

REQUIREMENTS ANALYSIS

"Measuring the Pulse of Prosperity: Economic Freedom Analysis"

1. Project Overview

The project aims to create an interactive dashboard that visualizes the relationship between economic freedom metrics and prosperity indicators across various countries, using the provided dataset.

2. Data Attributes

The dataset includes the following attributes, which will be essential for analysis and visualization:

Attribute	Description
Country_id	Unique identifier for each country
Country Name	Name of the country
Region	Geographical region of the country
World Rank	Rank of the country in the world based on economic freedom
Region Rank	Rank of the country within its region
2022 Score	Overall economic freedom score for the year 2022
Property Rights	Score indicating the protection of property rights
Judicial Effectiveness	Score indicating the effectiveness of the judicial system
Government Integrity	Score indicating the integrity of government institutions
Tax Burden	Score indicating the burden of taxation on individuals and businesses
Government Spending	Score indicating the level of government spending
Fiscal Health	Score indicating the fiscal health of the country
Business Freedom	Score indicating the freedom to start and operate a business
Labor Freedom	Score indicating the freedom of labor markets
Monetary Freedom	Score indicating the freedom of monetary policy
Trade Freedom	Score indicating the freedom to trade internationally
Investment Freedom	Score indicating the freedom to invest
Financial Freedom	Score indicating the freedom in financial markets
Tariff Rate (%)	Average tariff rate applied to imports
Income Tax Rate (%)	Average income tax rate applied to individuals

3. Functional Requirements

3.1 Data Management

- **FR1:** The system shall import the dataset and allow for data cleaning and preprocessing.
- **FR2:** The system shall handle missing values appropriately (e.g., imputation or exclusion).
- **FR3:** The system shall allow users to filter data based on specific attributes (e.g., region, income tax rate).

3.2 User Interface

- **FR4:** The dashboard shall display an interactive world map color-coded by the 2022 economic freedom score.
- **FR5:** The dashboard shall include scatter plots to visualize relationships between key metrics (e.g., Property Rights vs. GDP).
- **FR6:** The dashboard shall provide a rankings table showing the top and bottom 10 countries based on the 2022 score.
- **FR7:** The dashboard shall include tooltips to explain each metric when hovered over.

3.3 User Interaction

- **FR8:** Users shall be able to select multiple countries for comparison in visualizations.
- **FR9:** Users shall be able to export visualizations and data in PDF format.
- **FR10:** Users shall be able to view detailed country profiles by clicking on a country in the map.

3.4 Reporting and Analytics

- **FR11:** The system shall generate reports summarizing key findings based on user-selected metrics.
 - **FR12:** The system shall provide insights into trends over time for selected countries.
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4. Non-Functional Requirements

4.1 Performance

- **NFR1:** The dashboard shall load within 3 seconds for datasets with up to 200 countries.
- **NFR2:** The system shall handle up to 100 concurrent users without performance degradation.

4.2 Usability

- **NFR3:** The dashboard shall be intuitive and easy to navigate for users with varying levels of technical expertise.
- **NFR4:** The system shall be responsive and accessible on both desktop and mobile devices.

4.3 Security

- **NFR5:** The system shall ensure that user data is protected and not shared with third parties.
- **NFR6:** The system shall implement secure data handling practices to prevent unauthorized access.

4.4 Maintainability

- **NFR7:** The codebase shall be well-documented to facilitate future updates and maintenance.
- **NFR8:** The system shall be modular to allow for easy integration of new features.

5. User Stories

1. **As a policymaker**, I want to visualize the economic freedom scores of my country compared to others, so I can identify areas for improvement.
2. **As a researcher**, I want to export data and visualizations for my academic papers, so I can support my findings with evidence.

3. **As a student**, I want to understand the relationship between economic freedom and prosperity, so I can better grasp the concepts discussed in class.
4. **As a journalist**, I want to quickly access the top 10 most free economies, so I can write an engaging article.
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6. Constraints

- **C1:** Limited budget for hosting and data storage solutions.
- **C2:** Time constraints due to academic deadlines (project completion required by end of semester).
- **C3:** Data availability and quality may vary by country, affecting

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Comprehensive Project Plan: Economic Freedom Index Dashboard

1. Project Overview

Title: Measuring the Pulse of Prosperity: Economic Freedom Index Analysis

Objective: Develop an interactive dashboard analyzing economic freedom metrics and correlations with prosperity indicators.

Core Features:

- Interactive world map visualizing 2022 scores by country
- Comparative analytics between regions/income groups
- Exportable reports (PDF/CSV)
- Country profiles with detailed metrics

2. Detailed Data Analysis

Dataset Attributes (Key Metrics)

Category	Metrics
Identifiers	Country_id, Country Name, Region
Rankings	World Rank, Region Rank
Composite Scores	2022 Score
Economic Freedoms	Property Rights, Business Freedom, Trade Freedom, Investment Freedom
Financial Metrics	Tariff Rate (%), Income Tax Rate (%)
Governance	Judicial Effectiveness, Government Integrity

Key Correlations to Analyze

1. 2022 Score × GDP per capita (expected strong positive)
2. Tax Burden × Business Freedom (expected negative)
3. Government Integrity × Investment Freedom

3. Technical Implementation

Data Pipeline

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1CSV → Python Cleaning → PostgreSQL → API → React Frontend

- **Tools:** Pandas (cleaning), FastAPI (backend), Chart.js (visualizations)

Visualization Components

1. **World Map**
 - Color gradient based on 2022 Score
 - Clickable countries → detailed profile
2. **Scatter Plots**
 - Example: "Income Tax Rate vs. Business Freedom"

- Trendlines with R² values
3. Rank Comparison Tables
- Sortable by any metric
4. Radar Charts
- Country comparisons across 5 key metrics

4. Wireframes with Sample Data

Dashboard Layout

plaintext

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```
1+-----+
2| Header: "2022 Economic Freedom Index" |
3+-----+
4| [World Map] | [Filters Panel] |
5+-----+
6| [Scatter Plot] | [Rankings] |
7+-----+
8| [Metric Correlation Matrix] |
9+-----+
```

Sample Country Profile (Bahrain)

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```
1▣ Region: Middle East/North Africa
2▣ World Rank: 74
3▣ Key Strengths:
4  - Trade Freedom (83)
5  - Financial Freedom (80)
6▣ Key Weaknesses:
7  - Judicial Effectiveness (27.4)
```

5. Development Timeline

Phase	Duration	Deliverables
Data Prep	1 week	Cleaned dataset, Database schema
Core Features	3 weeks	Functional map + 2 chart types
Enhancements	2 weeks	PDF export, Mobile responsiveness
Deployment	1 week	Live dashboard, User docs

6. Data Handling Plan

Missing Value Strategy

- **Afghanistan (all zeros):** Exclude or flag as incomplete data
- **Partial missing:** Impute with regional medians

Data Transformations

- Normalize all scores to 0-100 scale for consistent comparison
- Calculate derived metrics:
- "Fiscal Freedom Score" = $(\text{Tax Burden} + \text{Fiscal Health})/2$

7. Sample Code Implementation

Python Data Cleaning

python7 lines

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```
import pandas as pd

...
```

React Component (Scatter Plot)

jsx12 lines

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```
<Scatter

data={{

...


```

8. Validation Approach

1. **Sanity Checks:**

- Verify Australia's high scores match known rankings
- Confirm negative correlation between tariff rates & trade freedom

2. **User Testing:**

- Have economists validate correlation findings
- Test export functionality with journalists

9. Expected Insights

- "Countries with tax burdens <30% average 15% higher business freedom scores"
- "Strong judicial systems correlate with +22% higher investment freedom"

10. Maintenance Plan

- Annual data refresh process
- Feature voting system for users
- Performance monitoring with New Relic