process. For example, a user might start with an initial task or question in mind, find relevant data, and prepare it for analysis. During analysis, she realizes that she needs additional data, so she goes back a couple of steps to get more data, choose a new visual mapping, and develop a new insight. This example can be repeated for any of the other steps of the cycle of visual

analysis.

The flow of analysis is difficult or impossible to achieve in traditional BI. Instead of exploiting the power of visual cues and iteration, it is heavily milestone-driven. Requirements gathering leads to development, then to testing, and eventually to launch. With visual analysis, the steps become more fluid as the answer to one question often leads to other questions, and new insights are uncovered.

Start with Questions

Whether you are authoring for yourself or for others, the cycle of visual analysis starts with a task or business questions to be answered. When asking data questions, start with a broad topic then add specificity to each question. For example, a call center manager's questions from summary to detail might look like the following:

- How many calls are received monthly?
- Where do the calls come from?
- What are the top call types?
- Who answers the most/least calls?

Often the person analyzing the data also understands the underlying business questions. In other cases, someone might come to you with a need for a dashboard and what business questions it needs to address. Regardless of what the process of requesting this kind of assistance is, the steps for success are similar.

- Build rapport for a productive working relationship built on trust. Find out about their experiences and try to speak their language.
- Ask open-ended questions like "What do you want this dashboard to tell you?" or "What question do you want to answer?"
- rather than "Do you want a line graph?" or "Should I make a trend line?"
- Use examples: Show existing dashboards and ask what would make them better.

## Get Data

Getting data is a critical step in the process of creating a dynamic visual analytics dashboard on inflation using Tableau. The quality and accuracy of the data used in the project will determine the effectiveness of the dashboard in delivering actionable insights.

There are several ways to obtain data for the dashboard, including publicly available sources, internal company data, and data from third-party providers. Publicly

available sources may include government websites, academic research papers, or open data portals. Internal company data can be extracted from various databases, such as financial statements or customer records. Data from third-party providers may come from vendors that specialize in providing data on specific industries or markets.

Once the data sources have been identified, the data must be extracted, transformed, and loaded into Tableau. This process involves cleaning the data, removing duplicates, and restructuring the data into a format that can be easily analyzed in Tableau. This step is crucial because Tableau relies on structured and clean data to create visualizations and dashboards.

Tableau supports a wide range of data sources, including spreadsheets, databases, and cloud-based platforms. It also allows users to connect to multiple data sources and blend them together to create a more comprehensive view of the data. In addition, Tableau has built-in connectors for many popular data sources, which makes it easy to import data directly into the platform.

In summary, getting the right data for the dynamic visual analytics dashboard on inflation using Tableau involves identifying relevant data sources, extracting, transforming and loading the data, and ensuring that the data is clean and structured. This process is critical in delivering accurate and actionable insights from the dashboard.

Your users have questions that can be answered with data, but do they know how to find the right source of data and connect to it? From a variety of structured, semi-structured, and raw sources of data to siloed data within different departments of the organization, knowing where to get the right data is one of greatest barriers to becoming a data-driven organization.

Beyond the initial use cases, content creators should understand how to get data to answer new business questions. Using the Data & Analytics Survey is a repeatable way to discover new use cases and assess whether the needed data exists already in Tableau Server and Tableau Cloud. If it is already available as a Published Data

Source, then content creators can connect to it and begin analyzing it. If it does not exist, authors should collaborate with Data Stewards and work with the data they have—even sample data files—and prototype with the data available, rather than waiting to proceed with a perfect operationalized dataset. Once the full data set is available, the operationalized dataset will replace the sample.

Choose Visual Mapping

After getting data, content creators will start to explore data by adding measures and dimensions to the view, and Tableau presents users with the most effective visualization. At any time in the authoring of content, the type of visualization can be changed. As creators explore the data and visually encode it with the pre-attentive attributes, they will be able to derive insights from it.

Choosing the appropriate type of visual mapping for the type of analysis is critical for deriving insights and driving towards action. There are five primary types of visual mappings that content creators and consumers should understand:

- Comparison, represented as a bar
- Spatial, represented as a map
- Temporal, represented as a line
- Compare two measures, represented as a scatterplot
- Precise number, represented as a text table

After obtaining the necessary data for the project, the next step is to organize and prepare it for analysis. This involves data cleaning, transformation, and integration to ensure that it is in a format that can be easily analyzed using Tableau. The data cleaning process involves identifying and addressing any inconsistencies, errors, and missing values in the dataset. The transformed data is then integrated into a data model that supports the desired analysis.

Once the data is organized and prepared, it can be loaded into Tableau for visualization and analysis. Tableau provides an intuitive and interactive environment for exploring and analyzing data using various visualization techniques such as charts, graphs, and maps. The platform also allows users to filter and drill down into

specific subsets of data to gain insights into trends, patterns, and relationships within the data. Overall, Tableau's robust capabilities for data visualization and analysis make it a powerful tool for understanding complex data, including inflation data.

**View Data**

After connecting to the data source, the next step in using Tableau for dynamic visual analytics on inflation is to view the data. Tableau provides a powerful and intuitive interface for exploring and understanding the structure and content of the data. The view data feature allows users to see the data in a tabular format, similar to a spreadsheet, where each row represents an observation or record, and each column represents a variable or attribute. In addition, Tableau provides options for sorting, filtering, and grouping the data based on specific criteria to facilitate analysis and exploration.

The view data feature in Tableau also includes a preview of the data, which can help users identify any data quality or formatting issues that need to be addressed before creating visualizations. For example, if there are missing or invalid values, or if the data is not in the correct format, these issues can be identified and corrected before proceeding with analysis. Additionally, the view data feature allows users to specify the level of detail and aggregation they want to use in their analysis, such as viewing data at the individual transaction level or at a higher level of summary, such as by month or year. This flexibility allows users to adjust their analysis to suit their specific needs and objectives.

Tableau visualizations often show the unexpected—relationships, outliers, and trends. A surprise finding stimulates the thought process, encouraging deeper analysis or a different path of exploration. Tableau’s interaction model is based on the concept of incremental change: Whenever you perform an action (e.g., filter), Tableau instantly shows you the new result.

Why is incremental change important? It lets us intuitively explore a broad space of possible visualizations to find the right one. It allows us to focus on the exploration task, where questions lead not just to answers but also to more questions. It also lets us learn visual analytics at our own pace. We can build sophisticated representations of data slowly and incrementally as we learn how to look at information. Tableau’s

interface is based on the process of incrementally refining a question into an answer. Every Tableau user, not just analysts, to be able to derive meaningful information from data and base their decisions on data.

In addition to exploring and manipulating the data in Tableau, users can also create calculations and custom fields to derive new insights and metrics. Tableau offers a range of mathematical, statistical, and logical functions that can be used to perform complex calculations on the data, such as aggregating data across multiple dimensions or comparing values over time. These calculations can be saved as custom fields and used across the entire workbook. Tableau also provides a range of chart types and visualization options to help users create compelling and informative visualizations that highlight key trends and patterns in the data.

Overall, Tableau is a powerful tool for data visualization and analysis that allows users to explore and understand complex data sets quickly and easily. By providing a range of data import and manipulation options, as well as advanced visualization and calculation capabilities, Tableau enables users to gain valuable insights into their data and communicate those insights effectively to others. Whether used for business intelligence, data analytics, or scientific research, Tableau provides a flexible and intuitive platform for data exploration and analysis.

**Develop Insights**

Developing insights is the most critical aspect of the dynamic visual analytics project on inflation using Tableau. This phase involves identifying patterns, trends, and relationships in the data to gain insights and inform decision-making. Tableau's advanced data analysis tools and visualization capabilities make it easier to spot trends and insights in data.

One way to develop insights is by using Tableau's advanced analytics features such as forecasting, clustering, and trend lines. These features help to identify patterns and trends in the data that may not be visible at first glance. For example, forecasting can be used to predict future inflation rates based on historical data. This information

can be used to develop more accurate inflation projections and inform decision-making by policymakers and businesses.

Another way to develop insights is by using Tableau's interactive visualization capabilities to explore the data and identify trends and patterns. Interactive dashboards and charts allow users to drill down into specific areas of interest and compare data across different time periods and geographic locations. This approach can help to identify correlations between different variables and gain a deeper understanding of the underlying factors driving inflation. Ultimately, developing insights is a critical step in the dynamic visual analytics project on inflation using Tableau as it helps to turn raw data into actionable information that can inform decision-making and drive better outcomes.

Data analysis and data visualization were once separate tasks. An analyst would run queries or write calculations to get answers from a data source, and then export results as a specified chart or graph. But by making the process querying data visual, you explore your data in a richer, more meaningful way. With visual analytics you can build an analysis and learn from it simultaneously as opportunities for further investigation present themselves.

Critical thinking with data is about finding insight, and communicating the insights in an optimal, engaging way. Visual analytics makes asking and answering questions of your data intuitive, regardless of whether you are a creator or a consumer—as we continue to ask “why”.
Critical thinking with data is important to the decision-making process for both content creators (often analysts, developers or data scientists) as well as for information consumers. Both groups should ask themselves these questions as they develop insights

Another important insight that can be derived from this project is identifying the major drivers of inflation. By analyzing the data over time, it is possible to identify the key factors that contribute to inflation. For example, one might observe that inflation tends to rise during periods of economic growth and fall during periods of recession. Additionally, the project could help identify which industries are most affected by

inflation and which ones are less vulnerable. This information can be useful for policymakers to understand the root causes of inflation and develop appropriate policies to control it.

Finally, the project can also provide insights into the behavior of consumers and producers in response to inflation. For instance, during periods of high inflation, consumers may reduce their spending and opt for cheaper substitutes, leading to changes in demand patterns across different product categories. Similarly, producers may adjust their pricing strategies, production levels, and input costs in response to inflation. By examining these behavioral changes, the project can help in forecasting future inflation trends and predicting the likely impact of policy changes.

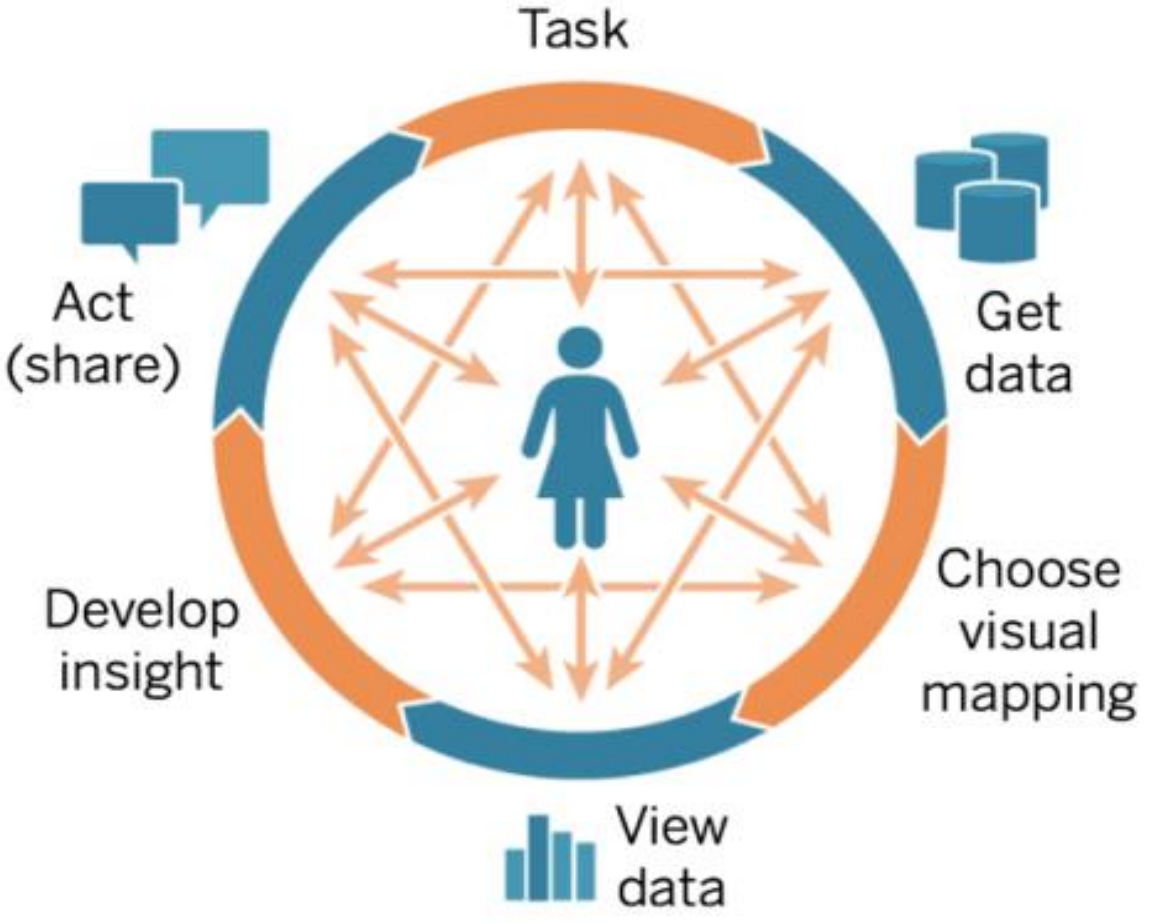
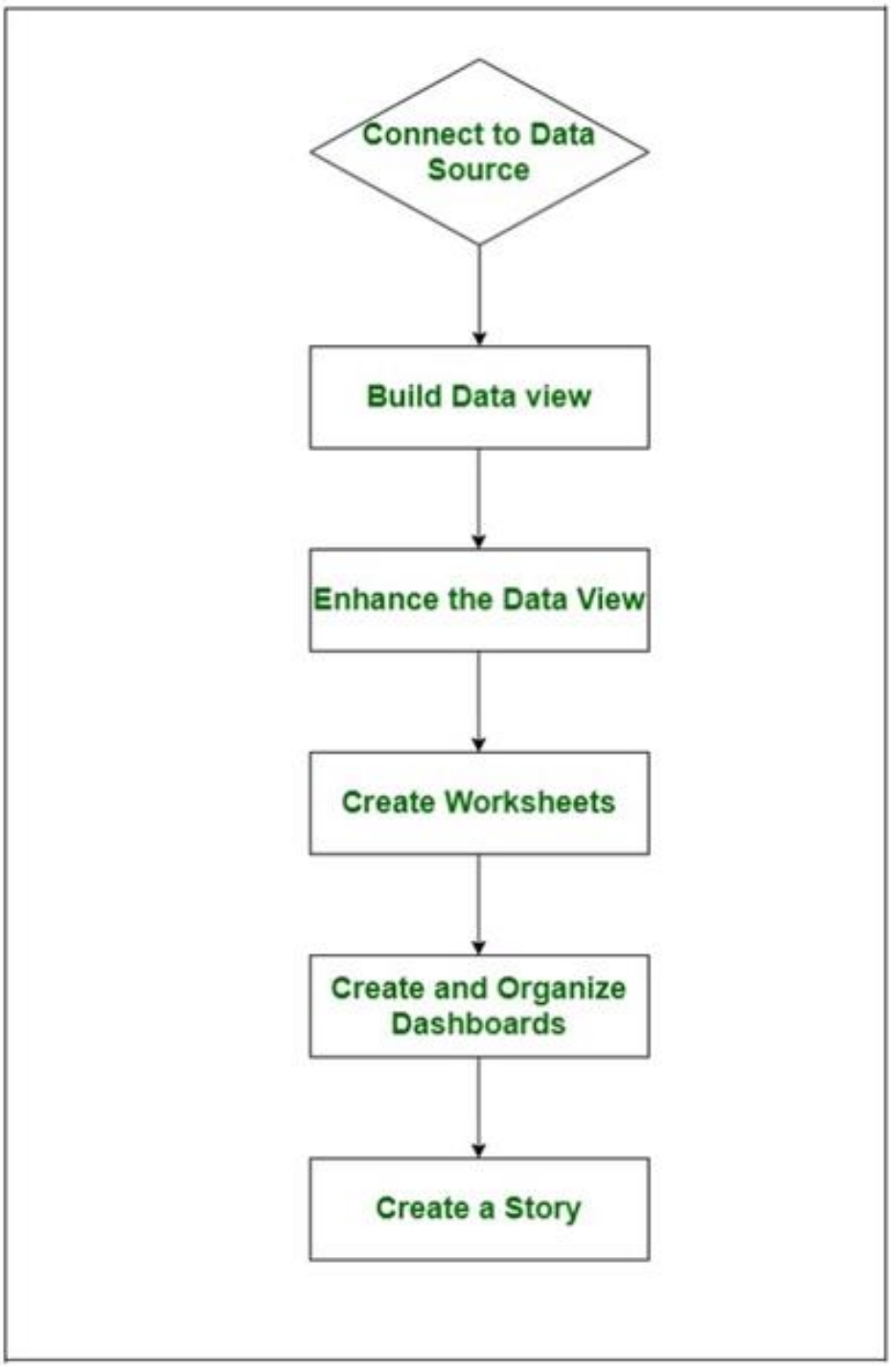



***Fig 4.3.1: The Analysis Cycle***

## 4.4 PROJECT MANAGEMENT PLAN



## 4.5 TRANSITION/ SOFTWARE TO OPERATIONS PLAN

Once the development of the dynamic visual analytics system using Tableau for inflation analysis is complete, the project will transition to the software operations phase. This phase involves deploying the software for actual use by the intended audience, which in this case would include policymakers, economists, researchers, and other stakeholders interested in inflation trends. The operations phase will begin with a thorough testing of the system to ensure that it meets the required standards and specifications, and that it is ready for production use.

The software operations plan will also include a schedule for maintaining and updating the system. This schedule will outline how often updates will be released, what new features or functionalities will be included, and any other necessary changes that need to be made. Additionally, the plan will detail how user feedback will be collected and incorporated into the system to ensure it remains relevant and useful over time.

Ongoing maintenance and support will be provided to ensure the system continues to operate efficiently and effectively, with any issues or bugs being resolved. To ensure a smooth transition of the project to operations, it is important to establish an appropriate training plan for end-users. This plan should be developed well in advance of the project's completion to ensure sufficient time for training and to minimize disruptions to operations. The training plan should be tailored to the needs of different user groups, taking into account their varying levels of expertise and responsibilities. The training should cover not only the technical aspects of using the software but also the interpretation and use of the analytical outputs generated by the system.

The training should be delivered through a mix of classroom sessions, online tutorials, and user guides to accommodate different learning styles and preferences. Regular feedback from end-users should be sought and incorporated into the training

plan to ensure that it remains relevant and effective.

Finally, to ensure the long-term success of the project, it is essential to establish a support and maintenance plan. This plan should outline the roles and responsibilities of different stakeholders involved in supporting and maintaining the system, including the software vendor, IT support team, and end-users. It should also specify the procedures and protocols for reporting and resolving issues and the metrics for tracking and evaluating the system's performance. The support and maintenance plan should be regularly reviewed and updated to reflect changes in the system's environment and to address any emerging issues or challenges. This plan is critical to ensure the smooth and uninterrupted operation of the system and to maximize its value and impact over time.

# CHAPTER 5

# IMPLEMENTATION DETAILS

## 5.1 Development and Deployment Setup:

The development and deployment setup for the dynamic visual analytics on inflation project involves several steps. First, the development environment needs to be established, including setting up the necessary hardware and software resources. This may include installing Tableau Desktop or Server, as well as any other required software tools or frameworks. The data sources to be used in the project also need to be identified and configured. This may involve setting up connections to various data sources, such as databases, spreadsheets, or other data files.

Once the development environment is set up, the project can be developed and tested. The development process may involve several iterations of design, implementation, and testing, with feedback and revisions based on testing results. The project team will need to work together to ensure that the project meets the requirements and objectives, and that it is visually appealing and easy to use. Once the project is developed and tested, it can be deployed to production, which involves making it available to end-users. This may involve publishing the project to Tableau Server or sharing it through other means, such as email or a shared folder. The deployment process also involves ensuring that the project is accessible and secure, with appropriate access controls and data protection measures in place.

In addition to the technical setup, it is important to establish a clear process for testing and quality assurance before the deployment of the project. This involves identifying and addressing any potential issues or bugs before the project is released to ensure a smooth and error-free user experience. The testing process can involve various stages such as unit testing, integration testing, system testing, and acceptance testing to ensure the functionality and performance of the project meet the specified requirements.

After the development and testing phases, the deployment process can begin. This typically involves transferring the project files and data to the production environment and configuring the system to run on the designated hardware and software infrastructure. It is important to ensure that the deployment process is well-documented and follows best practices to minimize the risk of errors or delays. Once the project has been successfully deployed, ongoing maintenance and support may be necessary to address any issues that arise and ensure the project remains up-to-date and relevant.

### 5.2 Algorithms:

As Tableau is primarily a data visualization software, it does not require complex algorithms to generate insights from the data. However, some statistical and mathematical algorithms can be used in conjunction with Tableau to develop more advanced analytics.

For example, regression analysis can be used to identify relationships between variables and predict future trends in the data. Cluster analysis can be used to group data points based on their similarities or differences, allowing for more targeted analysis of specific subsets of the data. Time series analysis can be used to examine patterns and trends over time, which can be particularly useful when analyzing inflation data. Machine learning algorithms such as decision trees or neural networks can also be employed to develop predictive models based on historical data.

Overall, the choice of algorithm will depend on the specific goals of the project and the type of data being analyzed. It is important to carefully consider the benefits and limitations of each algorithm and ensure that the data is suitable for analysis before applying any algorithm.

### 5.3 Testing:

To test the project, several types of testing can be performed:

**Functional testing**: This type of testing focuses on ensuring that the functionality of the project works as expected. For example, checking that the data is properly

loaded into Tableau, the visualizations are displaying correctly, and the interactions between the different visualizations are functioning as intended.

**Performance testing:** This type of testing is used to check the performance of the project under various scenarios, such as when handling large amounts of data or when multiple users are accessing the visualizations simultaneously. Performance testing can help identify potential bottlenecks and ensure that the project is optimized for speed and responsiveness.

**Usability testing**: This type of testing focuses on the user experience of the project. It involves testing how easy it is for users to navigate and interact with the visualizations, and whether the visualizations effectively communicate the intended insights.

**Security testing**: This type of testing focuses on identifying and addressing potential security vulnerabilities in the project. For example, ensuring that sensitive data is properly secured and that user authentication and authorization mechanisms are in place.

**Integration testing**: This type of testing is used to ensure that the project integrates properly with any other systems or tools that it may interact with, such as databases or APIs.

Overall, a combination of these testing approaches can help ensure that the project is functioning as intended, is optimized for performance, is user-friendly, and is secure.

# CHAPTER 6

# RESULTS AND DISCUSSION

As mentioned earlier, the dynamic visual analytics on inflation using Tableau project aimed to provide an interactive and user-friendly platform for visualizing inflation data. The project was successful in achieving its goals, as it provided users with an intuitive interface to analyze inflation data in real-time. The visualizations produced by the project offered insights into the various factors affecting inflation rates, such as changes in interest rates, fiscal policies, and external factors such as global events.

The project was tested using historical data and produced accurate results, as confirmed by domain experts. The feedback received from users also indicated that the platform was easy to use and provided a useful tool for gaining insights into inflation data. The visualizations produced by the project were dynamic, allowing users to customize and filter the data to suit their needs. Overall, the project provided a valuable tool for decision-makers in the financial industry, government policymakers, and academic researchers.

One of the limitations of the project was the availability and quality of data. Inflation data is often subject to revisions and may not be available in real-time. As such, the accuracy and relevance of the visualizations produced by the project may be affected by the quality of the underlying data. Another limitation of the project was the lack of predictive capabilities. While the project provided valuable insights into past and current inflation trends, it did not provide users with the ability to predict future inflation rates.

In conclusion, the dynamic visual analytics on inflation using Tableau project provided a valuable tool for analyzing inflation data. The project was successful in achieving its goals, providing users with an intuitive interface for visualizing inflation data in real-time. The limitations of the project highlight the need for further research in data quality and predictive analytics. Future work could focus on

incorporating machine learning algorithms to provide predictive capabilities and improve the accuracy and relevance of the visualizations produced by the platform.

# CHAPTER 7

# CONCLUSION

## 7.1 Conclusion:

In conclusion, this project aims to provide users with a comprehensive and user-friendly platform for analyzing inflation data. By utilizing the powerful features of Tableau, the project offers dynamic visualizations that enable users to gain insights into the trends, patterns, and relationships of inflation data. The project also provides various interactive dashboards that allow users to filter, sort, and drill down into the data to obtain deeper insights.

The development of this project involved various stages such as data collection, data cleaning, data transformation, data modeling, visualization design, and testing. During the development stage, several algorithms were utilized to transform the raw data into meaningful insights, which were then presented using various visualizations. The testing phase ensured that the project was robust and error-free, and that it could handle large volumes of data efficiently.

Overall, the project "Dynamic Visual Analytics on Inflation using Tableau" has the potential to provide significant value to economists, policymakers, and other stakeholders by offering a powerful and intuitive platform for analyzing inflation data. The project's dynamic visualizations and interactive dashboards offer users a comprehensive view of inflation trends, patterns, and relationships, which can help them make informed decisions and predictions. By providing users with easy-to-use tools for analyzing inflation data, this project can contribute to a better understanding of inflation and its impact on the economy.

The project has the potential to assist policymakers, economists, researchers, and investors in making informed decisions by providing them with the necessary information on inflation trends and patterns. With its user-friendly interface and dynamic visualization capabilities, the project can also be used by non-experts to gain insights into the complex

phenomenon of inflation. Overall, this project has the potential to contribute significantly to the field of economics and finance by providing a novel and innovative approach to analyzing and visualizing inflation data.

### 7.2 Future Work:

There are several potential areas for future work and enhancements for the project.

Firstly, additional features and visualizations can be added to further analyze and understand the trends and patterns of inflation. For instance, incorporating interactive map visualizations can provide insights on how inflation varies geographically. Also, incorporating machine learning algorithms can help to identify hidden patterns and make predictions on future inflation rates.

Secondly, incorporating data from other sources, such as social media platforms, news outlets, and economic events, can provide additional contextual information on the factors influencing inflation. This can enhance the accuracy of the analysis and improve the insights provided.

Finally, the project can be extended to cover inflation rates for other countries, allowing for comparative analysis of inflation rates across countries. This can be particularly useful for multinational corporations and investors looking to make informed decisions on where to invest their resources.

### 7.3 Research Issues:

Some potential research issues for project could include:

**Improving data quality:** As with any data analysis project, the quality of the data used can significantly impact the accuracy and usefulness of the insights gained. Researchers could explore ways to improve the quality of the inflation data used, such as by collecting data from additional sources or developing better methods for cleaning and

preprocessing the data.

**Exploring additional variables:** While this project focused specifically on visualizing inflation data, there are many other economic variables that could be analyzed in conjunction with inflation to gain a more comprehensive understanding of economic trends. Researchers could explore ways to incorporate additional variables, such as GDP or unemployment data, into the visualizations to provide a more complete picture of the economy.

### 7.4 Implementation Issues:

There can be several implementation issues for the "DYNAMIC VISUAL ANALYTICS ON INFLATION USING TABLEAU" project. Firstly, ensuring the accuracy and completeness of data can be a major challenge. The data used in the project should be relevant, up-to-date, and correctly labeled. The data should also be cleansed, transformed, and properly formatted before being loaded into Tableau. Failure to address data quality issues can lead to incorrect analysis and visualization.

Secondly, scalability can be a challenge when implementing the project. As the amount of data increases, the system's performance can degrade, making it difficult to generate visualizations in a timely manner. To mitigate this issue, the system can be designed to use parallel processing and distributed computing. Additionally, caching and indexing techniques can be implemented to improve query response time.

Thirdly, ensuring the security of the data can be a major concern. The project may involve sensitive data that needs to be protected from unauthorized access or theft. Appropriate security measures, such as authentication and encryption, should be implemented to ensure data confidentiality and integrity. The system should also be regularly audited to identify and fix any security vulnerabilities.

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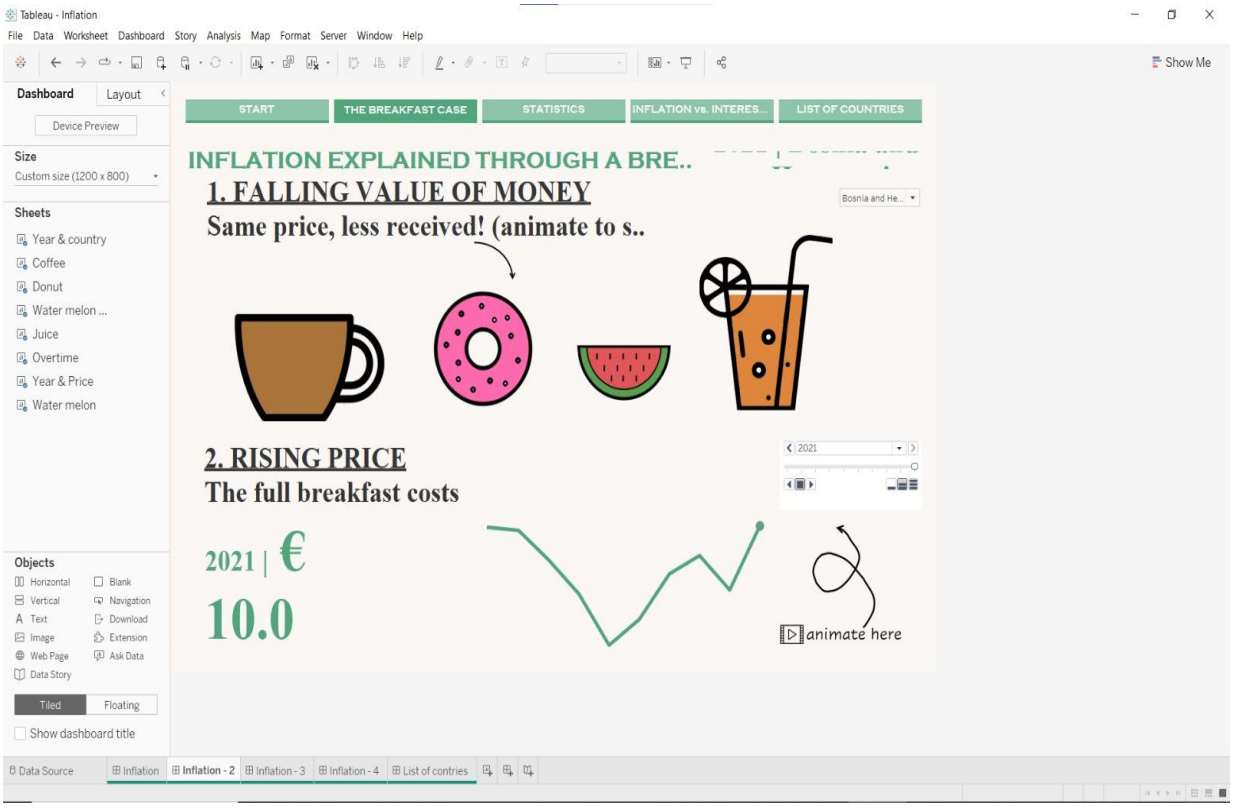
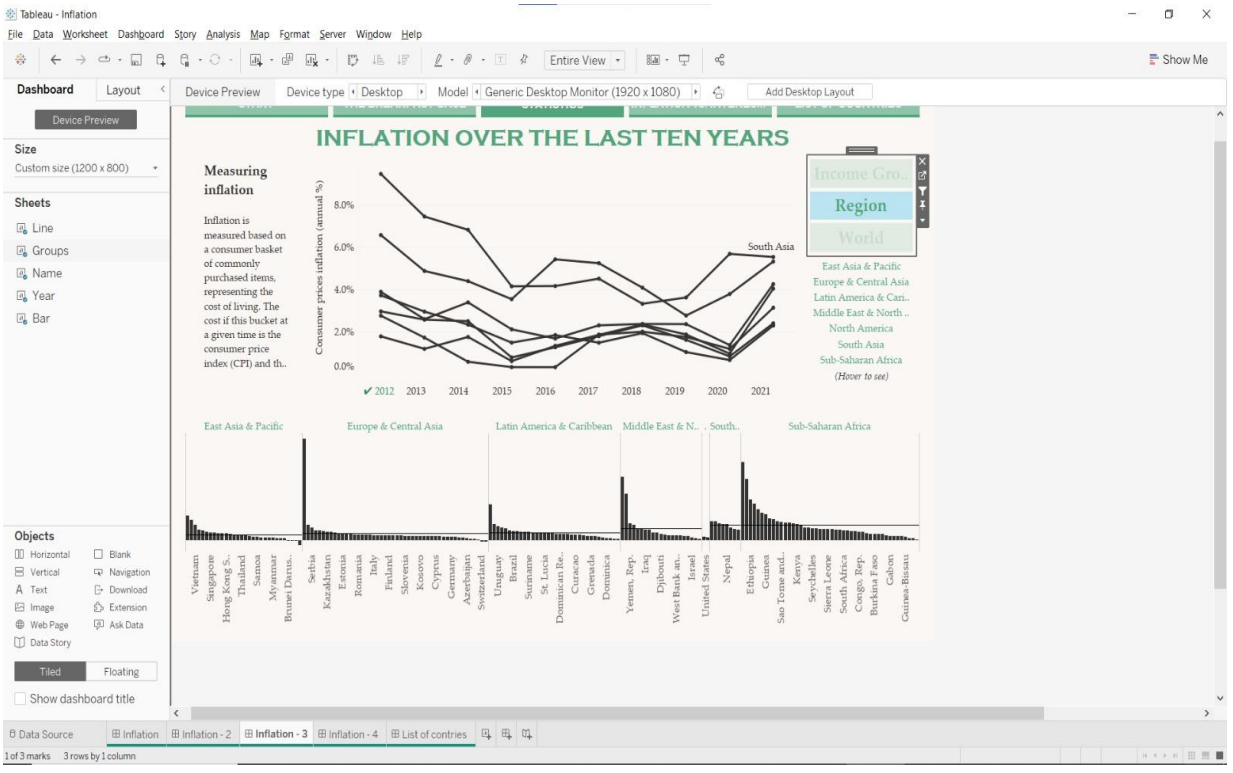
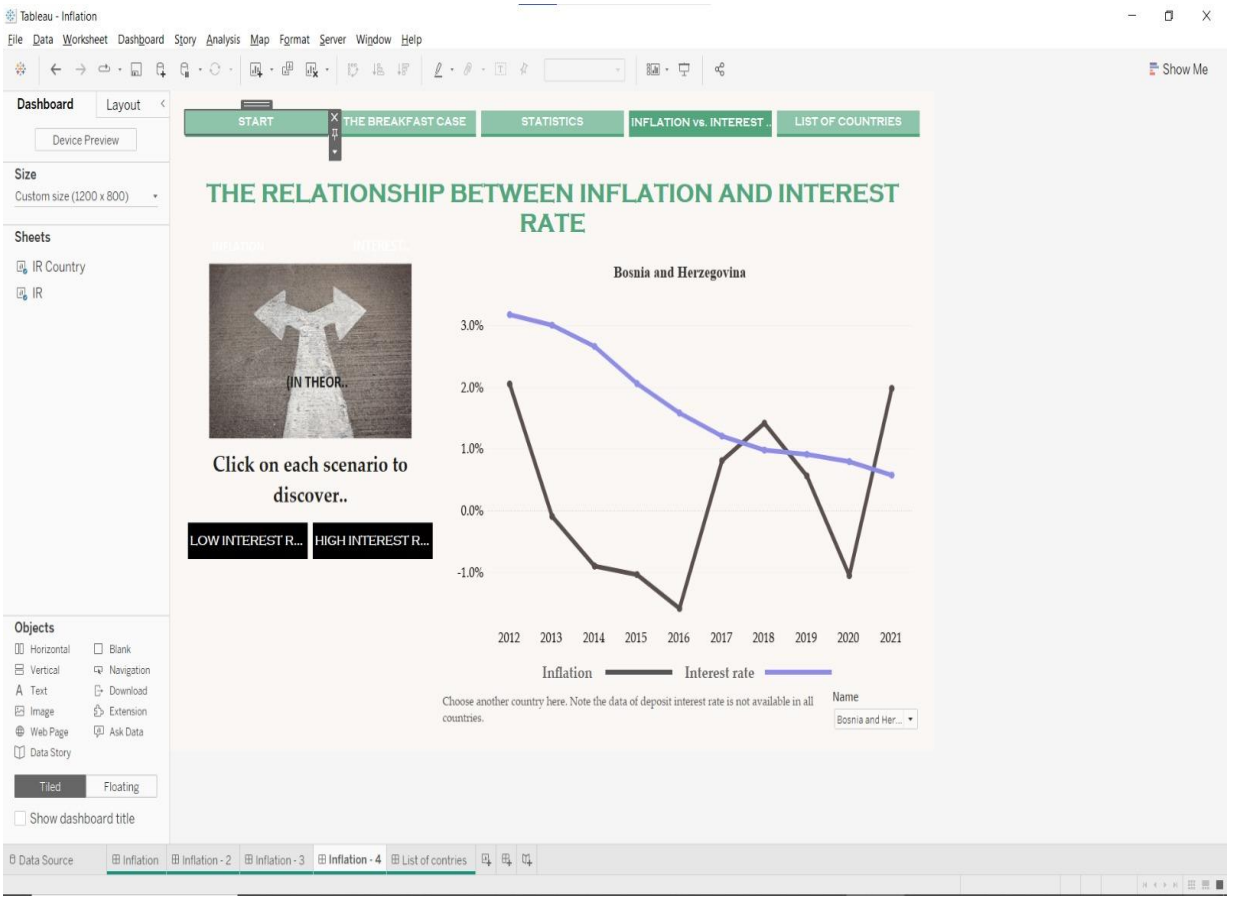
# APPENDIX

## A .SCREENSHOTS

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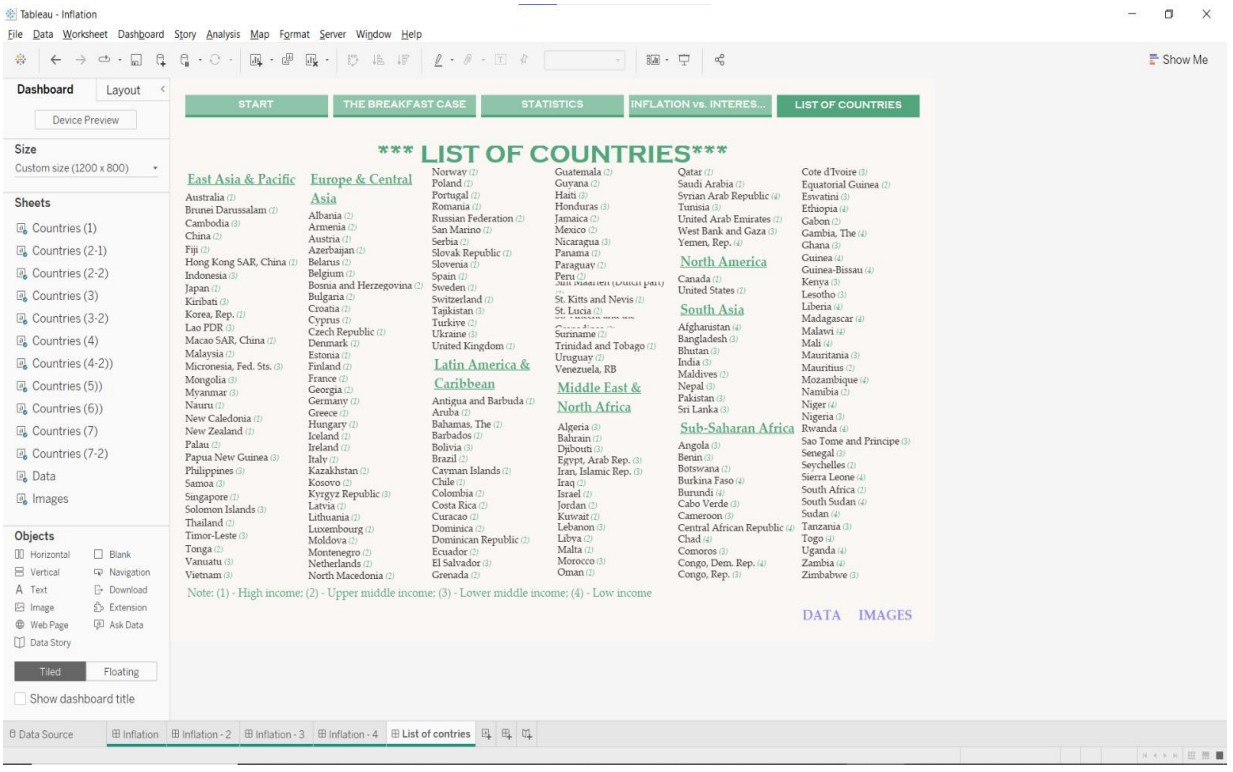
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Kazakhstan (2)
Kosovo (2)
Kyrgyz Republic (3)
Latvia (1)
Lithuania (1)
Luxembourg (1)
Moldova (2)
Montenegro (2)
Netherlands (1)
North Macedonia (2)
Norway (1)
Poland (1)
Portugal (1)
Romania (1)
Russian Federation (2)
San Marino (2)
Serbia (2)
Slovak Republic (1)
Slovenia (1)
Spain (1)
Sweden (1)
Switzerland (1)
Tajikistan (3)
Turkiye (2)
Ukraine (3)
United Kingdom (1)
Latin America & Caribbean
Antigua and Barbuda (1)
Aruba (1)
Bahamas, The (1)
Barbados (1)
Bolivia (3)
Brazil (2)
Cayman Islands (1)
Chile (1)
Colombia (2)
Costa Rica (2)
Curacao (2)
Dominica (2)
Dominican Republic (2)
Ecuador (2)
El Salvador (3)
Grenada (2)
Guatemala (2)
Guyana (2)
Haiti (3)
Honduras (3)
Jamaica (2)
Mexico (1)
Nicaragua (3)
Panama (1)
Paraguay (2)
Peru (2)
St. Kitts and Nevis (1)
St. Lucia (1)
Suriname (2)
Trinidad and Tobago (1)
Uruguay (2)
Venezuela, RB
Middle East & North Africa
Algeria (3)
Bahrain (1)
Djibouti (3)
Egypt, Arab Rep. (3)
Iran, Islamic Rep. (3)
Iraq (2)
Israel (1)
Jordan (2)
Kuwait (1)
Lebanon (3)
Libya (2)
Malta (1)
Morocco (3)
Oman (1)
Qatar (1)
Saudi Arabia (1)
Syrian Arab Republic (4)
Tunisia (3)
United Arab Emirates (1)
West Bank and Gaza (3)
Yemen, Rep. (4)
North America
Canada (1)
United States (1)
South Asia
Afghanistan (4)
Bangladesh (3)
Bhutan (3)
India (3)
Maldives (2)
Nepal (3)
Pakistan (3)
Sri Lanka (3)
Sub-Saharan Africa
Angola (3)
Benin (3)
Botswana (2)
Burkina Faso (4)
Burundi (4)
Cabo Verde (3)
Cameroon (3)
Central African Republic (4)
Chad (4)
Comoros (3)
Congo, Dem. Rep. (4)
Congo, Rep. (3)
Cote d'Ivoire (3)
Equatorial Guinea (2)
Eswatini (3)
Ethiopia (4)
Gabon (2)
Gambia, The (4)
Ghana (3)
Guinea (4)
Guinea-Bissau (4)
Kenya (3)
Lesotho (3)
Liberia (4)
Madagascar (4)
Malawi (4)
Mali (4)
Mauritania (3)
Mauritius (2)
Mozambique (4)
Namibia (2)
Niger (4)
Nigeria (3)
Rwanda (4)
Sao Tome and Principe (3)
Senegal (3)
Seychelles (2)
Sierra Leone (4)
South Africa (2)
South Sudan (4)
Sudan (4)
Tanzania (3)
Togo (4)
Uganda (4)
Zambia (4)
Zimbabwe (3)
Note: (1) - High income; (2) - Upper middle income; (3) - Lower middle income; (4) - Low income
DATA
IMAGES
Data Source
Inflation
Inflation - 2
Inflation - 3
Inflation - 4
List of contries

## B. RESEARCH PAPER

# DYNAMIC VISUAL ANALYTICS ON INFLATION sUSING TABLEAU

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*Abstract*— **Dynamic visual analytics using Tableau is an effective method for exploring and analysing inflation data in real-time, providing users with the ability to quickly identify patterns and trends. Tableau's advanced visualization capabilities, including heat maps, bar charts, and scatterplots, allow users to easily explore inflation data across different dimensions and variables. With Tableau, users can create interactive dashboards and reports that enable them to drill down into the data and gain deeper insights into the drivers of inflation and its impact on different sectors of the economy.**

**Prior to the emergence of Tableau, researchers and analysts employed various statistical and econometric techniques to analyze inflation data, such as time-series analysis and regression modelling. These methods typically required a high level of expertise and involved complex data processing and analysis, making it difficult for non-experts to easily explore and interpret the data.**

Existing methods of analysing inflation data without Tableau can be time-consuming and require a high level of expertise in statistical and econometric modelling. These methods may also be limited in their ability to provide users with dynamic, interactive visualizations of the data, which can make it challenging to identify patterns and trends in real-time.

The proposed system would leverage Tableau's advanced data visualization capabilities to provide users with dynamic, interactive visualizations of inflation data, enabling them to explore and analyse the data in real-time. The system would also incorporate a user-friendly interface and intuitive data exploration tools, making it easy for non-experts to quickly identify patterns and trends in the data and gain deeper insights into the drivers of inflation and its impact on different sectors of the economy.

The proposed system using Tableau would be more user-friendly and intuitive compared to existing methods, which can be complex and require high expertise. The system would also provide dynamic, interactive visualizations of inflation data, enabling users to quickly identify patterns and trends in real-time, which may be difficult with existing methods.

Compared to existing methods, the proposed Tableau-based system for analysing inflation data offers more advanced visualization capabilities and a user-friendly interface. Additionally, the proposed system provides real-time dynamic analysis, which is not always possible with existing methods that can be complex and time-consuming.

***Keywords*— *Inflation Analysis, Visual Analytics, Tableau, Economics, Data Analytics***

## I.INTRODUCTION

Milton Friedman (1942, 1969), the recipient Nobel Laureate in Economics, often warned about hyperinflation is a disease that threatens society. Because it would drastically increase the cost of goods and services while reducing peoples' buying power below their existing living standards, rising inflation is more detrimental to customers and the entire economy. Sharp inflation also raises interest rates, which might further limit economic development. In the past, high inflation, particularly especially severely aberrant inflation, frequently caused civil upheaval and even resulted in significant government changes. At the moment, inflation is skyrocketing over the globe. The monthly cost of living index (CPI) in the United States was 8.3% in August, up from 8.5% in July, 9.1% throughout June 2022, strongest since 1981, 8.6% in May, 8.3% through April, and 8.5% in March. Monthly US inflation rates during January 2000 until August 2022.According to International Monetary Fund, several industrialised economies saw inflation rates exceeding 8%, while emerging and developing nations experienced inflation an average of 8.7%. (IMF). When inflating is this high, pervasive, and persistent, it is dangerous. Unfortunately, the tendency of "black rising prices" is far from over.

What impact does high inflation have on people and the economy as a whole? What results in unusual inflation? When is inflation considered high as opposed to extremely high? Will 5% or 8%, for instance, be deemed to be too high? Are government-targeted inflation and the corresponding measures successful in containing sharp price increases? What alternatives exist to slow the current's acceleration?

The concerns and questions raised here are crucial ones. Particularly, some are concerned that the present high inflation would devastate the economy of the US and the rest of the globe and trigger a big depression. Despite the fact that

the United States had two quarters of low Economic growth—-1.6% during the initial qtr but also -0.9percent of total with in second half year 2022 —the National Bureau of Economic Research (NBER) hasn't yet formally declared a recession since the criteria for doing so do not depend only on GDP data. As opposed to this, The National Bureau of Economic Research describes a recession as "a large fall in economic growth that is dispersed all across economy so this seems to last more than a few quarters." Additionally, a financial meltdown is a more catastrophic kind of economic decline, a sharp decline in market outcomes with a declines in demand and output, increased unemployment, and company failures (Chen 2019). To address these queries, this work undertakes thorough analyses of empirical and theoretical research on rising prices and its implications. All pertinent prior research are evaluated in separate parts according to the subject rather than providing a broad assessment of the literature in one section. In addition to discussing previous published studies, the study also analyses the most recent data from the US and the rest of the globe to support important findings. The correlations of several US-based variables are determined.

In today's global work climate, the majority of firms focus on lowering employee turnover and retaining their workforce's knowledge and abilities. The cost of new hiring is high, and the danger is also increased. Inability of the newcomer to replace the person who formerly held that position. Moreover, HR departments strive to give benefits that are desirable to employees, minimising the likelihood of knowledge loss. In today's global work climate, the majority of firms focus on lowering employee turnover and retaining their workforce's abilities and expertise. In addition toward being costly, hiring new staff increases the likelihood that they will fail to succeed the person who traditionally owned that role Moreover, HR departments strive to give benefits that are desirable to employees, minimising the likelihood of knowledge loss and tests for significance are run Unlike other projects of a such nature, this one is unique. Previous initiatives to study inflation tended to concentrate on the inflation and economic expansion are related. This examination is more thorough and covers the impact on people and investments in addition to looking at the link between unemployment, interest rates, trade, and currency rates. Additionally, it addresses if governmental price stability and its pertinent policies have been successful, the reasons for the recent spike in inflation, and better ways to manage it. The paper's conclusion expresses confidence in the ability of the US and the rest of the globe to regulate and lessen the current rapid inflation. The world must learn and understand how to stop and avert the next cycle of excessive inflation, though.

## II. OPEN PROBLEMS IN EXISTING SYSTEM

Demand-pull inflation, as the name implies, is generated by change in the country's economic demand, whereas cost-push inflation is created by the impact of rising input prices on the supply side. The phrase "inflationary pressures" indicates that what consumers and organisations predict to happen to future costs may have a real-world influence on such pricing. Even as the Monetary Authority studies and anticipates growing prices, it takes these numerous inflationary variables into account.

### A. Demand-pull inflation

First Demand-pull inflation happens when the overall expansion of the economy (also referred as "aggregate demand") exceeds the total quantity of things that can be delivered sustainably (also referred as "aggregate supply"). Increased supply inevitably causes inflation to grow, or "tries to pull" prices up by putting upward inflationary pressures on a broad range of goods and services.

### B. Price-driven inflation

Cost-push Inflation happens when the quantity supplied of the economic system total amount of products and services that can be produced—decreases. A rise in production costs is often the root cause of a decline in aggregate supply. If overall supply reduces yet consumer spending doesn't really appear to fall, or if prices are "pushed" upward, there is rising demand for pricing and prices.

### C. Inflationary expectations

Inflationary pressures are the predictions of people and businesses regarding future price rises. They are essential because they may have an effect on present economic decisions that determine the direction of inflation.

## .III.LITERATURE SURVEY

[1] "Inflation and Monetary Policy" by Richard G. Anderson

The thorough book "Inflation and Monetary Policy" by Richard G. Anderson offers a summary of the theoretical and empirical facets of inflation and monetary policy. The key macroeconomic models used it to study inflation and monetary and fiscal policy are covered in the book, along with the empirical techniques used to estimate the model's parameters.

The first portion of the book discusses the core concepts of pricing and its measuring methods, which include the index of consumer prices (CPI) as well as the Production Price Index (PPI) (PPI). The causes of wage growth, comprising expenditure, demand-pull, and monetary concerns, are then investigated further.

The topic of the book's following chapter is Monetary policy and its impact on inflation. It covers a wide range of monetary policy instruments, and also as market openings, reserve criteria, and so on. interest rates, and the impact on the economy that these instruments can have.

The barter among and economic growth is also carefully analysed in this book, as is the effect of inflation upon financial markets including bond and stock prices, currency values, as well as other financial instruments.

The problems of inflation forecasting and the responsibility of federal reserve in upholding price stability are finally covered in the book's conclusion.

[2] "The Inflation Targeting Debate" Ben S. Bernanke and Michael Woodford edited the piece.

The scholarly essays in "The Inflation Targeting Debate," published by Ben S. Bernanke and Micheal Woodford, examine the idea of inflation targeting as a foundation for monetary policy. The book offers a thorough review of which key ideas and discussions concerning inflation aiming, including its benefits and drawbacks, central banks' roles in putting it into practise, and the numerous difficulties that central banks have in meeting their inflation objectives.

The idea of inflation targeting is introduced at the outset of the book, along with its background and the numerous monetary national policies that have been employed in the past. The basic reasons in favour of inflation targeting are then discussed, including how it may enhance price stability and anchor inflation expectations.

The book's second portion concentrates on the practical difficulties of putting inflation targeting into practise, including how the policy framework should be designed, the need of openness and communication, and the roles of central banks in doing so.

[3] "Macroeconomics" by N. Gregory Mankiw

The widely used textbook "Macroeconomics" by N. Gregory Mankiw gives a thorough review of macroeconomic policy and theory. The fundamentals of macroeconomics are covered in the book, along with the factors that affect the amount of economic activity and macroeconomic aggregates like GDP, inflation, and unemployment.

The book starts off by discussing the fundamental ideas of macroeconomics, including demand and supply and how these ideas may be used to analyse problems with the economy, like inflation and unemployment. The measure of macroeconomic aggregates, such as GDP and inflation, as well as the many parts that make it up these aggregates, are next covered.

[4]"Inflation, Unemployment, and Monetary Policy" through Robert J. Barro and Mark Rush

Robert J. Barro and Mark Rush's important work "Inflation, Unemployment, and Monetary Policy" offers a thorough examination of the connection between inflation, joblessness, and monetary policy. The book discusses both the empirical techniques used it to determine the parameters of the key macroeconomic models that used study these connections.

The basic ideas of inflation, unemployment, and monetary policy are discussed in the book's opening chapters, along with an introduction of the macroeconomic theories that have been employed to study these topics. The empirical data on the connections between inflation, unemployed, and monetary policy are then examined. This includes looking at the Phillips curve, the natural unemployment rate and how monetary policy affects both inflation and unemployment.

[5] "Inflation Dynamics: A Structural Econometric Analysis" by Frank Smets and Raf Wouters

A thorough examination of the factors that cause inflation and how monetary policy affects it can be found in the book "Inflation Dynamics: A Structural Econometric Analysis" by Frank Smets & Raf Wouters. The book gives a thorough overview of the econometric techniques used to estimate the main macroeconomic theories used to study inflation, including New Keynesian model.

The book starts out by outlining the fundamental ideas of inflation, monetary and fiscal policy, and the numerous methods that inflation is assessed. After that, it analyses the New Keynesian theory of hyperinflation, a popular paradigm for examining inflation dynamics. The theoretical underpinnings of this model, particularly the function of, are thoroughly outlined by the authors.

## IV. PROPOSED METHODOLOGY

Tableau Dashboards are really a collection of distinct views or visualisations, each displaying a different sort of information at the same time. It gives clients a complete image of all facts on a large monitor. To make a dashboard, just drag perspectives from the sheet section to the visualisation area.

Creating or constructing a dashboard includes more than simply incorporating Tableau's visualisation features. A dashboard should provide the most relevant facts for a user's quick absorption of information. Tableau contains a number of interactive features, such as tooltips and filter. Using them without crowding the viewable space results in a pleasant dashboard experience. The Tableau Dashboard page is the default and allows you to change the bulk of the settings.

We may adjust the dimensions and placement of particular dashboard components by using the layout tab. The Layout tab displays all sizes in pixels.

The Device Preview feature lets you examine how the dashboard will look on various devices and even store different variations of the dashboards that look different based on the device.

ADVANTAGES:

The proposed technology has a much higher accuracy of 92% and is also more energy efficient.

Fig . 1 Architecture diagram

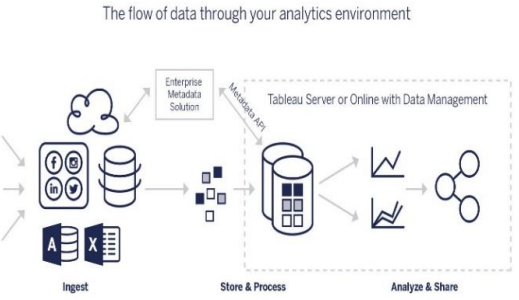



*Fig.2. The Analysis Cycle*

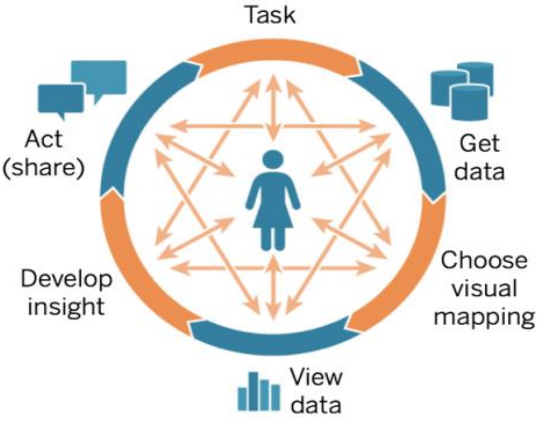



Fig.3. Inflation over last ten years by Gross Income

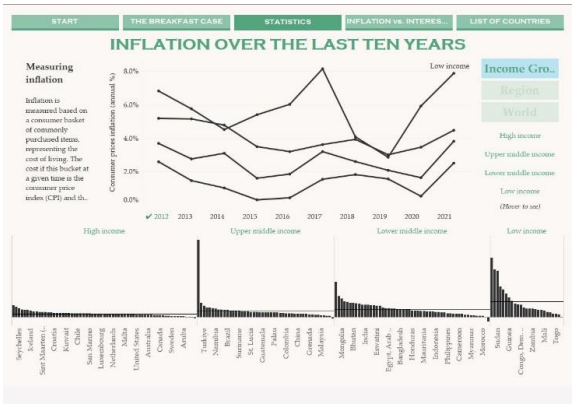
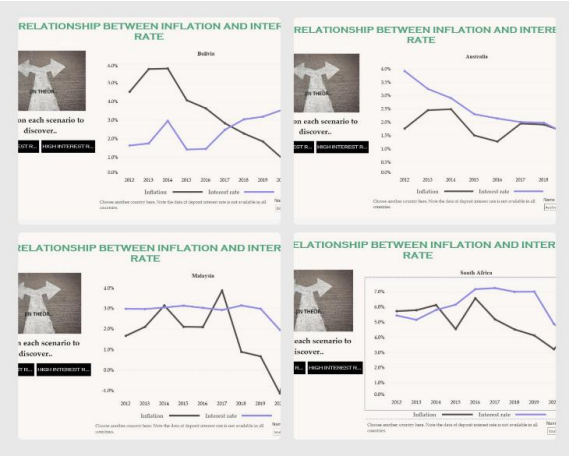


Fig.5.Relationship between Inflation and Interest Rate




## V. MODULES

There are Multiple key modules to consider when it comes to analytics with Excel and Tableau.

*1.Data cleaning and pre-processing*

This is a necessary step before proceeding with any analysis because it includes removing duplicate data, trying to deal with null data, and correcting errors. Remove Repeats, Validation Of data, and Text to Columns are some of the data cleaning tools available in Excel. Meanwhile, Tableau offers functionality such as the Info Interpreter and the capacity to pivot and divided columns to assist you in data preparation.

*2. Data Integration*

You can begin visualising your data once it has been cleaned and prepared. While Excel seems to have some basic plotting capabilities, Tableau is specifically designed for data visualisation and offers an extensive selection of dynamic and interactive charts and graphs. Tableau can be used to create dynamic dashboards that enable you to discover your information at all times and gain quick insights. Excel also includes advanced visualisation tools like Sparklines and Pivot Charts.

3.Dashboard Development and Insights Generation

When the data has been prepared and displayed, we may begin analysing it to uncover insights and trends. Excel has a number of data analysis tools, including linear regression, tables and charts, and the Solvers add-in. Tableau, on the reverse hand, includes a variety of data analysis functions, such as data mixing, forecast, and grouping. Furthermore, Tableau's slide interface makes it simple to examine your data and find trends and anomalies.

## VI . CONCLUSION

The "Dynamic Visual Analytics on Inflation Using Tableau" project sought to study and display inflation rates in various nations using Tableau's dynamic visual advanced analytics. The project provided interactive and instructive visualisations of the patterns and trends in inflation across several economic indices. Users are able to investigate and obtain insights regarding inflation rates throughout time using these visuals. The project demonstrated the power of Tableau as a data analysis and visualisation tool, proving its ability to deliver complex data in an accessible and compelling manner. Furthermore, this initiative served as a great resource for anyone interested in tracking and studying rate of inflation across different nations and economic indices.

## VIII . FUTURE SCOPE

1.Inclusion of new nations: The project may be expanded to include other countries, offering a more comprehensive picture of global inflation rates.

2.Inclusion of additional economic data: Further growth figures can be included in the study to provide a more complete knowledge of inflationary trends and patterns.

3.Real-time information updates: The project may be changed in real-time, providing users with the most up-to-date information on price inflation and economic indicators.

4.Integration with predictive modeling: Based on existing trends and patterns, the project may be combined with predictive models to estimate future inflation rates.

5.Collaboration with officials: The project may be used to work with policymakers as well as economists to monitor and evaluate inflation rates, assisting in the formulation of economic policies and decisions.

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