Final Project Report

Project Title **:** Measuring the Pulse of Prosperity: An Index of Economic Freedom Analysis

Team ID **:** LTVIP2025TMID49576

Team Members **:** Team Leader : Pappugari Jyotheeswara Reddy

Team member : S V N Thanuja

Team member : Sharik Shaik Md

Team member : Sorakundal Siva Vara Prasad

Team member : V Gagana Deepika

1. INTRODUCTION

1.1 Project Overview

This project focuses on analyzing global economic indicators using the Index of Economic Freedom dataset. It aims to uncover how various factors like GDP, inflation, trade freedom, and monetary freedom contribute to the prosperity of a nation.

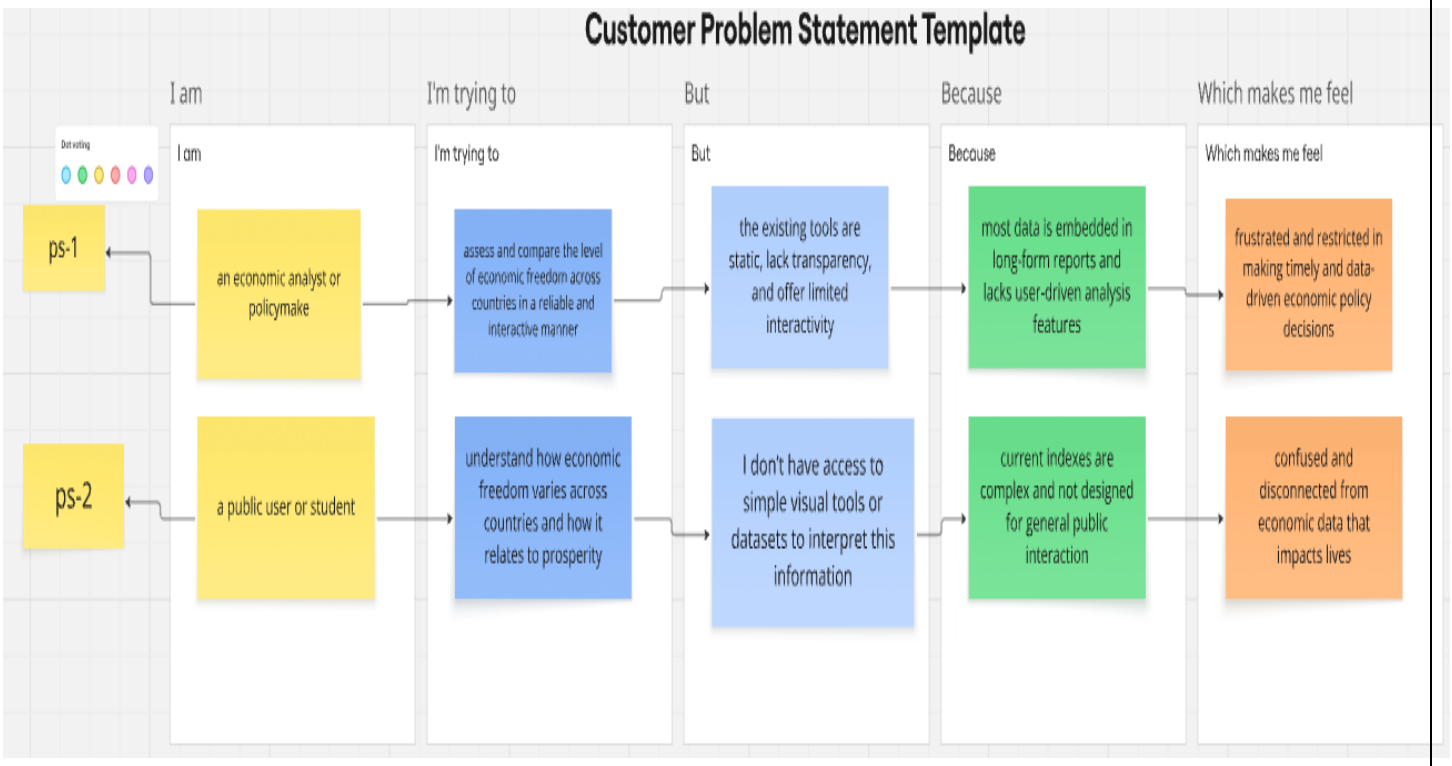
1.2 Purpose

The purpose of this project is to create interactive dashboards that visualize economic freedom indicators, enabling policymakers, students, and researchers to make data-driven insights about global development trends.

2. IDEATION PHASE

2.1 Problem Statement

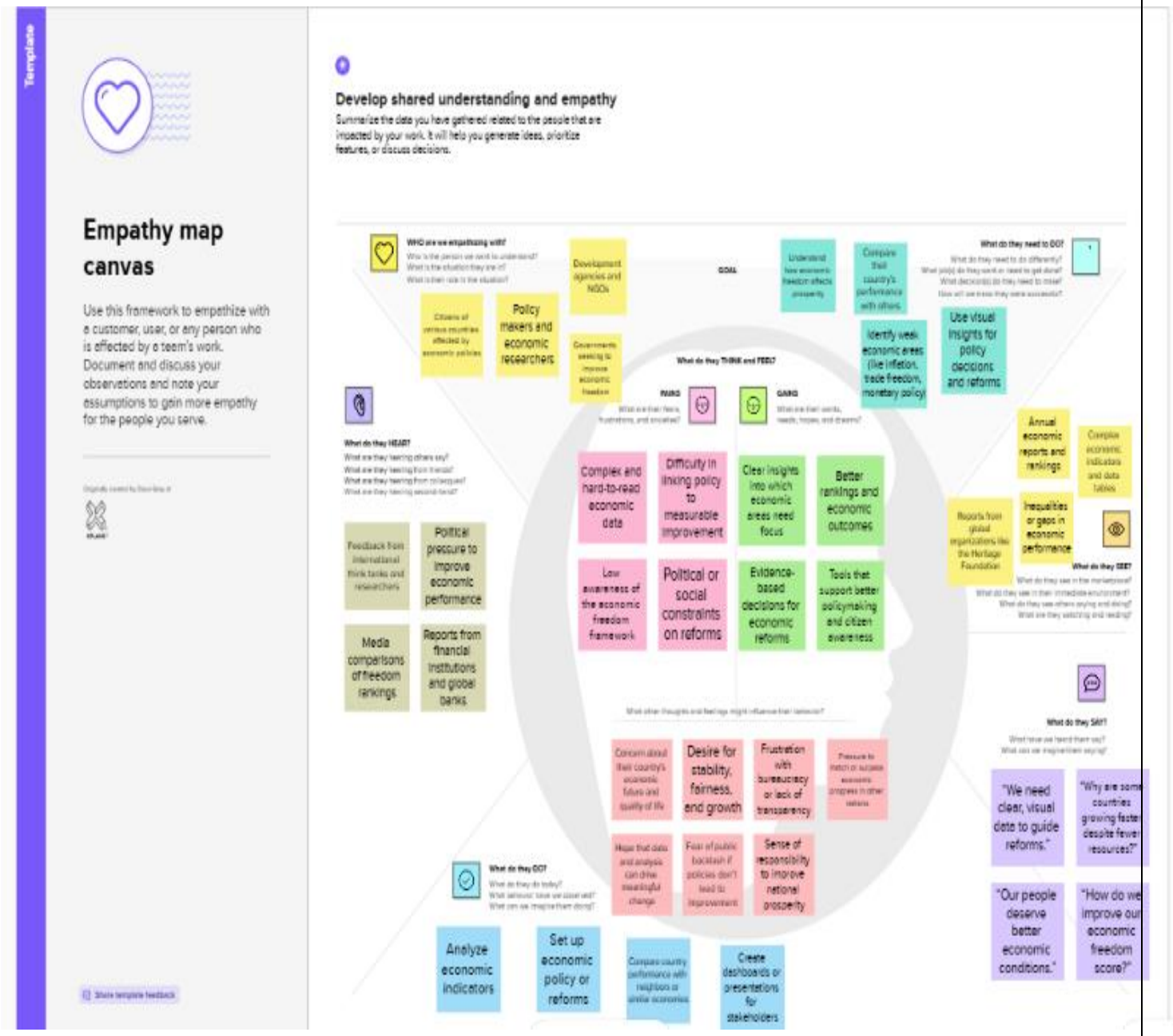
To understand and visualize how economic freedom influences prosperity across nations by exploring relationships between indicators such as GDP, inflation, monetary freedom, and investment freedom.



Statement	I am	I'm trying to	But	Because	Which makes me feel
PS-1	An economic analyst or policymaker	Assess and compare the level of economic freedom across countries in a reliable and interactive manner	The existing tools are static, lack transparency, and offer limited interactivity	Most data is embedded in long-form reports and lacks user-driven analysis features	Frustrated and restricted in making timely and data-driven economic policy decisions
PS-2	A public user or student	Understand how economic freedom varies across countries and how it relates to prosperity	I don't have access to simple visual tools or datasets to interpret this information	Current indexes are complex and not designed for general public interaction	Confused and disconnected from economic data that impacts lives

2.2.EMPATHY MAP CANVAS

- Who: Students, researchers, policymakers
- Do: Explore data, compare countries, identify development gaps
- See: Complex economic reports
- Say/Do: "How can we improve economic freedom?"
- Hear: Reports, political feedback, economic debates
- Pain: Overwhelming data
- Gain: Actionable insights, comparative advantage

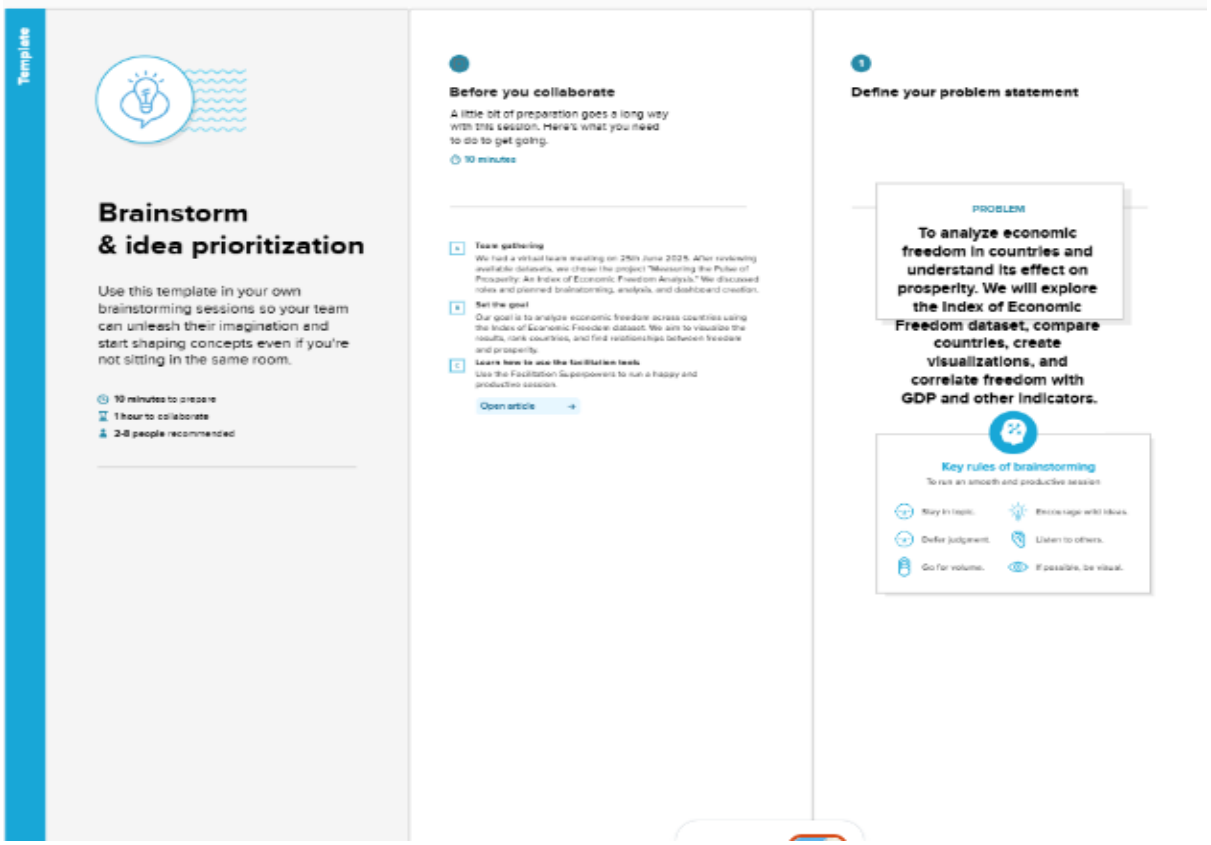


2.3 BRAINSTORMING

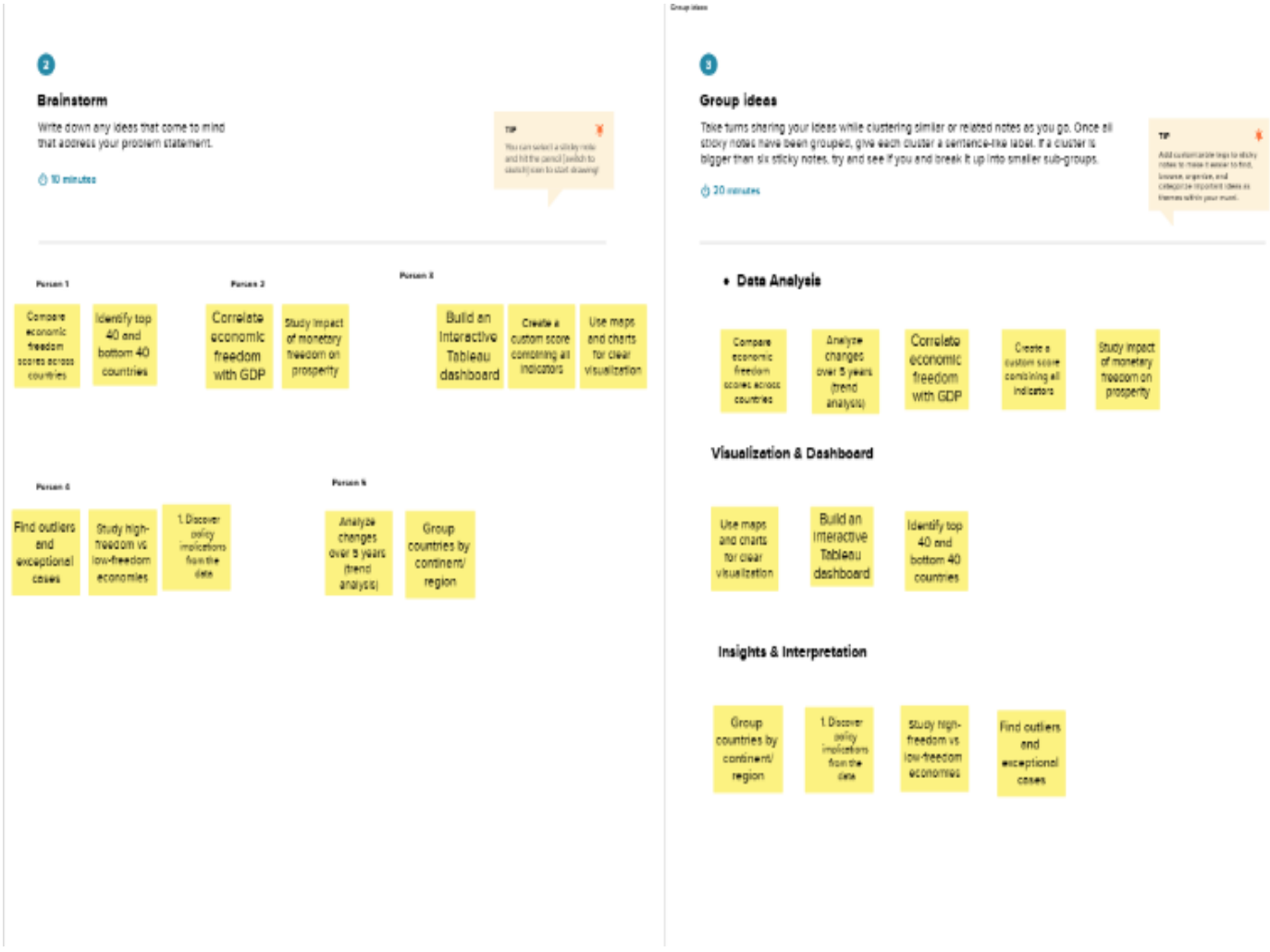
Key ideas included:
- GDP vs economic freedom comparison
- Top/bottom country ranking
- Region-based heatmaps
- Indicator-wise analysis
- Interactive dashboard in Tableau

Grouped into:
- Analysis
- Visualization
- Interpretation

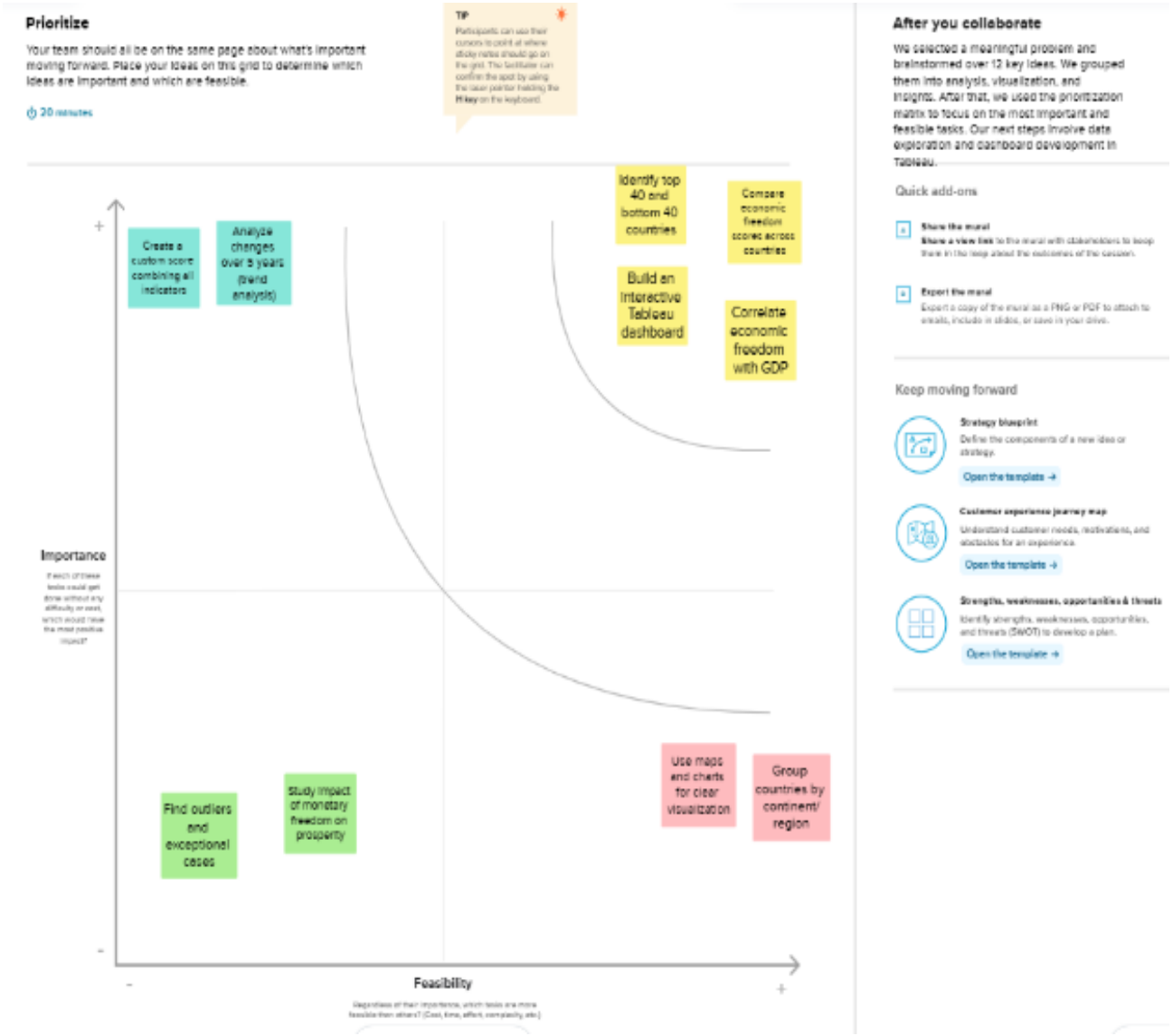
Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea Listing and Grouping



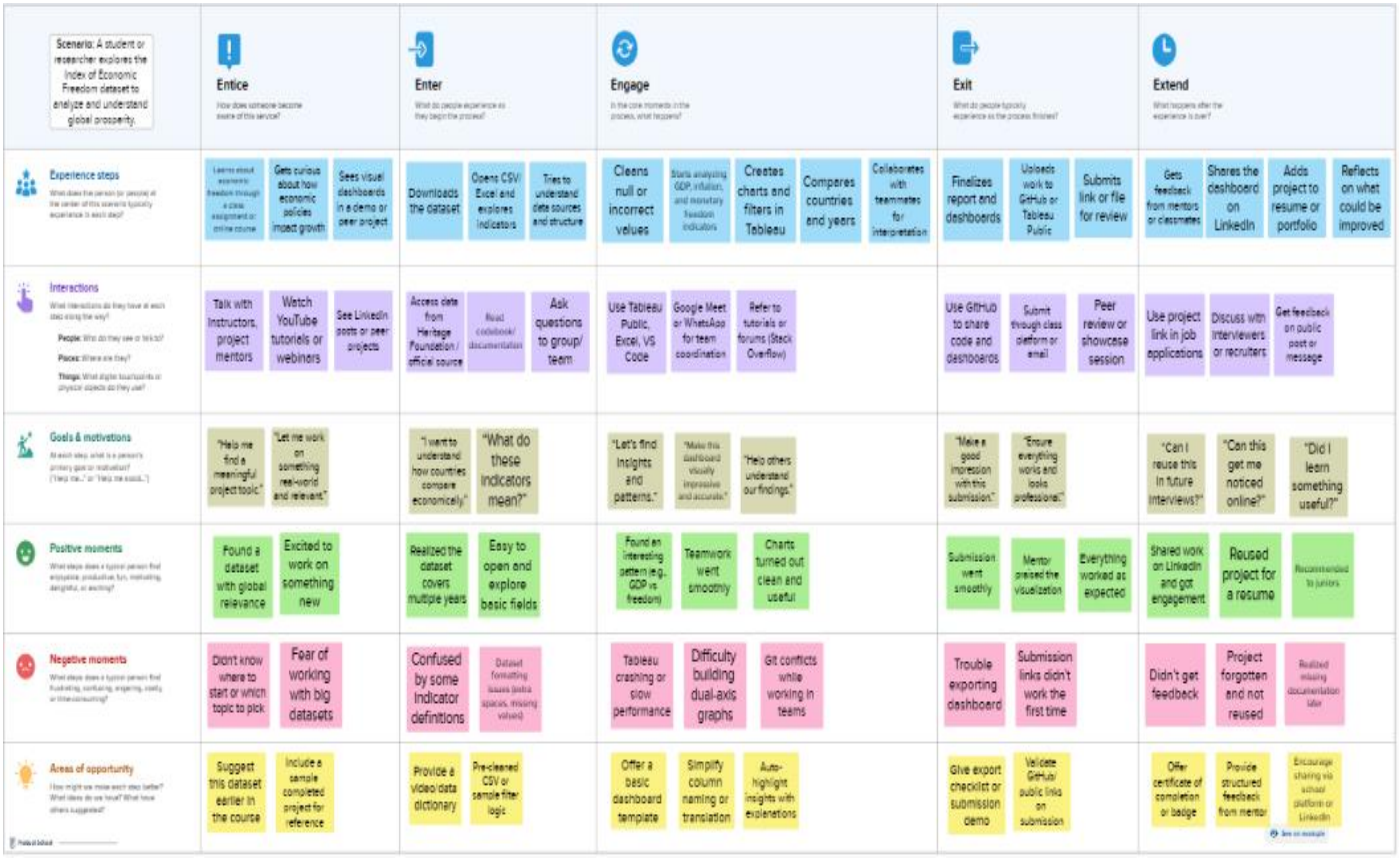
Step-3: Idea Prioritization



3.REQUIREMENT ANALYSIS

3.1 Customer journey Map

Experience mapped from discovering the dataset → exploring it → creating dashboards → submitting results → receiving feedback.



3.2.Solution requirement

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Dataset Upload	Upload Economic Freedom Dataset (CSV/Excel)
		Validate Data Format and Structure
FR-2	Index Computation	Apply Economic Freedom Index Formula
		Normalize and Aggregate Data
FR-3	Visualization & Reporting	Display Charts for Each Country/Region

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
		Allow Comparison Over Time
FR-4	User Roles & Authentication	Admin, Analyst, and Viewer Roles
		Secure Login via Email or Google OAuth
FR-5	Data Export	Export Freedom Index Reports in PDF or Excel

Non-functional Requirements:

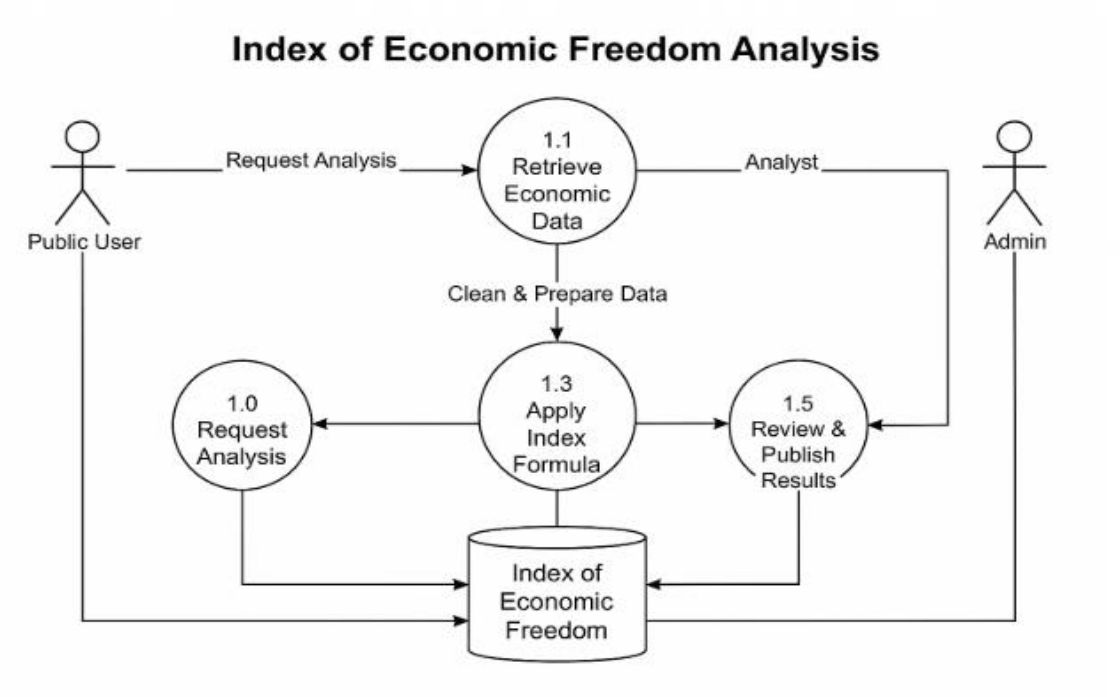
Following are the non-functional requirements of the proposed solution.

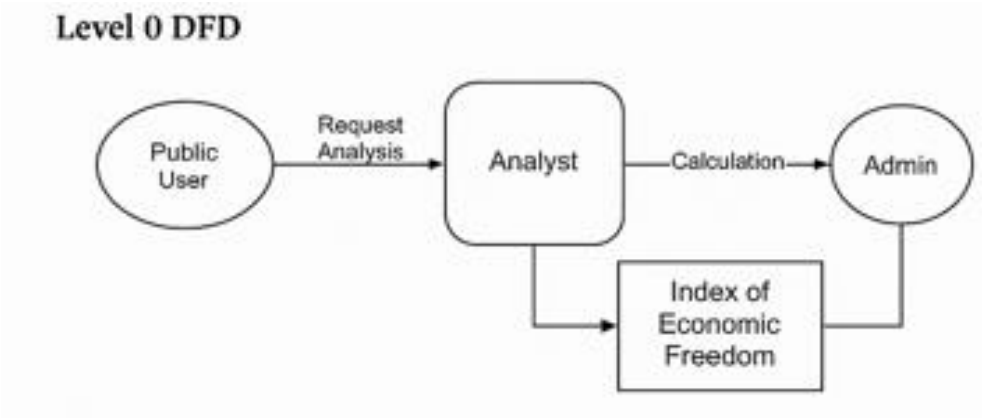
NFR No.	Non-Functional Requirement	Description
NFR-1	Usability	Interface should be user-friendly for analysts and public users.
NFR-2	Security	Ensure authentication, data privacy, and role-based access control.
NFR-3	Reliability	System should provide consistent results without failure.
NFR-4	Performance	Index computation and report generation must complete within 5 seconds.
NFR-5	Availability	System should have 99.5% uptime.
NFR-6	Scalability	Support expanding datasets with additional countries or indicators.

3.3.Data flow Diagram

Level 0 DFD:
- Input: Economic dataset
- Process: Clean → Analyze → Visualize
- Output: Dashboards and insights
- Users: Analysts, students

stored.





3.4.Technology stack

- Data Source: CSV file from Heritage Foundation
- Tool: Tableau Public
- Collaboration: GitHub
- Preprocessing: Excel / Python

Technical Architecture:

S.No	Component	Description	Technology
1	User Interface	Web portal for public users, analysts, and admins	React.js, Tailwind CSS
2	Application Logic-1	Data upload, preprocessing, and validation logic	Python (Flask or Django)

S.No	Component	Description	Technology
3	Application Logic-2	Index computation and aggregation	Python (Pandas, NumPy)
4	Application Logic-3	Visualization and filtering logic	Chart.js, D3.js
5	Database	Stores user roles, raw and processed economic data	PostgreSQL
6	Cloud Database	Cloud-hosted database for scalability and security	AWS RDS / Google Cloud SQL
7	File Storage	Stores uploaded datasets and exportable reports	AWS S3 / Google Cloud Storage
8	External API-1	Country-level economic indicators (if fetched dynamically)	World Bank API
9	Machine Learning Model	(Optional) Forecast economic freedom trends	Scikit-learn / XGBoost
10	Infrastructure	Application hosting & deployment	AWS EC2 / Google App Engine

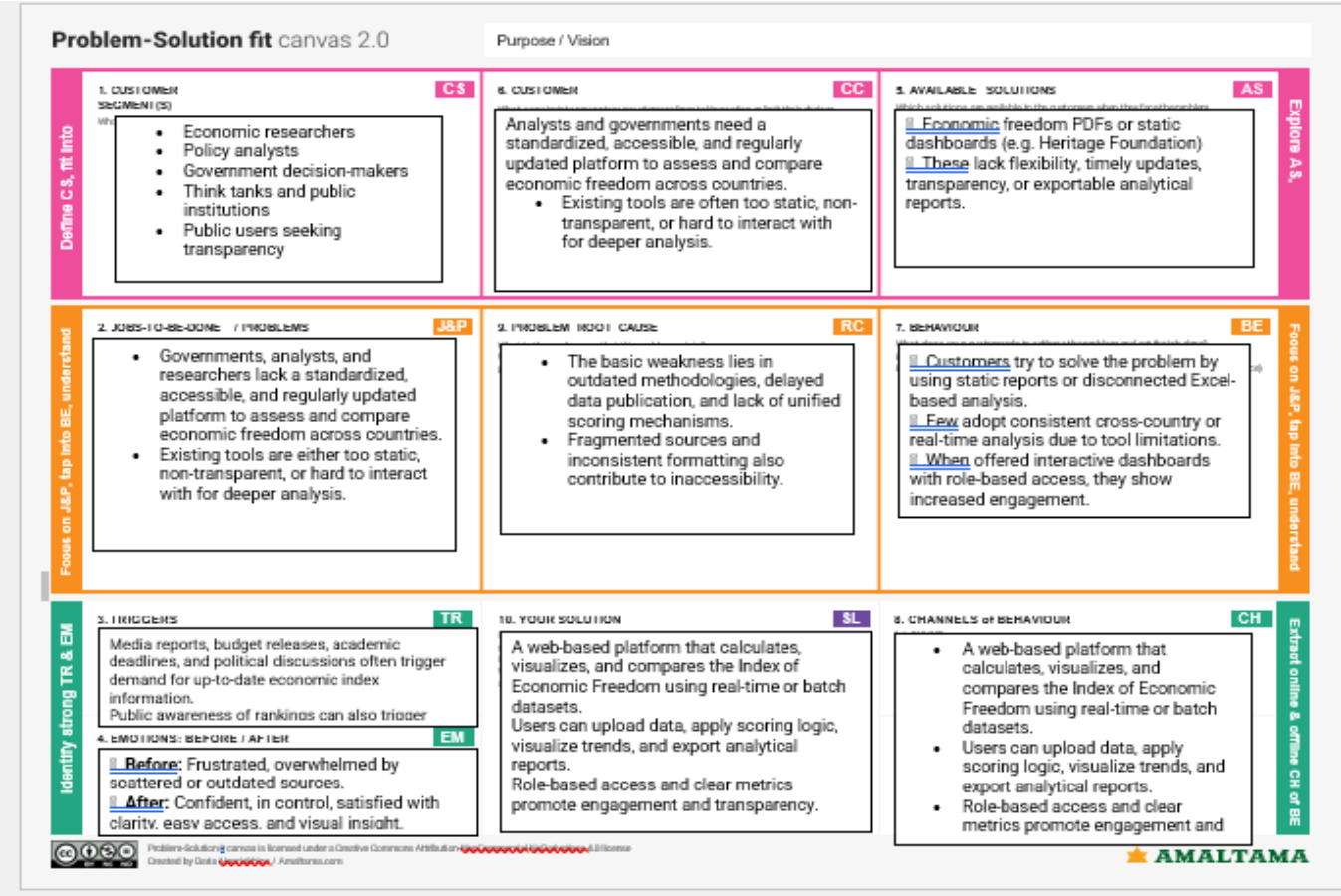
Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1	Open-Source Frameworks	Backend and frontend development frameworks	React.js, Flask, Django
2	Security Implementations	Data validation, login authentication, access control by role	OAuth 2.0, JWT, HTTPS, IAM (AWS)
3	Scalable Architecture	Modular microservices with database and UI tiers	3-Tier Architecture
4	Availability	Cloud-based deployment with potential load balancing	AWS Load Balancer /

4. PROJECT DESIGN

4.1 Problem Solution Fit

We address the difficulty in understanding raw economic data by converting it into clear, comparative visuals.



4.2 Proposed Solution

Create interactive dashboards with filters and story elements that help users understand and compare countries' economic status.

Proposed Solution Template:

Project team shall fill the following information in the proposed solution template.

S.No.	Parameter	Description
1	**Problem Statement**	Analysts, policymakers, and citizens lack an accessible, transparent, and dynamic tool to analyze and compare the economic freedom of countries.
2	**Idea / Solution Description**	A web-based platform that collects economic data, computes a standardized freedom index, provides interactive visualizations, and supports exportable reports. It supports multiple user roles (analyst, admin, public) and integrates scoring logic to track freedom trends.

S.No.	Parameter	Description
3	**Novelty / Uniqueness**	Combines real-time index generation, interactive dashboards, and transparent scoring logic in one accessible platform—unlike static PDF-based reports.
4	**Social Impact / Customer Satisfaction**	Promotes transparency and civic engagement by making economic data understandable to the public. Helps decision-makers adopt policies that enhance economic freedom.
5	**Business Model (Revenue Model)**	Freemium model: basic access is free for public users; subscription-based access for advanced analytics, report generation, and data exports for institutions.
6	**Scalability of the Solution**	Can scale horizontally by expanding to new countries, adding indicators, and integrating global data APIs. Supports cloud-based deployment for high availability and performance.

4.3 Solution Architecture

1. Raw Dataset
2. Preprocessing
3. Calculated fields
4. Dashboard Design
5. Storyboard Report

Key Architectural Components:

1. Frontend (User Interface):
    - Built with React.js and styled using Tailwind CSS.
    - Users (public, analyst, admin) can upload data, view dashboards, and export reports.
2. Backend Services:
    - Developed using Python (Flask/Django) for API creation and logic.
    - Handles dataset ingestion, validation, index computation, and user role management.
3. Data Storage:
    - Uses PostgreSQL or Google Cloud SQL for structured storage of country-level indicators and computed scores.
    - Uploads stored in AWS S3 / Google Cloud Storage.
4. Index Computation Engine:
    - Applies a weighted formula to compute the Economic Freedom Index using indicators like property rights, tax burden, and labor freedom.
    - Frameworks: Pandas, NumPy
5. Visualization Layer:
    - Interactive graphs and charts powered by Chart.js or D3.js for year-wise and country-wise comparisons.

6. Authentication & Security:
    - OAuth 2.0 / Google Sign-In for secure login.
    - Role-based access control for feature restrictions.
7. Hosting Infrastructure:
    - Deployed on AWS EC2 or Google App Engine
    - Supports scalability via load balancing and containerization (Docker/Kubernetes)

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

Product Backlog, Sprint Schedule, and Estimation

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Preparation	USN-1	As a data analyst, I want to collect data on economic freedom indicators	2	High	Team A
Sprint-1		USN-2	As a data engineer, I want to load the collected data into a clean format	1	High	Team A
Sprint-1		USN-3	As a data scientist, I want to handle missing values for consistent data analysis	3	Medium	Team A
Sprint-1		USN-4	As a data scientist, I want to encode categorical data properly	2	Medium	Team A
Sprint-2	Modeling & Deployment	USN-5	As a developer, I want to build an index model to compute economic freedom	5	High	Team B
Sprint-2		USN-6	As a tester, I want to validate the index model for correctness	3	High	Team B
Sprint-2		USN-7	As a UI designer, I want to create HTML pages to display results	3	Medium	Team C
Sprint-2		USN-8	As a backend developer, I want to deploy the application using Flask	5	High	Team C

Project Tracker, Velocity & Burndown Chart:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	Data Preparation	USN-1	As a data analyst, I want to collect data on economic freedom indicators	2	High	Team A
Sprint-1		USN-2	As a data engineer, I want to load the collected data into a clean format	1	High	Team A
Sprint-1		USN-3	As a data scientist, I want to handle missing values for consistent data analysis	3	Medium	Team A
Sprint-1		USN-4	As a data scientist, I want to encode categorical data properly	2	Medium	Team A
Sprint-2	Modeling & Deployment	USN-5	As a developer, I want to build an index model to compute economic freedom	5	High	Team B
Sprint-2		USN-6	As a tester, I want to validate the index model for correctness	3	High	Team B

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-2		USN-7	As a UI designer, I want to create HTML pages to display results	3	Medium	Team C
Sprint-2		USN-8	As a backend developer, I want to deploy the application using Flask	5	High	Team C

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

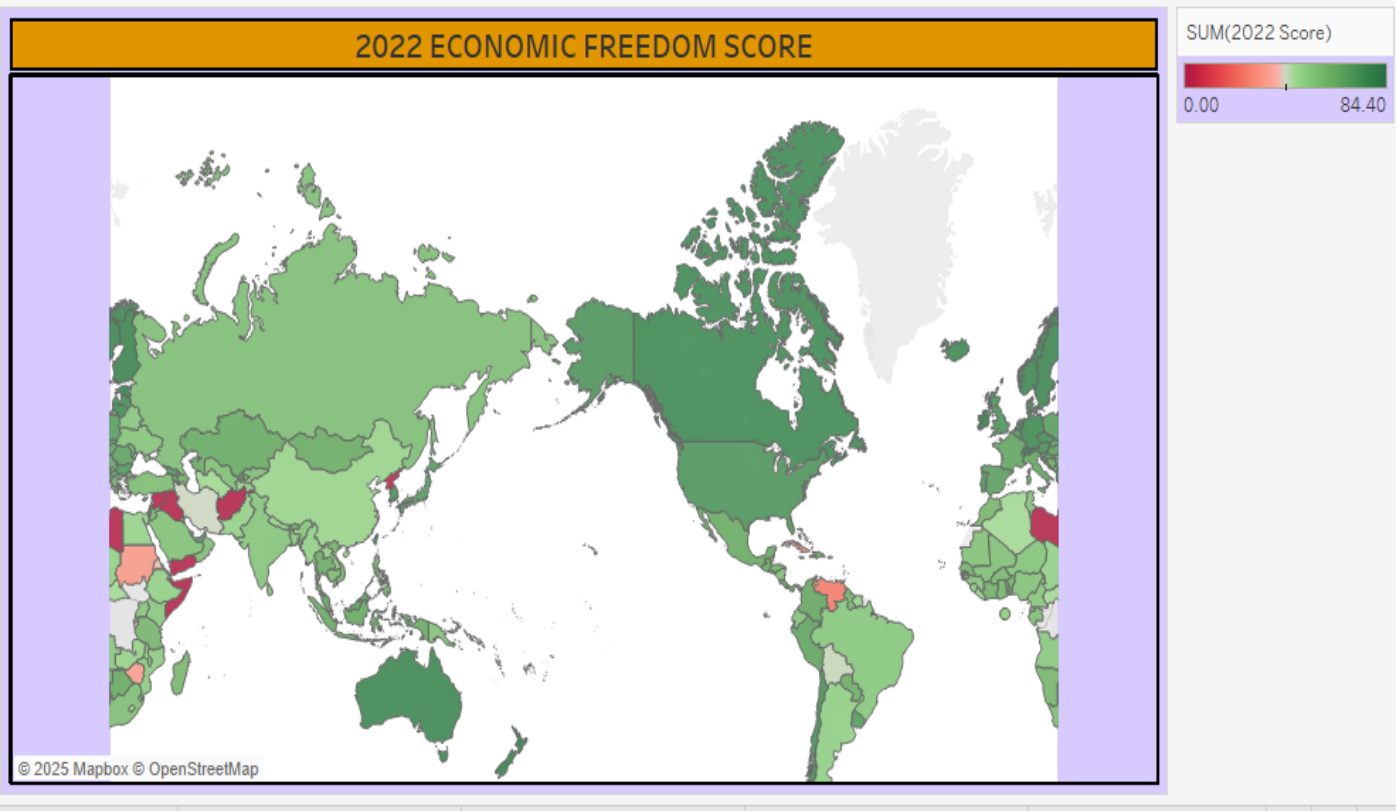
S.No.	Parameter	Screenshot / Values
1	Data Rendered	Data was imported from the Index of Economic Freedom dataset (CSV format). It contains various indicators such as GDP, inflation rate, trade freedom, monetary freedom, and investment freedom for different countries over multiple years.
2	Data Preprocessing	Unnecessary columns were removed. Missing values were handled using row-level filtering. Data types were standardized and renamed for clarity. Null entries were excluded before dashboard design.
3	Utilization of Filters	Filters used include: Country, Year, Region, Economic Freedom Score Range, and Indicator Type. These filters allow users to customize views and comparisons easily.
4	Calculation Fields Used	- GDP per Indicator Ratio - Custom Economic Index Score (weighted average) - Inflation vs Freedom Delta - Score Category Labels based on range
5	Dashboard Design	No of Visualizations / Graphs: 6 Visuals include: Line chart for GDP trends, Bar chart for top 10 countries, Heatmap by region, Pie chart for indicator distribution, Word cloud of key indicators, and Interactive Filters Panel.
6	Story Design	No of Visualizations / Graphs: 4 Story includes: Introduction to dataset, Key indicators visual summary, Region-wise freedom story, Final dashboard analysis and insights.

7. RESULTS

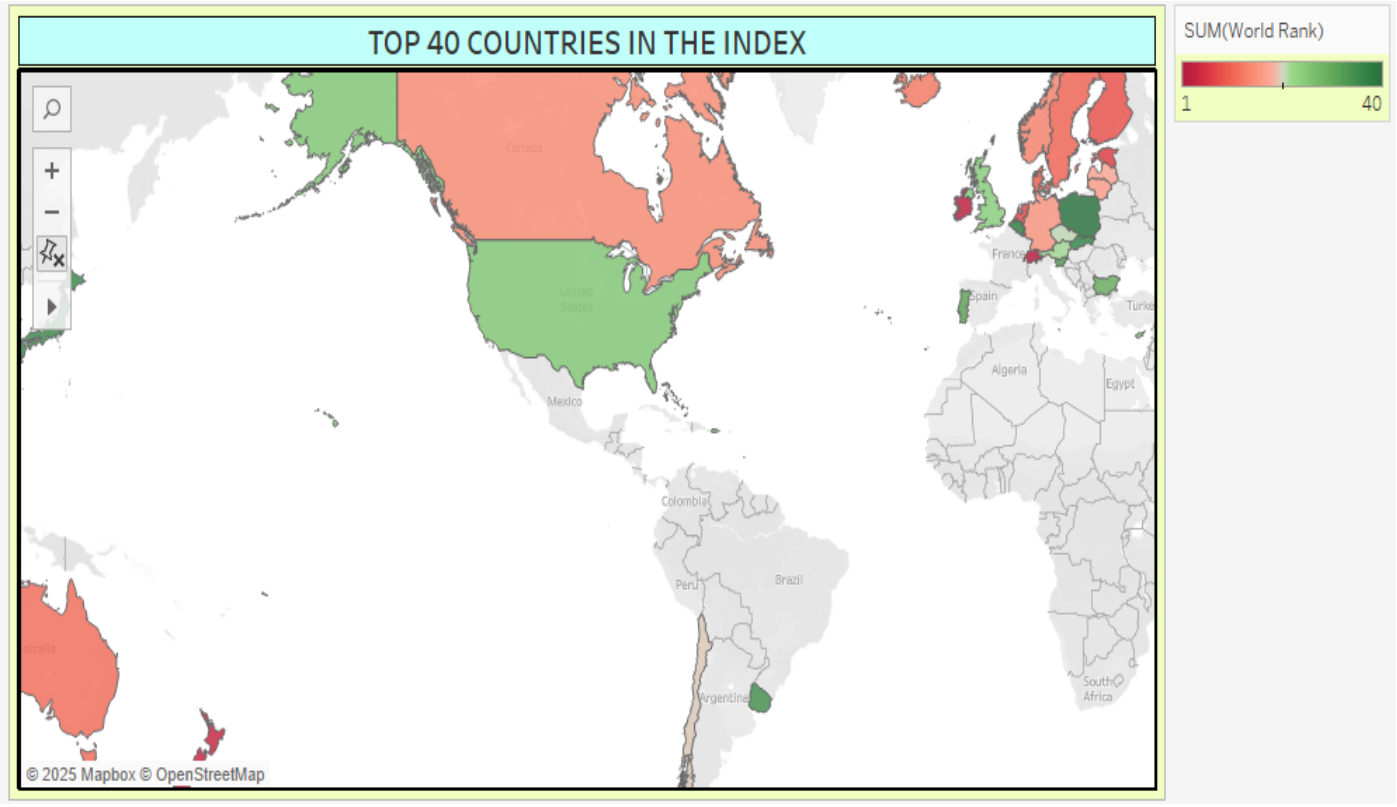
7.1 Output Screenshots

Visualisations

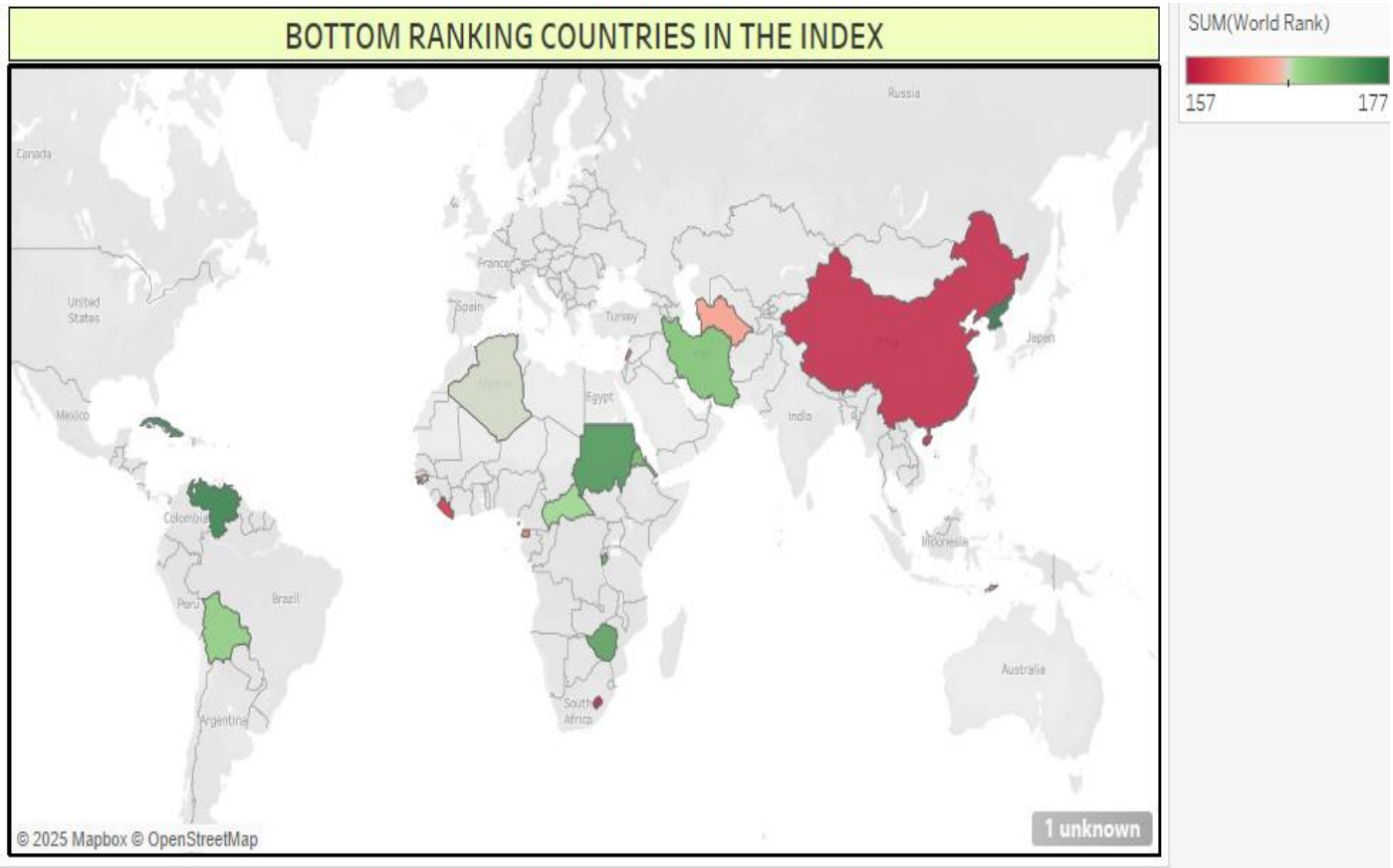
1) 2022 Economic freedom score



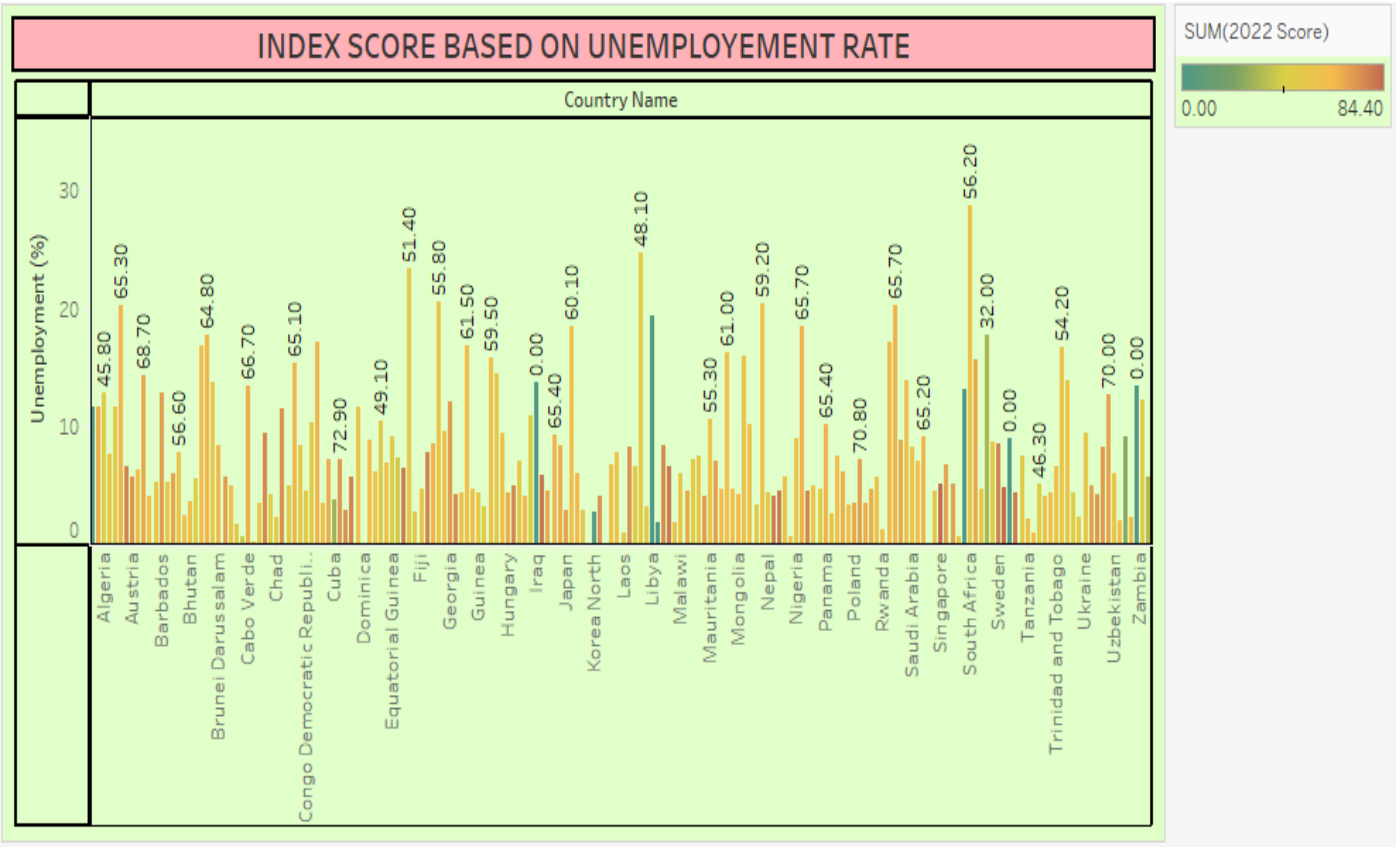
2) Top 40 countries in the index



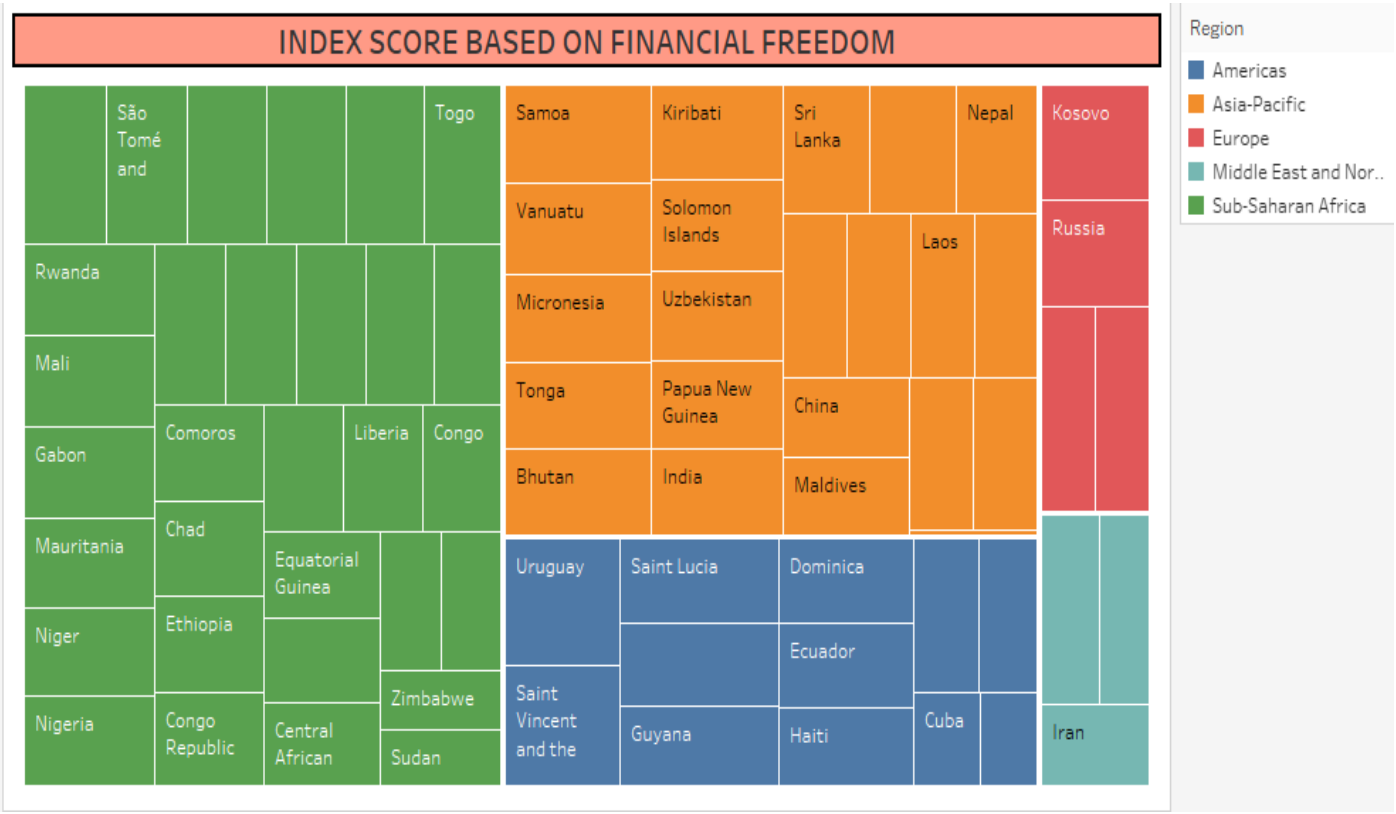
3) Bottom ranking countries in the index



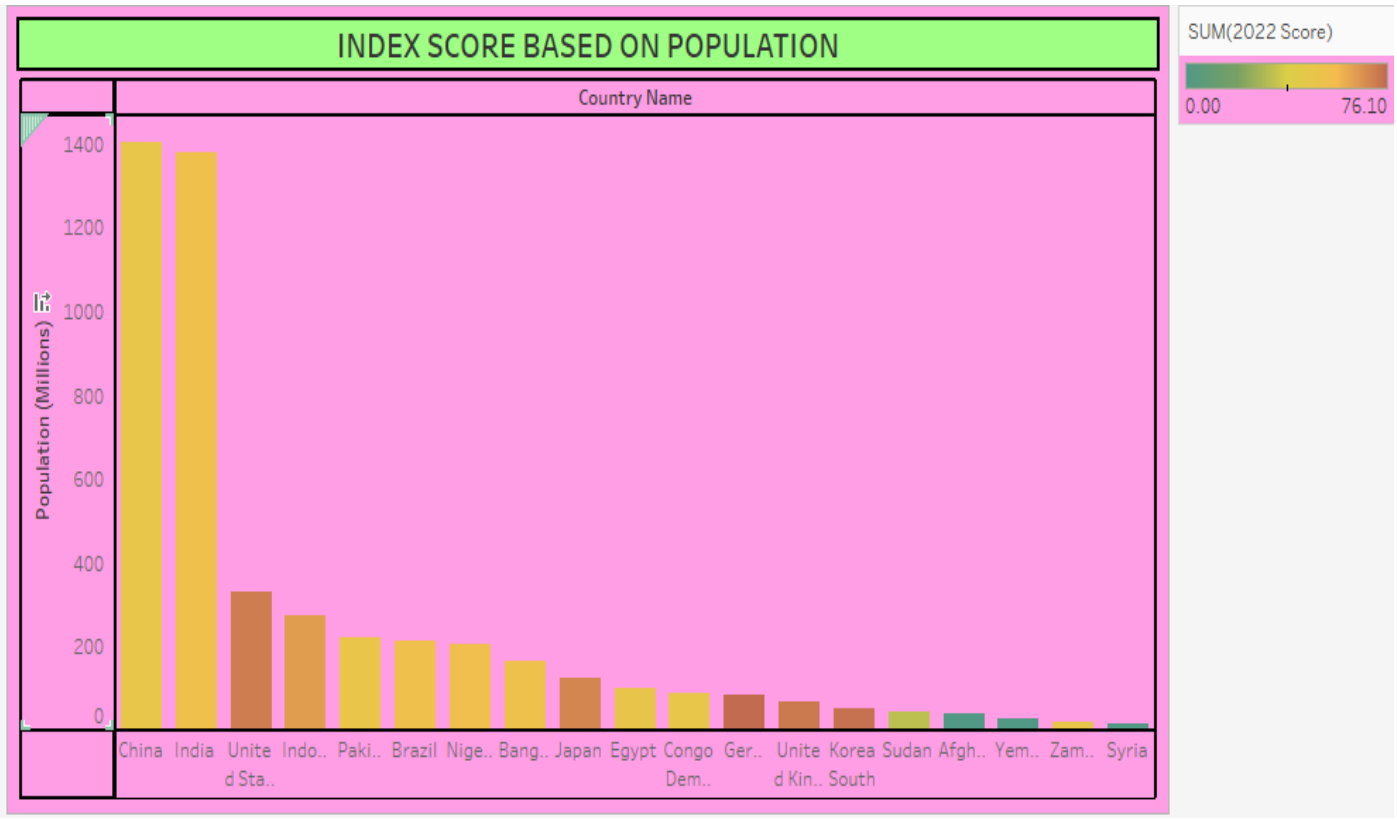
4) Index score based on unemployement rate



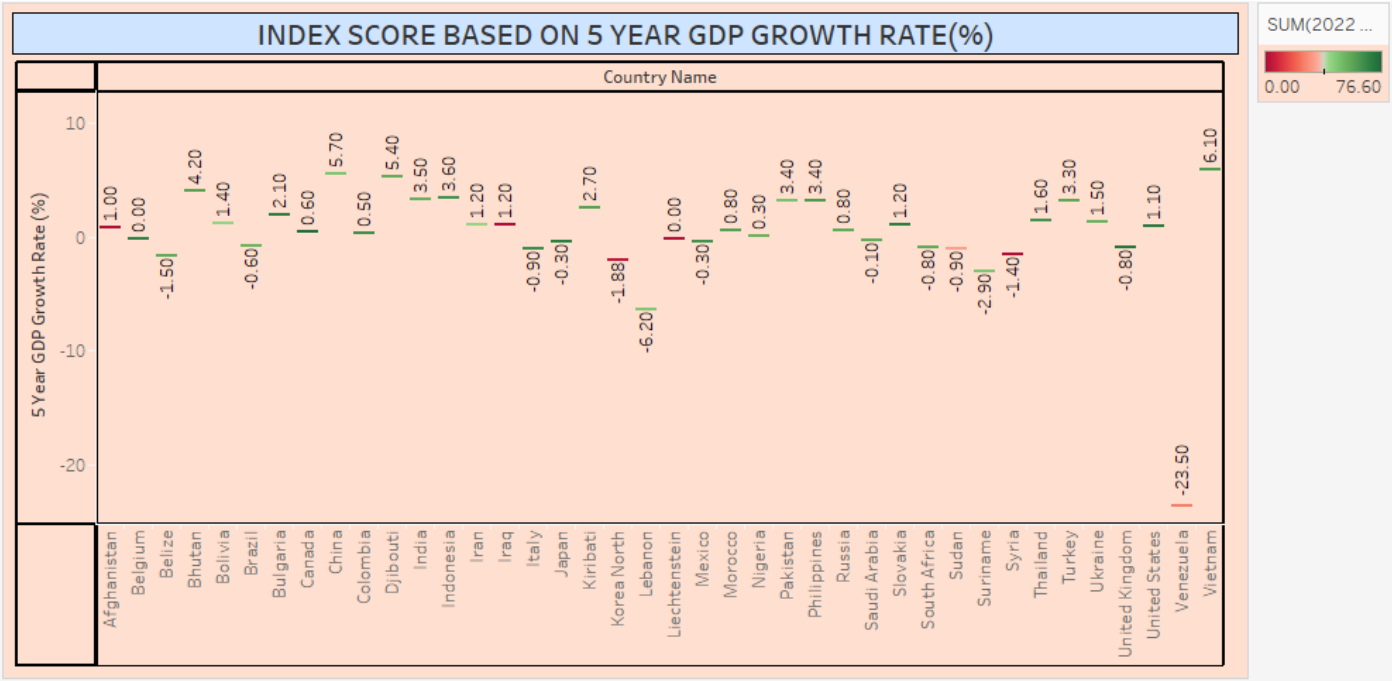
5) Index score based on financial freedom



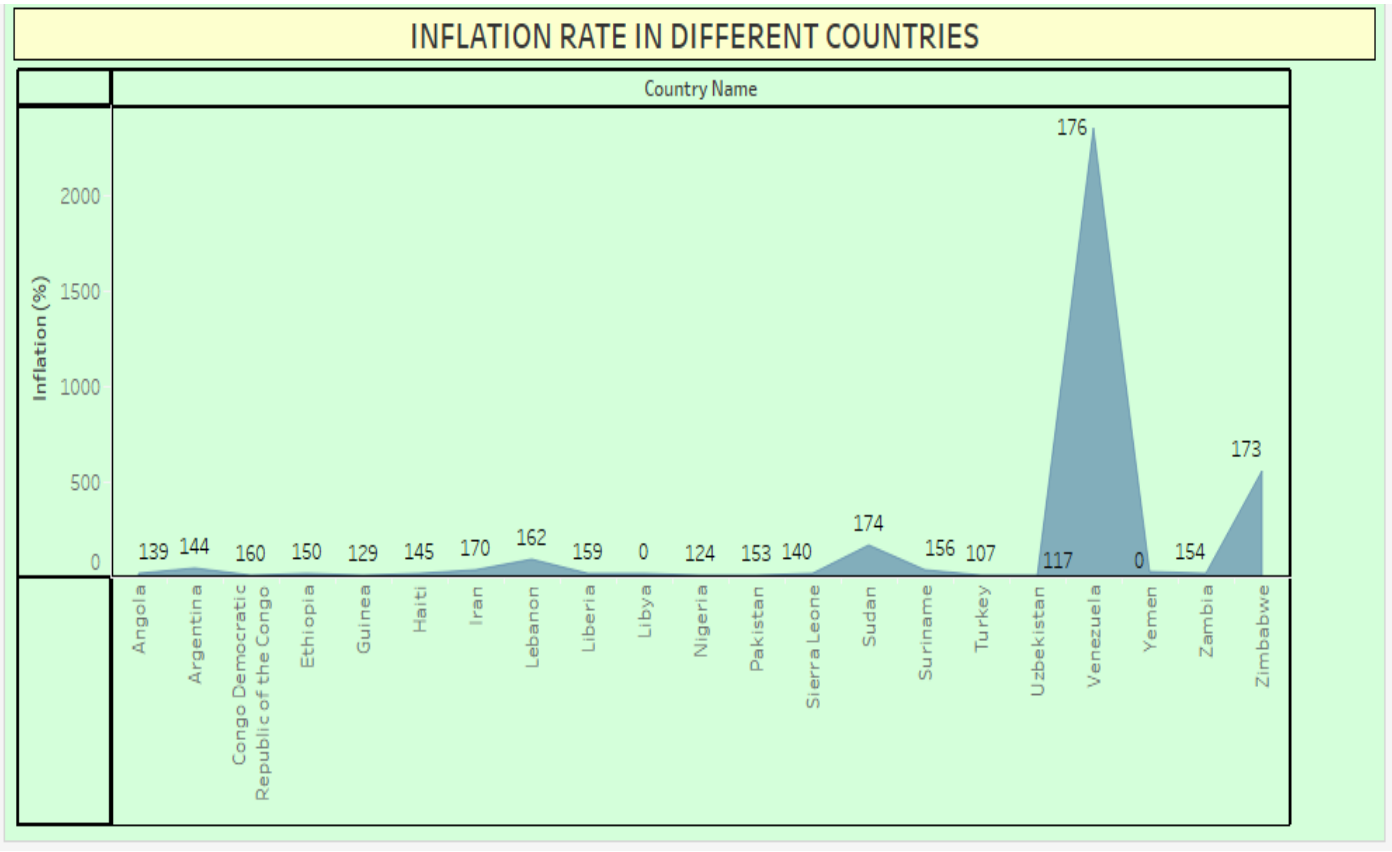
6) Index score based on population



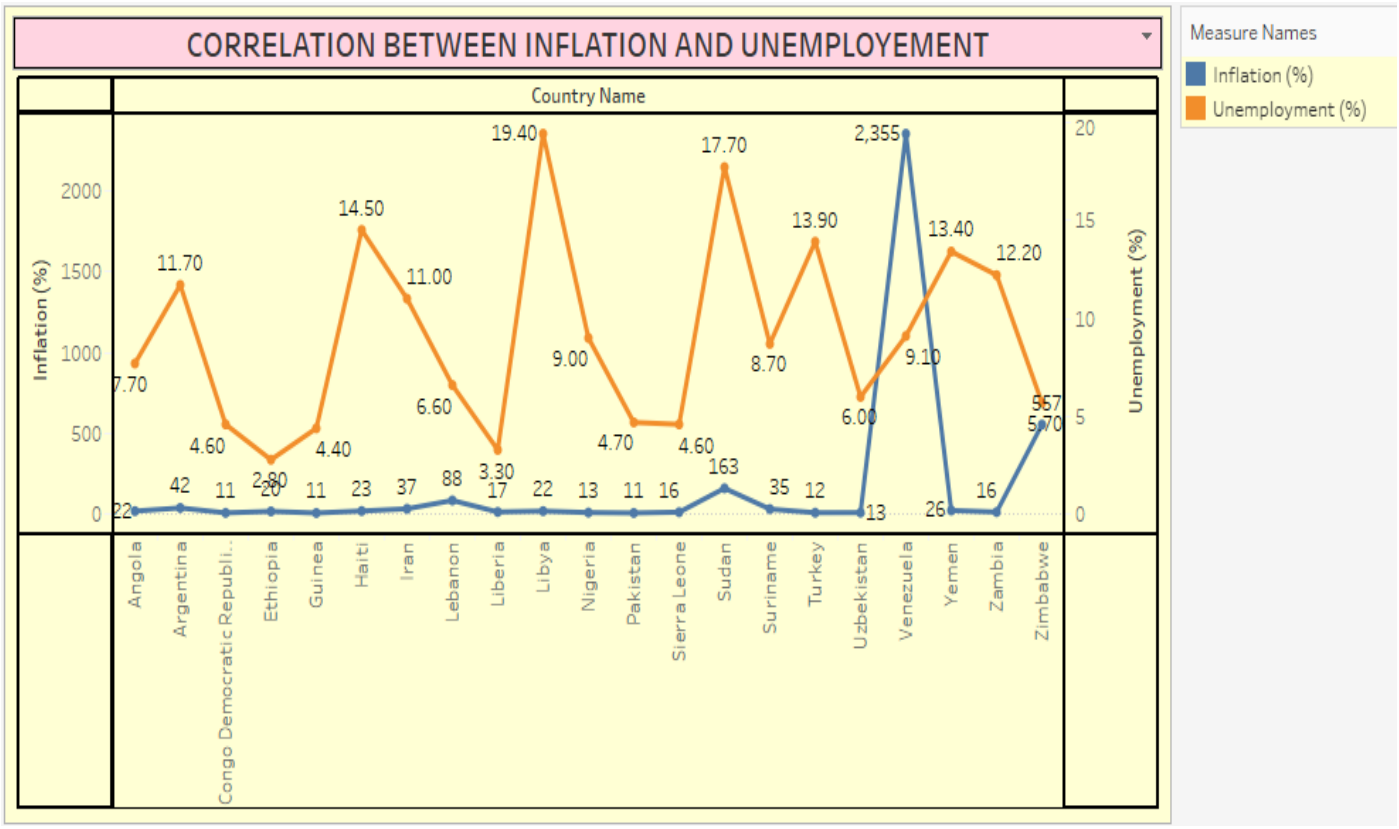
7) Index score based on 5 year GDP growth rate(%)



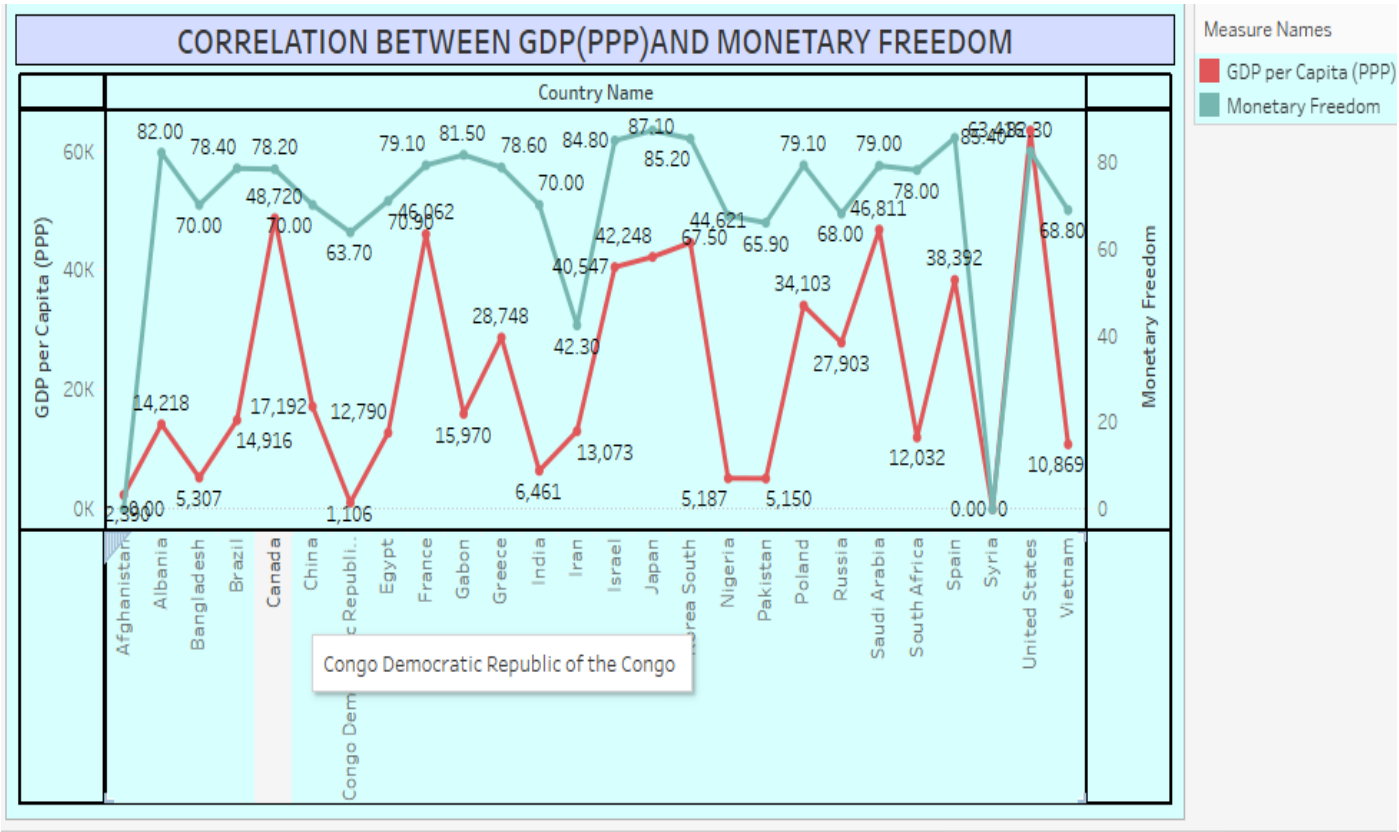
8) Inflation rate in different countries



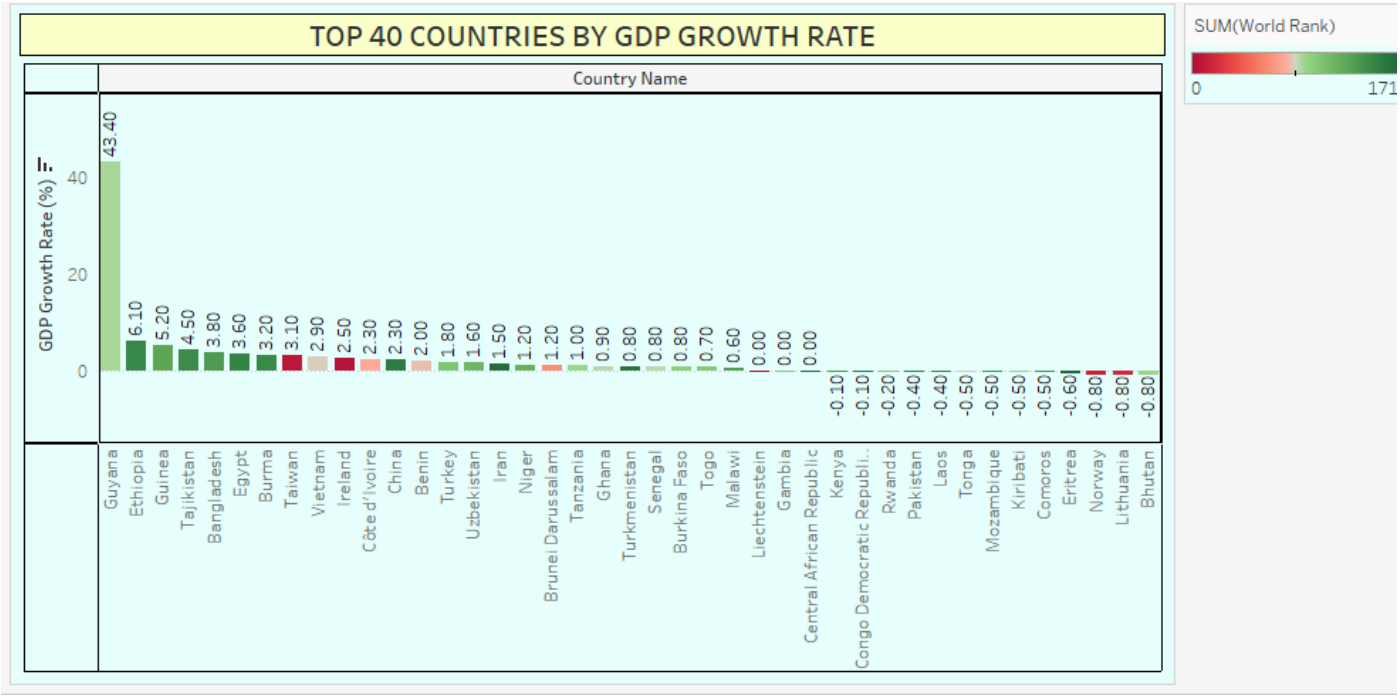
9) Correlation between inflation and unemployement



10) Correlation between GDP(PPP) and momentary freedom

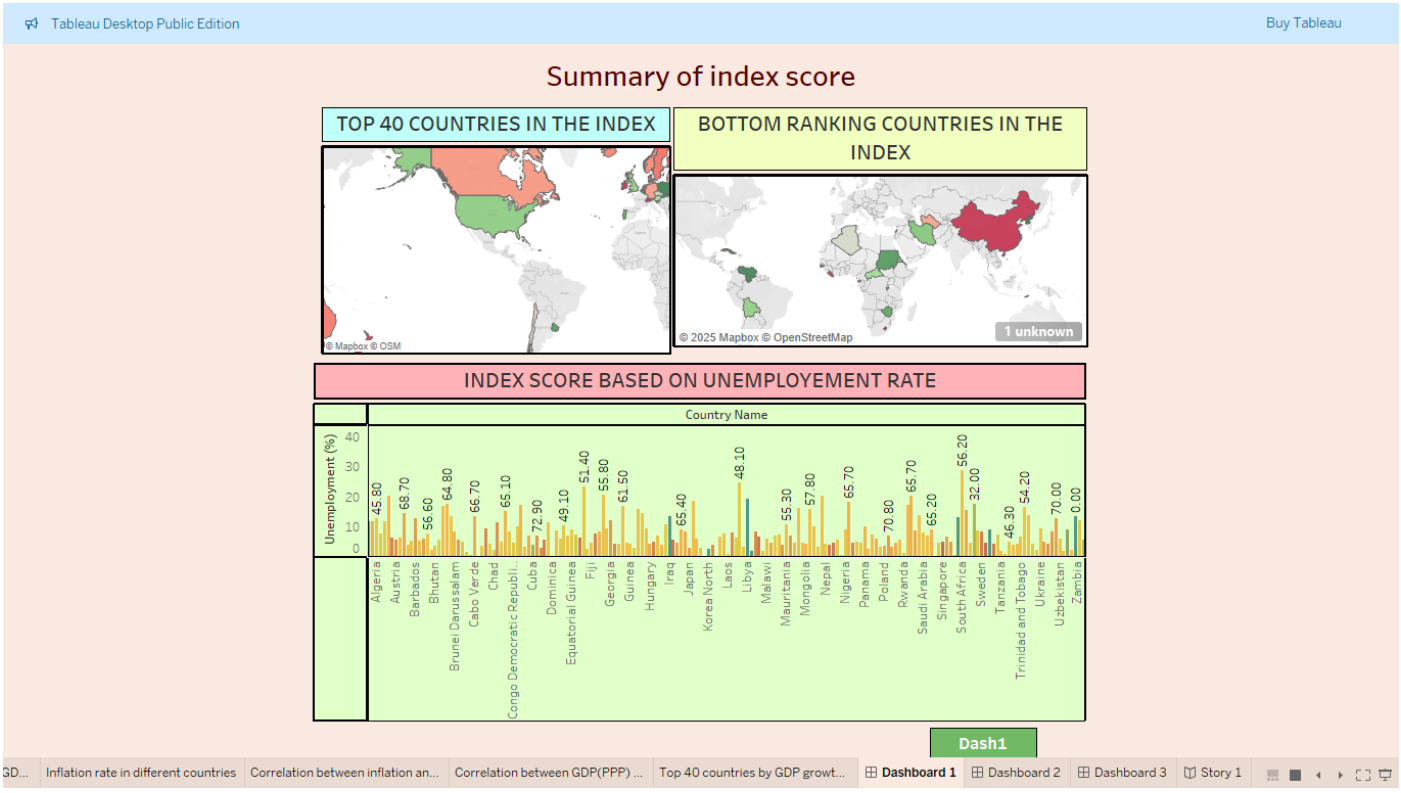


11) Top 40 countries by GDP growth Rate



Dashboards

1)



2)

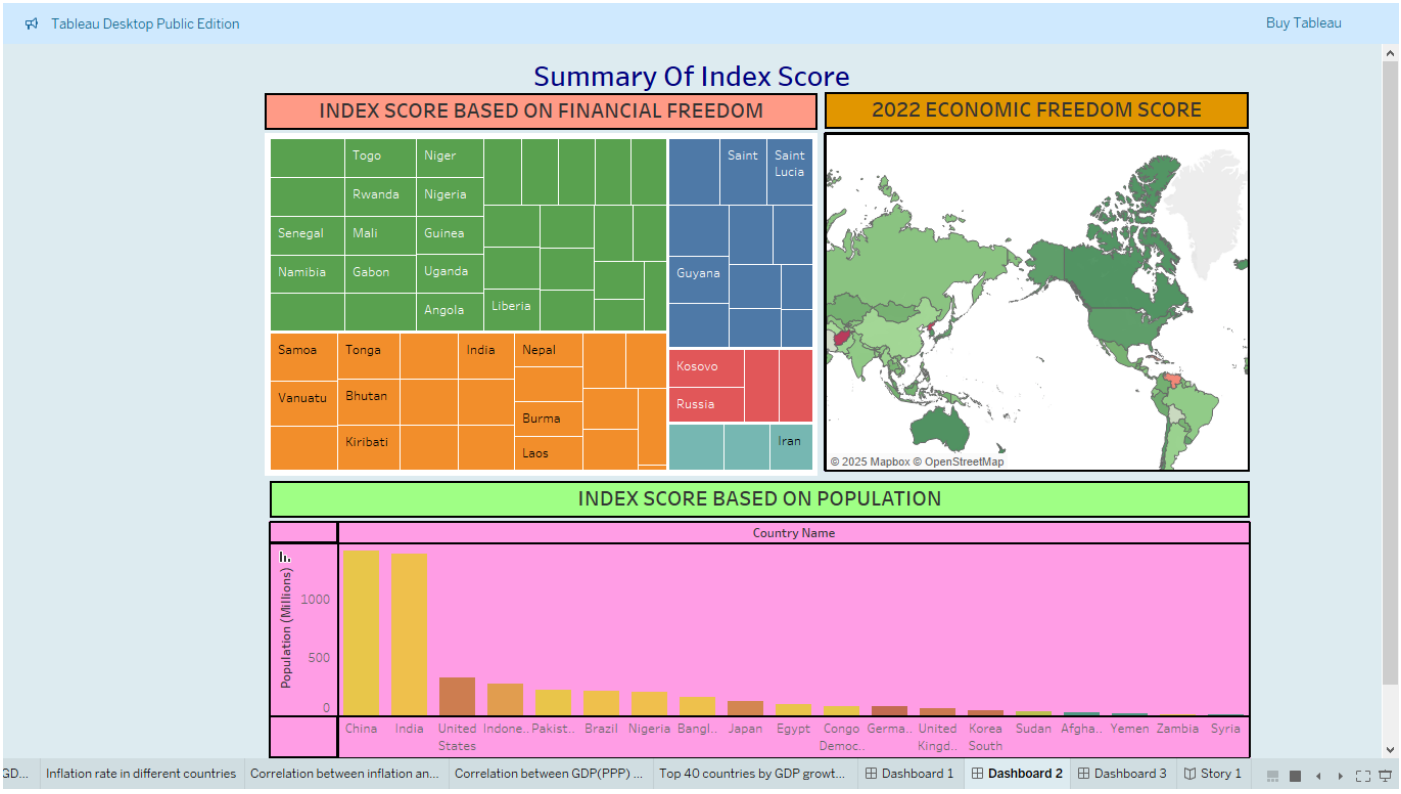


Tableau Desktop Public Edition
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Summary Of Index Score
INDEX SCORE BASED ON FINANCIAL FREEDOM
2022 ECONOMIC FREEDOM SCORE
Togo
Niger
Rwanda
Nigeria
Senegal
Mali
Guinea
Namibia
Gabon
Uganda
Angola
Liberia
Saint
Saint Lucia
Guyana
Kosovo
Russia
Iran
Samoa
Tonga
India
Nepal
Vanuatu
Bhutan
Burma
Kiribati
Laos
© 2025 Mapbox © OpenStreetMap
INDEX SCORE BASED ON POPULATION
Country Name
Population (Millions)
1000
500
0
China
India
United States
Indone..
Pakist..
Brazil
Nigeria
Bangl..
Japan
Egypt
Congo Democ..
Germa..
United Kingd..
Korea South
Sudan
Afgha..
Yemen
Zambia
Syria
GD...
Inflation rate in different countries
Correlation between inflation an...
Correlation between GDP(PPP) ...
Top 40 countries by GDP growt...
Dashboard 1
Dashboard 2
Dashboard 3
Story 1

3)

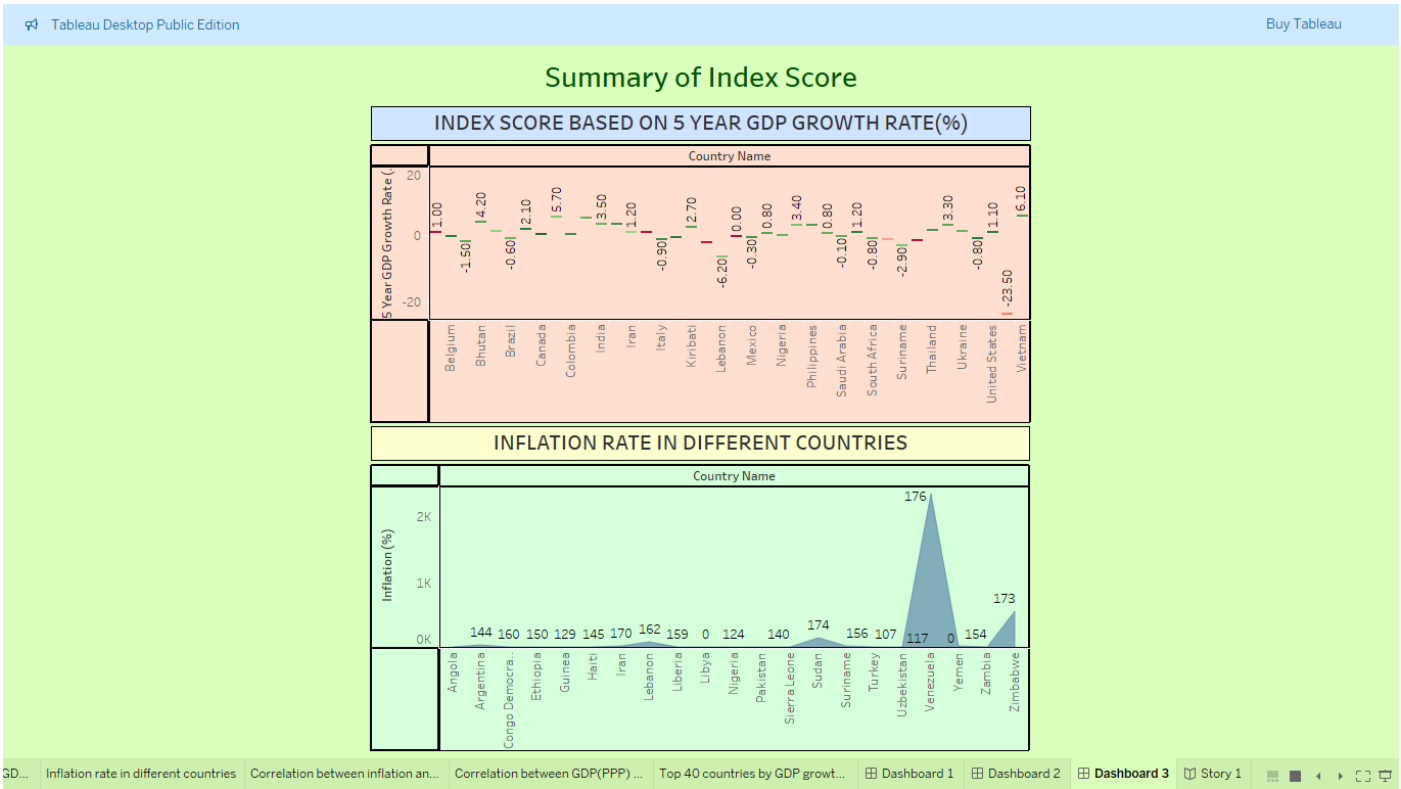
Tableau Desktop Public Edition
Buy Tableau
Summary of Index Score
INDEX SCORE BASED ON 5 YEAR GDP GROWTH RATE(%)
Country Name
5 Year GDP Growth Rate (
20
0
-20
1.00
-1.50
4.20
-0.60
2.10
5.70
3.50
1.20
-0.90
2.70
-6.20
0.00
-0.30
0.80
3.40
0.80
-0.10
1.20
-0.80
-2.90
3.30
-0.80
1.10
-23.50
6.10
Belgium
Bhutan
Brazil
Canada
Colombia
India
Iran
Italy
Kiribati
Lebanon
Mexico
Nigeria
Philippines
Saudi Arabia
South Africa
Suriname
Thailand
Ukraine
United States
Vietnam
INFLATION RATE IN DIFFERENT COUNTRIES
Country Name
Inflation (%)
2K
1K
0K
144
160
150
129
145
170
162
159
0
124
140
174
156
107
176
117
0
154
173
Angola
Argentina
Congo Democra..
Ethiopia
Guinea
Haiti
Iran
Lebanon
Liberia
Libya
Nigeria
Pakistan
Sierra Leone
Sudan
Suriname
Turkey
Uzbekistan
Venezuela
Yemen
Zambia
Zimbabwe
GD...
Inflation rate in different countries
Correlation between inflation an...
Correlation between GDP(PPP) ...
Top 40 countries by GDP growt...
Dashboard 1
Dashboard 2
Dashboard 3
Story 1

Story:

1-1

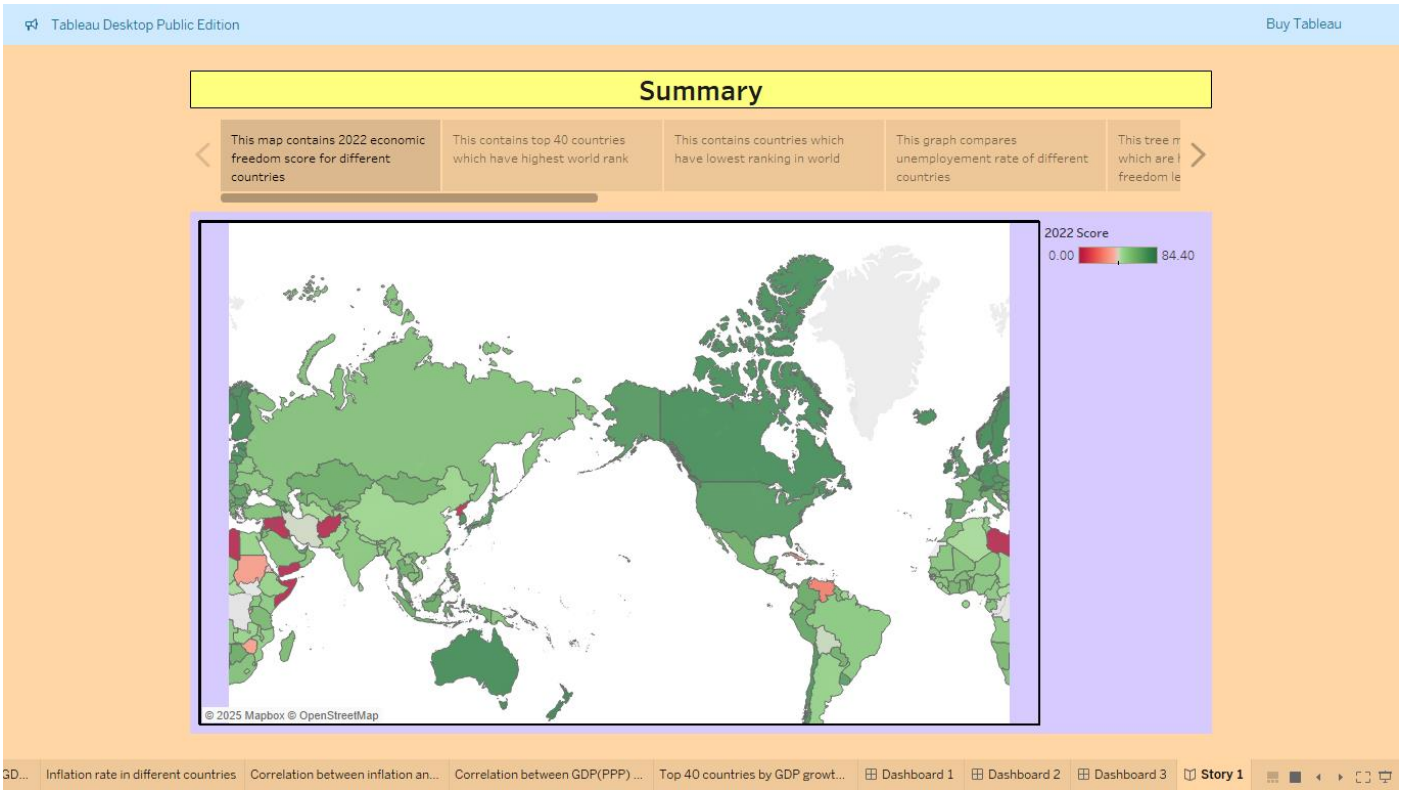
Tableau Desktop Public Edition
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Summary
This map contains 2022 economic freedom score for different countries
This contains top 40 countries which have highest world rank
This contains countries which have lowest ranking in world
This graph compares unemployement rate of different countries
2022 Score
0.00
84.40
© 2025 Mapbox © OpenStreetMap
Inflation rate in different countries
Correlation between inflation an...
Correlation between GDP(PPP) ...
Top 40 countries by GDP growt...
Dashboard 1
Dashboard 2
Dashboard 3
Story 1

1-2

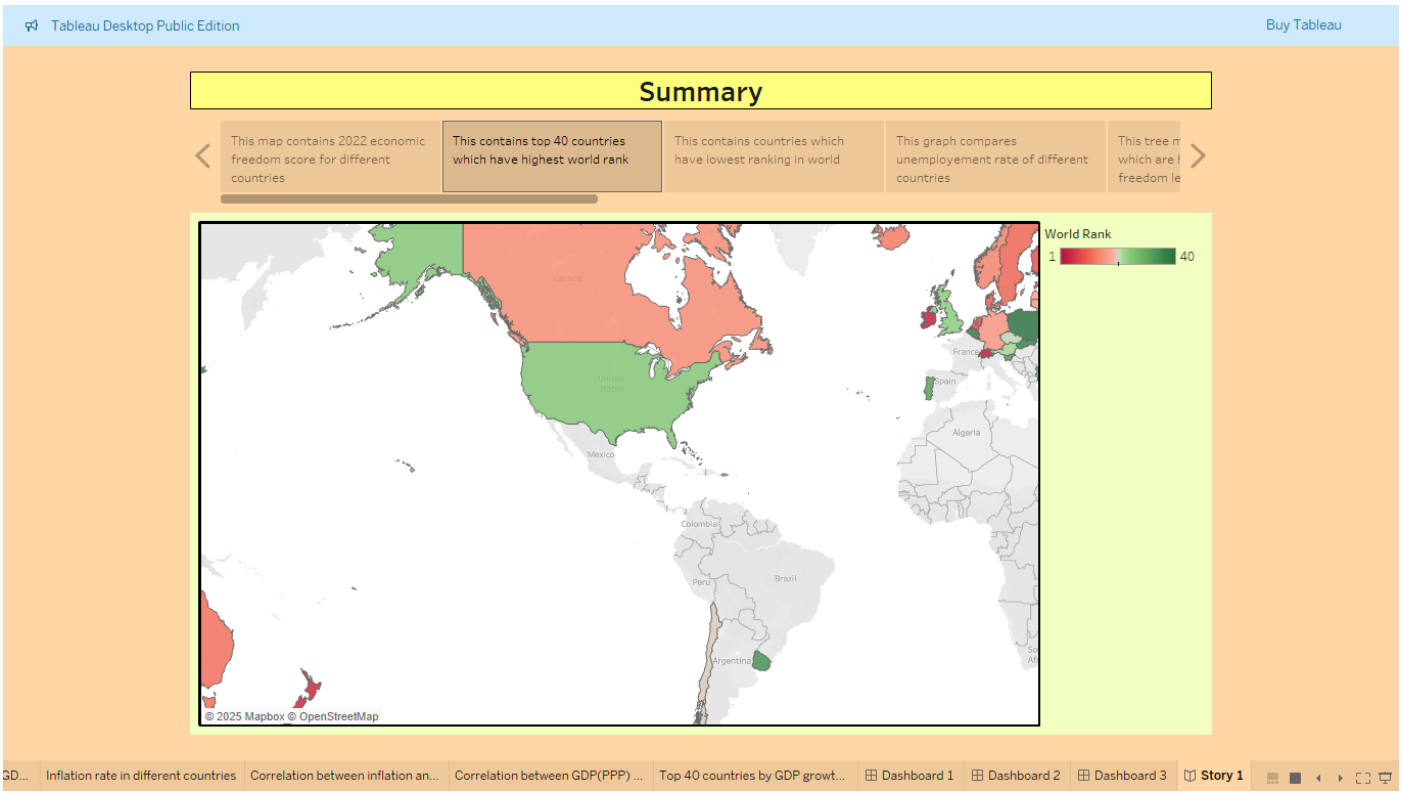
Tableau Desktop Public Edition
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Summary
This map contains 2022 economic freedom score for different countries
This contains top 40 countries which have highest world rank
This contains countries which have lowest ranking in world
This graph compares unemployement rate of different countries
World Rank
1
40
Canada
United States
Mexico
Colombia
Peru
Brazil
Argentina
France
Spain
Algeria
© 2025 Mapbox © OpenStreetMap
Inflation rate in different countries
Correlation between inflation an...
Correlation between GDP(PPP) ...
Top 40 countries by GDP growt...
Dashboard 1
Dashboard 2
Dashboard 3
Story 1

1-3

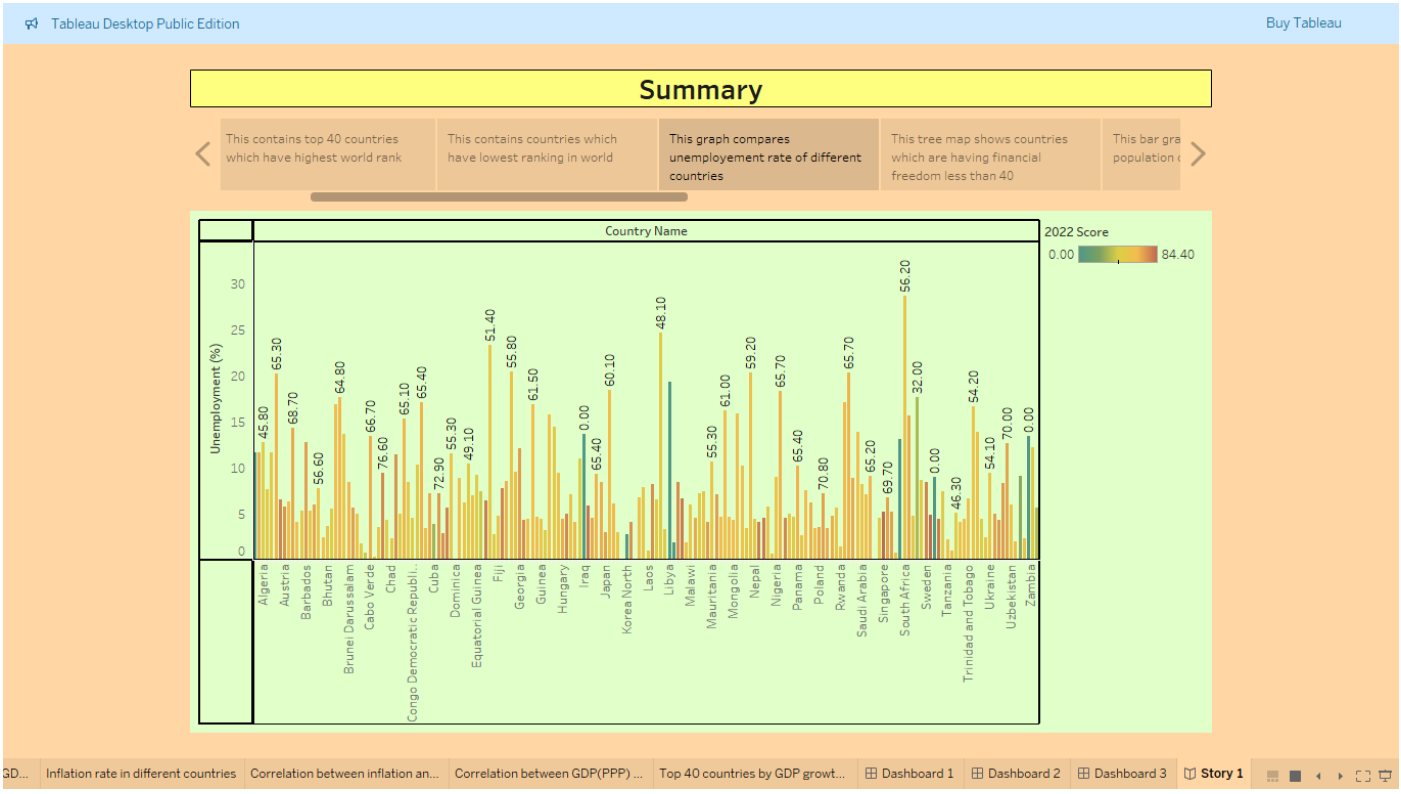
Tableau Desktop Public Edition
Buy Tableau
Summary
This contains top 40 countries which have highest world rank
This contains countries which have lowest ranking in world
This graph compares unemployement rate of different countries
This tree map shows countries which are having financial freedom less than 40
This bar gra population
Country Name
2022 Score
0.00
84.40
Unemployment (%)
0
5
10
15
20
25
30
45.80
65.30
68.70
56.60
64.80
66.70
76.60
65.10
65.40
72.90
55.30
49.10
51.40
55.80
61.50
0.00
65.40
60.10
48.10
55.30
61.00
59.20
65.70
65.40
70.80
65.70
65.20
69.70
56.20
32.00
0.00
46.30
54.20
54.10
70.00
0.00
Algeria
Austria
Barbados
Bhutan
Brunei Darussalam
Cabo Verde
Chad
Congo Democratic Republi...
Cuba
Dominica
Equatorial Guinea
Fiji
Georgia
Guinea
Hungary
Iraq
Japan
Korea North
Laos
Libya
Malawi
Mauritania
Mongolia
Nepal
Nigeria
Panama
Poland
Rwanda
Saudi Arabia
Singapore
South Africa
Sweden
Tanzania
Trinidad and Tobago
Ukraine
Uzbekistan
Zambia
GD...
Inflation rate in different countries
Correlation between inflation an...
Correlation between GDP(PPP) ...
Top 40 countries by GDP growt...
Dashboard 1
Dashboard 2
Dashboard 3
Story 1

1-4

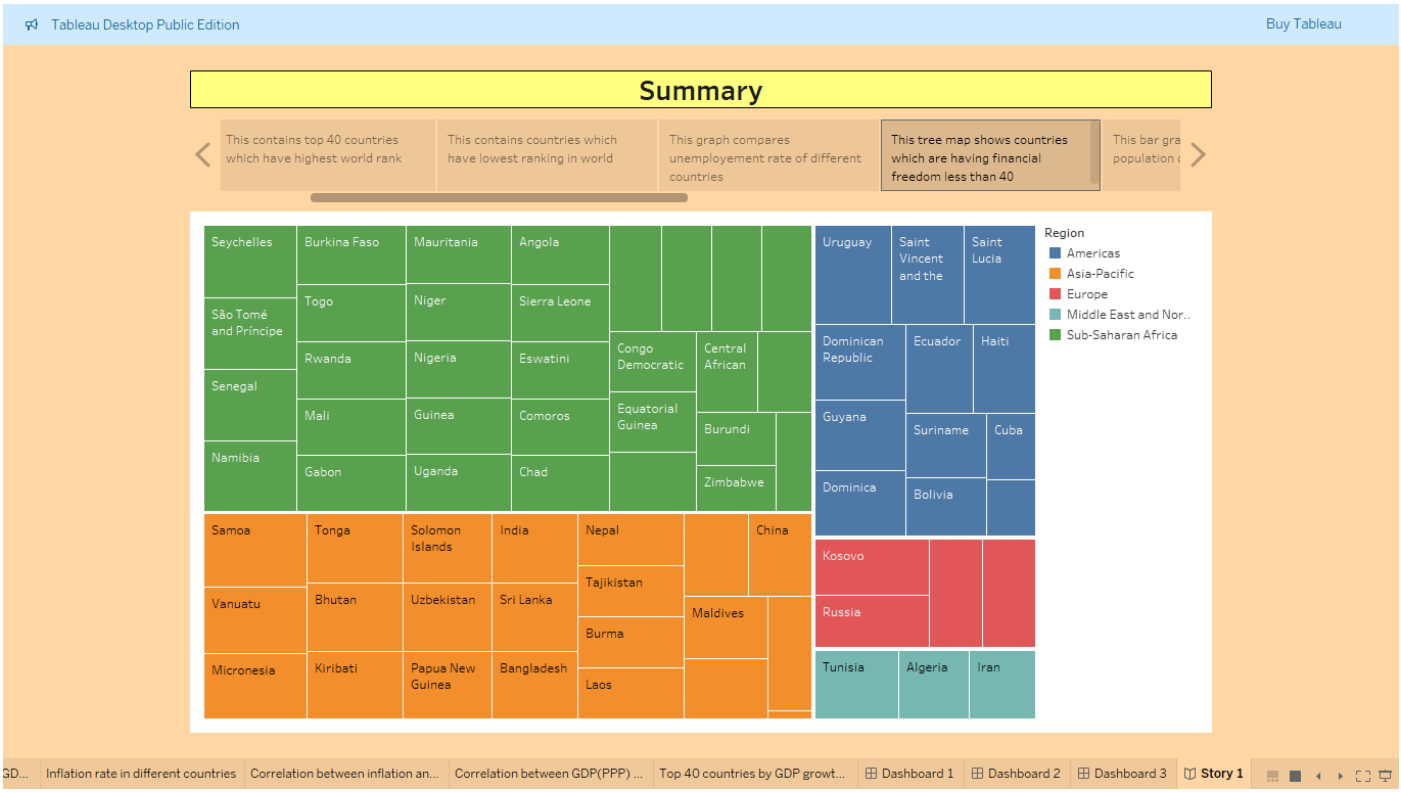
Tableau Desktop Public Edition
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Summary
This contains top 40 countries which have highest world rank
This contains countries which have lowest ranking in world
This graph compares unemployement rate of different countries
This tree map shows countries which are having financial freedom less than 40
This bar gra population
Seychelles
Burkina Faso
Mauritania
Angola
São Tomé and Príncipe
Togo
Niger
Sierra Leone
Senegal
Rwanda
Nigeria
Eswatini
Congo Democratic
Central African
Namibia
Mali
Guinea
Comoros
Equatorial Guinea
Burundi
Gabon
Uganda
Chad
Zimbabwe
Samoa
Tonga
Solomon Islands
India
Nepal
China
Vanuatu
Bhutan
Uzbekistan
Sri Lanka
Tajikistan
Maldives
Micronesia
Kiribati
Papua New Guinea
Bangladesh
Burma
Laos
Uruguay
Saint Vincent and the
Saint Lucia
Dominican Republic
Ecuador
Haiti
Guyana
Suriname
Cuba
Dominica
Bolivia
Kosovo
Russia
Tunisia
Algeria
Iran
Region
Americas
Asia-Pacific
Europe
Middle East and Nor..
Sub-Saharan Africa
GD...
Inflation rate in different countries
Correlation between inflation an...
Correlation between GDP(PPP) ...
Top 40 countries by GDP growt...
Dashboard 1
Dashboard 2
Dashboard 3
Story 1

1-5

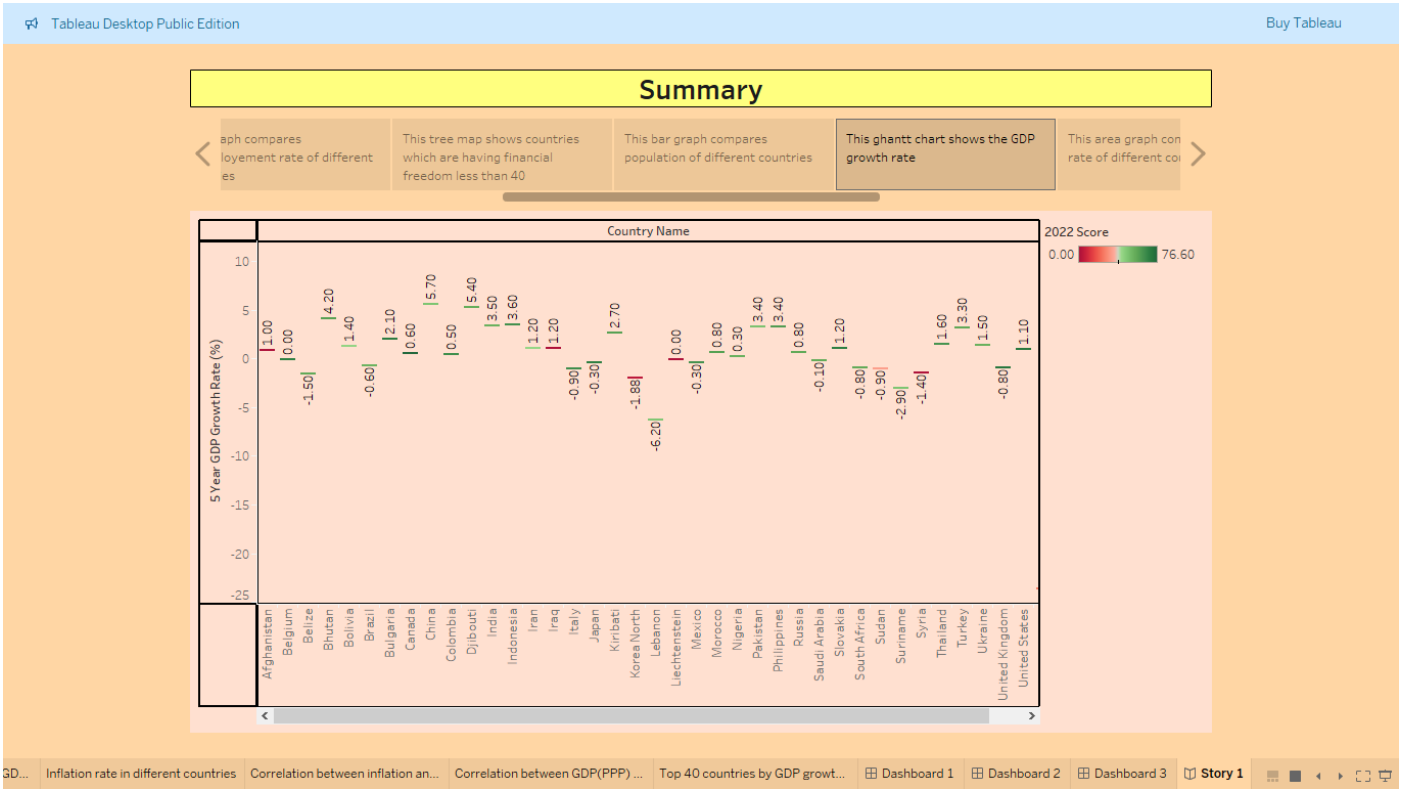
Tableau Desktop Public Edition
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Summary
aph compares loyement rate of different es
This tree map shows countries which are having financial freedom less than 40
This bar graph compares population of different countries
This ghantt chart shows the GDP growth rate
This area graph con rate of different co
Country Name
2022 Score
0.00
76.60
5 Year GDP Growth Rate (%)
Afghanistan
Belgium
Belize
Bhutan
Bolivia
Brazil
Bulgaria
Canada
China
Colombia
Djibouti
India
Indonesia
Iran
Iraq
Italy
Japan
Kiribati
Korea North
Lebanon
Liechtenstein
Mexico
Morocco
Nigeria
Pakistan
Philippines
Russia
Saudi Arabia
Slovakia
South Africa
Sudan
Suriname
Syria
Thailand
Turkey
Ukraine
United Kingdom
United States
Inflation rate in different countries
Correlation between inflation an...
Correlation between GDP(PPP) ...
Top 40 countries by GDP growt...
Dashboard 1
Dashboard 2
Dashboard 3
Story 1

1-6

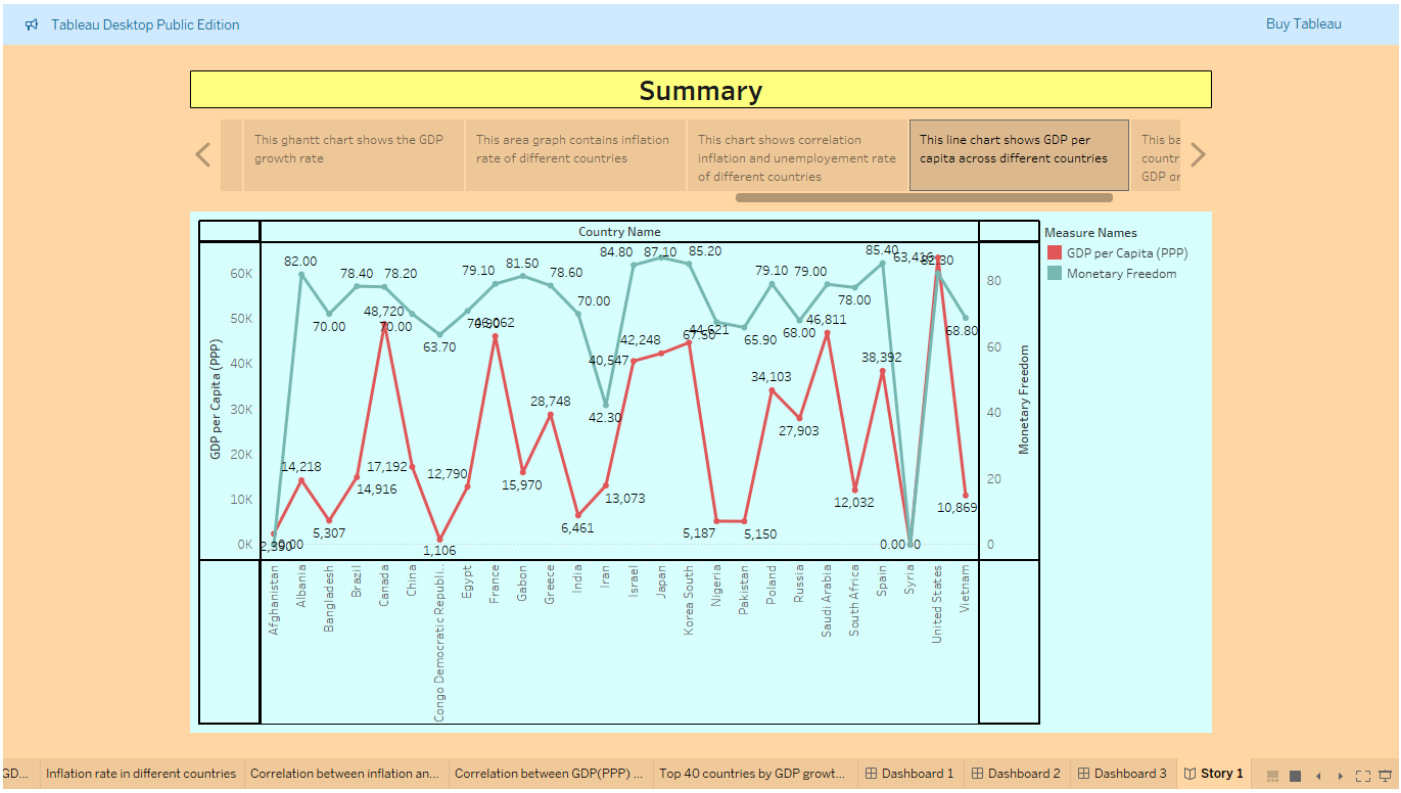
Tableau Desktop Public Edition
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Summary
This ghantt chart shows the GDP growth rate
This area graph contains inflation rate of different countries
This chart shows correlation inflation and unemployement rate of different countries
This line chart shows GDP per capita across different countries
Country Name
Measure Names
GDP per Capita (PPP)
Monetary Freedom
GDP per Capita (PPP)
Monetary Freedom
Afghanistan
Albania
Bangladesh
Brazil
Canada
China
Congo Democratic Republi...
Egypt
France
Gabon
Greece
India
Iran
Israel
Japan
Korea South
Nigeria
Pakistan
Poland
Russia
Saudi Arabia
South Africa
Spain
Syria
United States
Vietnam
Inflation rate in different countries
Correlation between inflation an...
Correlation between GDP(PPP) ...
Top 40 countries by GDP growt...
Dashboard 1
Dashboard 2
Dashboard 3
Story 1

1-7

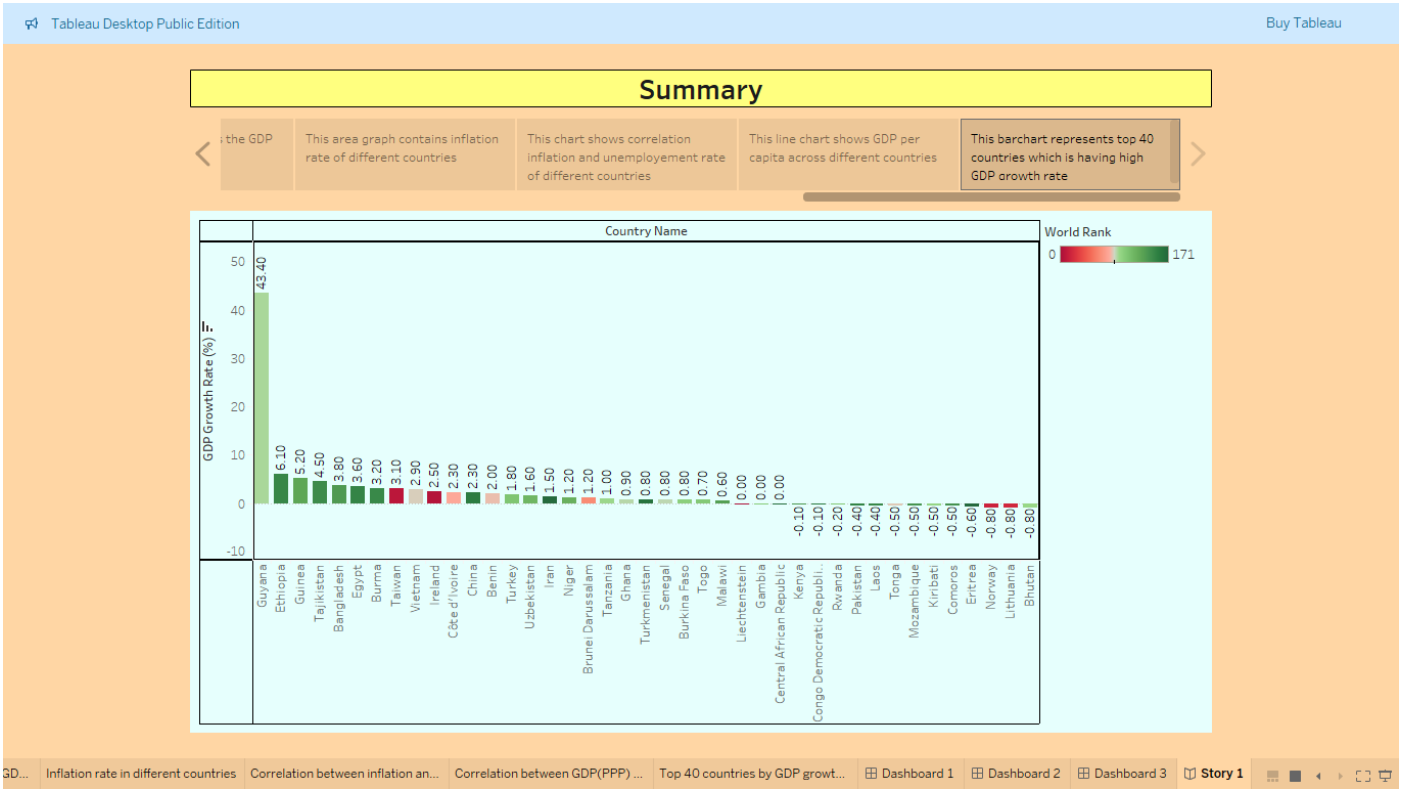
Tableau Desktop Public Edition
Buy Tableau
Summary
: the GDP
This area graph contains inflation rate of different countries
This chart shows correlation inflation and unemployement rate of different countries
This line chart shows GDP per capita across different countries
This barchart represents top 40 countries which is having high GDP growth rate
Country Name
World Rank
0
171
GDP Growth Rate (%)
50
40
30
20
10
0
-10
43.40
6.10
5.20
4.50
3.80
3.60
3.20
3.10
2.90
2.50
2.30
2.30
2.00
1.80
1.60
1.50
1.20
1.20
1.00
0.90
0.80
0.80
0.80
0.70
0.60
0.00
0.00
0.00
-0.10
-0.10
-0.20
-0.40
-0.40
-0.50
-0.50
-0.50
-0.50
-0.60
-0.80
-0.80
-0.80
Guyana
Ethiopia
Guinea
Tajikistan
Bangladesh
Egypt
Burma
Taiwan
Vietnam
Ireland
Côte d'Ivoire
China
Benin
Turkey
Uzbekistan
Iran
Niger
Brunei Darussalam
Tanzania
Ghana
Turkmenistan
Senegal
Burkina Faso
Togo
Malawi
Liechtenstein
Gambia
Central African Republic
Kenya
Congo Democratic Republi...
Rwanda
Pakistan
Laos
Tonga
Mozambique
Kiribati
Comoros
Eritrea
Norway
Lithuania
Bhutan
GD...
Inflation rate in different countries
Correlation between inflation an...
Correlation between GDP(PPP) ...
Top 40 countries by GDP growt...
Dashboard 1
Dashboard 2
Dashboard 3
Story 1

8. ADVANTAGES & DISADVANTAGES

Advantages

- Simplifies economic data
- Interactive & easy to understand
- Useful for research and education
- Reusable dashboard

Disadvantages

- Data may be outdated
- Requires internet to access Tableau
- Only provides visual correlation, not causation

9. CONCLUSION

This project successfully visualizes economic freedom indicators and their effect on national prosperity. The dashboards created help make complex data more accessible and actionable.

10. FUTURE SCOPE

- Add more datasets (e.g., human development, corruption index)
- Integrate AI for predictive insights
- Build a website to host the dashboards

11. APPENDIX

GitHub & Project Demo: https://github.com/gaganade/Measuring-the-Pulse-of-Prosperity-An-Index-of-Economic-Freedom-Analysis
Dataset Link: https://drive.google.com/file/d/1EBIa1LtM3Ni2Uh3nekLB6wt3263Q3NeX/view?usp=share_link