Objective :

The goal is to analyze the collected data to identify factors affecting a country's Economic Complexity Index (ECI), observe its temporal changes, and examine its distribution across sub-Saharan African countries**.** The data spans multiple years(1995-2018) for each country provided in the dataset, so it could be aggregated, and filtered by year, or the most recent ECI could be used for each country.

Background of Data :

The original data set that was provided was collection of ECI data for sub-Saharan Africa in excel spreadsheet. The dataset had total of 11 variables and 720 observations.

Data Pre-Processing :

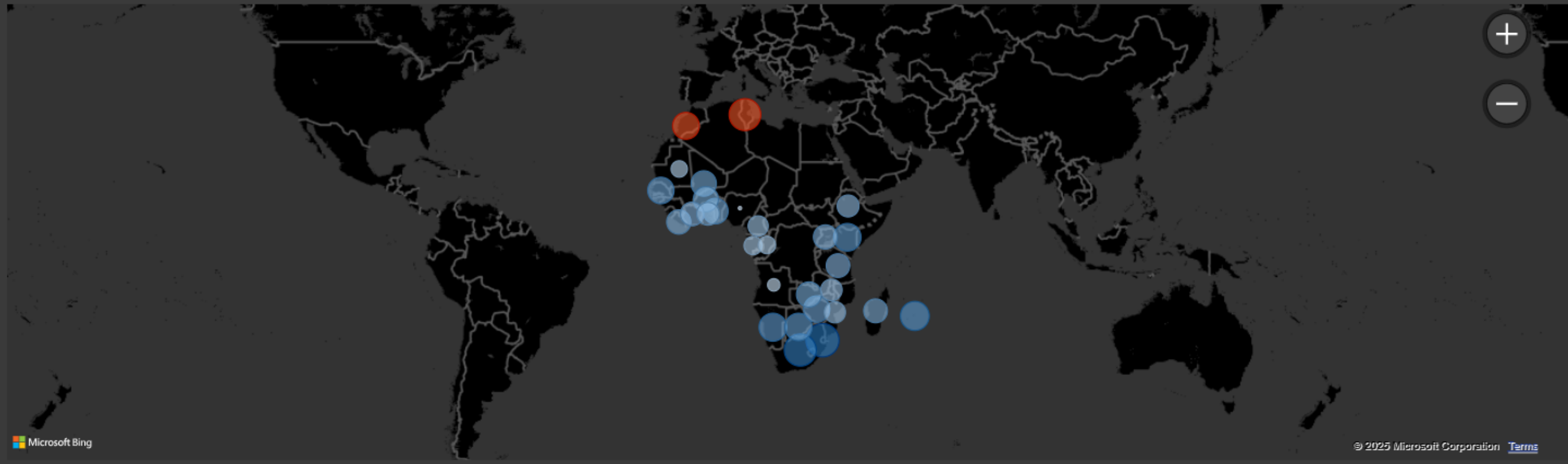
Handling missing values by replacing them with averages for numerical columns the data pre-processing technique that helps us prepare the datasets for accurate analysis and modeling. Once, the cleaning up of the data was done, we added additional 23 variables to see if their is correlation analysis on ECI.

Data Attribute	Data Description	Data Type
Air Transport Intensity (passengers per capita) -	The number of air transport passengers per unit of population. It indicates the level of air travel activity relative to the population size. (Numerical)	Numerical
Air transport, passengers carried	Number of passengers carried by air transport (Numerical)	Numerical
Average Spending per Tourist = (Tourism Contribution to GDP / International tourism, number of arrivals) * 1000	The average amount of money spent by each tourist. It is calculated by dividing the tourism contribution to GDP by the number of international tourist arrivals and then multiplying by 1000. (Numerical)	Numerical
Averageticketprice	The average price of a ticket for air travel or other forms of transportation. This metric is often used in the context of tourism and transport industries.(Numerical)	Numerical
Carbon Intensity of GDP per country per year	A measure of the amount of carbon dioxide emissions produced per unit of GDP in a country over a period(1995-2018). It indicates the environmental impact relative to economic activity. (Numerical)	Numerical
CO2 emissions (kt)	Total CO2 emissions in kilotons (Numerical)	Numerical
CO2 emissions (metric tons per capita)	CO2 emissions per capita in metric tons (Numerical)	Numerical
CO2 Emissions per GDP	The amount of carbon dioxide emissions produced per unit of GDP. It shows the carbon efficiency of economic activity. (Numerical)	Numerical
CO2 Emissions per Unit of Energy Used	The amount of carbon dioxide emissions produced per unit of energy consumed. It reflects the carbon intensity of the energy sources used in a country. (Numerical)	Numerical
CO2 Intensity (CO2 emissions per unit GDP): kt per US$	The amount of carbon dioxide emissions in kilotonnes per unit of GDP in US dollars. It provides a standardized measure of carbon intensity relative to economic output. (Numerical)	Numerical
Coal rents (% of GDP)	The percentage of GDP attributed to coal rents (Numerical)	Numerical
Country Name	The data consists of African countries.(Categorical)	Categorical
ECI Growth Rate	The rate at which the Economic Complexity Index (ECI) changes over a specified period(1995-2018). It indicates how quickly a country's economy is becoming more or less complex. (Numerical)	Numerical
ECI to GDP Ratio	A ratio that compares the Economic Complexity Index to the Gross Domestic Product (GDP) of a country. It provides insight into the relationship between economic complexity and economic output. (Numerical)	Numerical
ECI	The ECI captures the sophistication of a country's economy based on the diversity and uniqueness of its export basket. (Numerical)	Numerical
Energy use (kg of oil equivalent) per $1,000 GDP (constant 2017 PPP)	Energy use per $1,000 GDP in constant 2017 PPP (kg of oil equivalent) (Numerical)	Numerical
Energy Use and CO2 Emissions Interaction	An analysis of how energy use and carbon dioxide emissions are related. This can include correlations, dependencies, and the impact of energy consumption on emission levels. (Numerical)	Numerical
Energy Use per Capita	The total amount of energy consumed by a country divided by its population. It provides an average energy consumption per person. (Numerical)	Numerical
Energy Use per GDP	The amount of energy consumed per unit of GDP. It indicates the energy efficiency of an economy in terms of how much energy is used to produce economic output. (Numerical)	Numerical
GDP (constant 2010 US$)	Gross Domestic Product in constant 2010 US dollars (Numerical)	Numerical
GDP Growth Rate	The rate at which a country's Gross Domestic Product (GDP) grows or shrinks over a specified period(1995-2018), usually expressed as a percentage. (Numerical)	Numerical
GDP per capita (constant 2010 US$)	GDP per capita in constant 2010 US dollars (Numerical)	Numerical
GDP per Capita Growth Rate	The rate of growth in GDP per capita, which measures the average economic output per person. This indicates changes in the average standard of living or economic well-being of the population. (Numerical)	Numerical
Income Category	A classification of Sub-Sarahan based on their income levels, typically categorized by organizations such as the World Bank. The categories include low income, lower-middle income, upper-middle income, and high income. Using the Given GDP per capita to classify into categories. (continuous to categorical)	Categorical

- Economic Complexity Index (ECI) The Economic Complexity Index (ECI) is a metric that measures the diversity and sophistication of a country's exports. It provides insights into a country's economic structure, potential for future growth, and ability to adapt to changing market demands.
- The highest ECI levels are often between two and three. The economies of nations like Japan, Germany, or Switzerland, which scored so highly, are incredibly complex and diverse.
- Usually, the lowest ECI values range from -2 to -3. These scores are observed in Sub-Saharan African nations whose economies are less diversified and more dependent on a small number of exports, frequently primary commodities.
- The map overview below illustrates ECI in a few African nations. This report will concentrate on the sub-Saharan African nations because it is our primary goal and area of interest.
- **The blue shades bubble indicate ECI where the lighter blue and small bubble size represents low and the darker the shade and larger bubble size high level of ECI.**

Country Name	Region	Time Period (1995-2018)	Income Category	ECI
All	All	All	All	-2,35 — 0,96

Overview of ECI



Since analyzing each country will take a lot of time, the below visual and tables show how ECI progresses over time and which countries have the highest or lowest ECI. We analyze the ECI in each country to find the average ECI between 1995 -2018 as this will show us which countries have a low or high average ECI. The results, show countries with the highest average ECI from (1995-2018) are Eswatini(0.35), South Africa(0.17), **Tunisia**(0.13), Mauritius(-0.26), and Namibia(-0.39). The bottom 5 countries by ECI are Nigeria(-1.91), Angola(-1.70), Mauritania(-1.48), Congo.Rep(-1.41) and Congo Dem Rep(-1.40).

Top 5 Countries by ECI

Country Name	Avg ECI
Eswatini	0,35
South Africa	0,17
Tunisia	0,13
Mauritius	-0,26
Namibia	-0,39

Bottom 5 ECI Countries

Country Name	Avg ECI
Nigeria	-1,91
Angola	-1,70
Mauritania	-1,48
Congo, Rep.	-1,41
Congo, Dem. Rep.	-1,40

Top & Bottom 5: All

Country Name: All

Region: All

Time Period (1995-2018): All

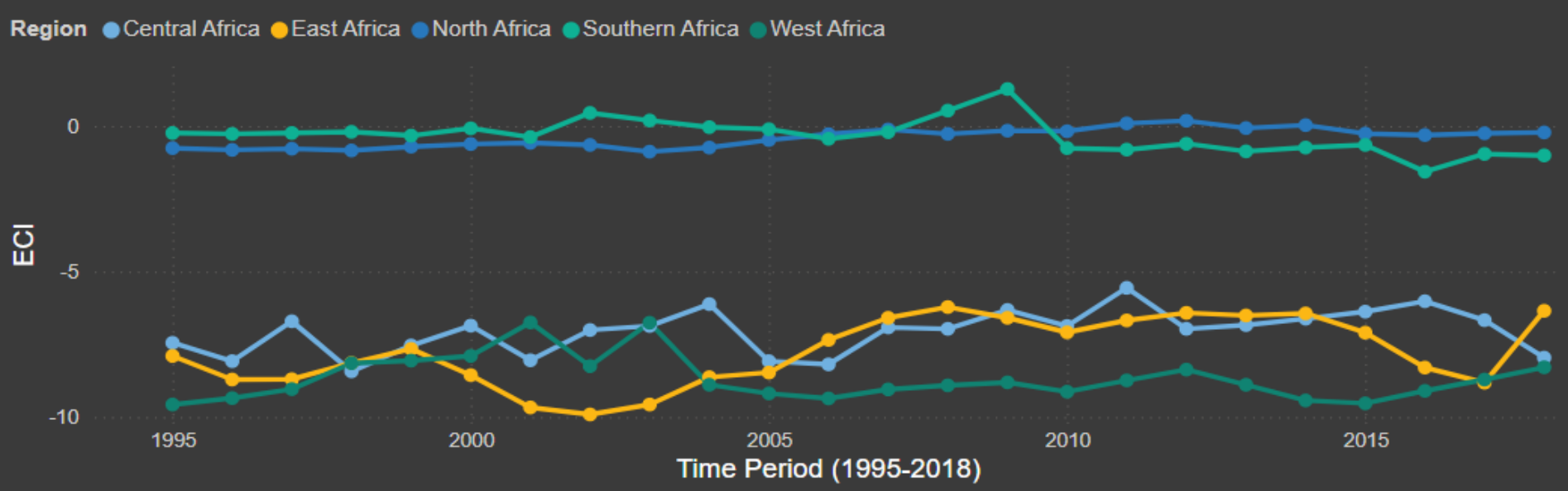
Income Category: All

ECI: -2,35 — 0,96

ECI Table Overview

Country Name	Avg of ECI
Eswatini	0,35
South Africa	0,17
Tunisia	0,13
Mauritius	-0,26
Namibia	-0,39
Kenya	-0,43
Botswana	-0,46
Morocco	-0,53
Senegal	-0,57
Zimbabwe	-0,59
Togo	-0,67
Mali	-0,69
Burkina Faso	-0,71
Zambia	-0,71
Liberia	-0,80

Annual ECI by Region



To analyze which variables have impact of the Economic Complexity Index (ECI) we started to calculate the growth rate on the GDP per capita and ECI across the time period 1995-2018.The trend line graph below illustrates the annual growth of GDP per capita and ECI, to see if GDP per capita influences ECI score.

Top & Bottom 5: All

Country Name: All

Region: All

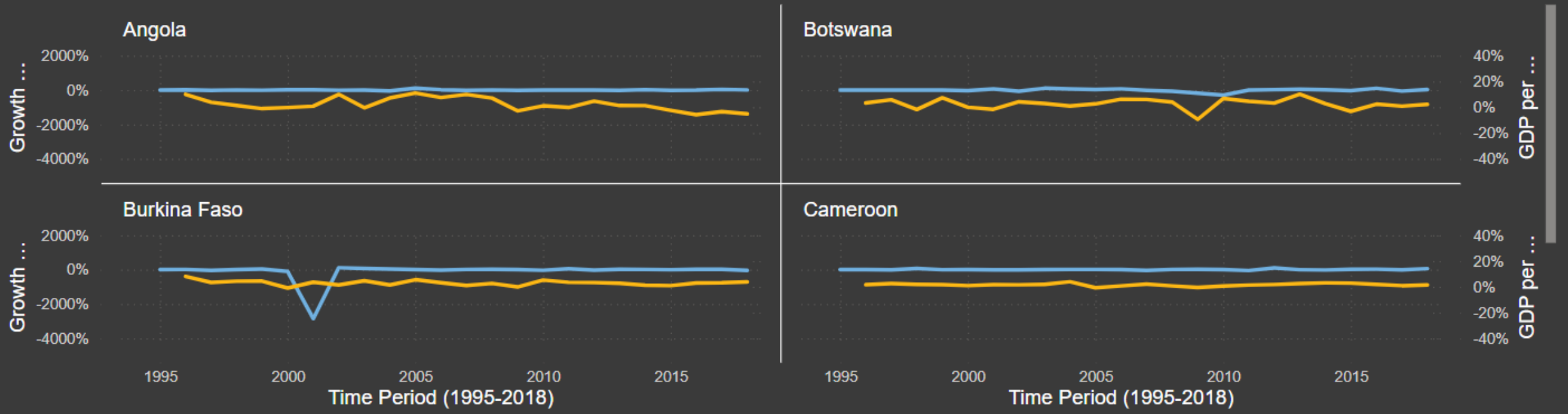
Time Period (1995-2018): All

Income Category: All

ECI: -2,35 — 0,96

Annual Growth of ECI vs GDP per capita

ECI Growth Rate GDP per capita Growth Rate



Time Period (1995-2018)

All

Country Name

All

Region

All

16,18M

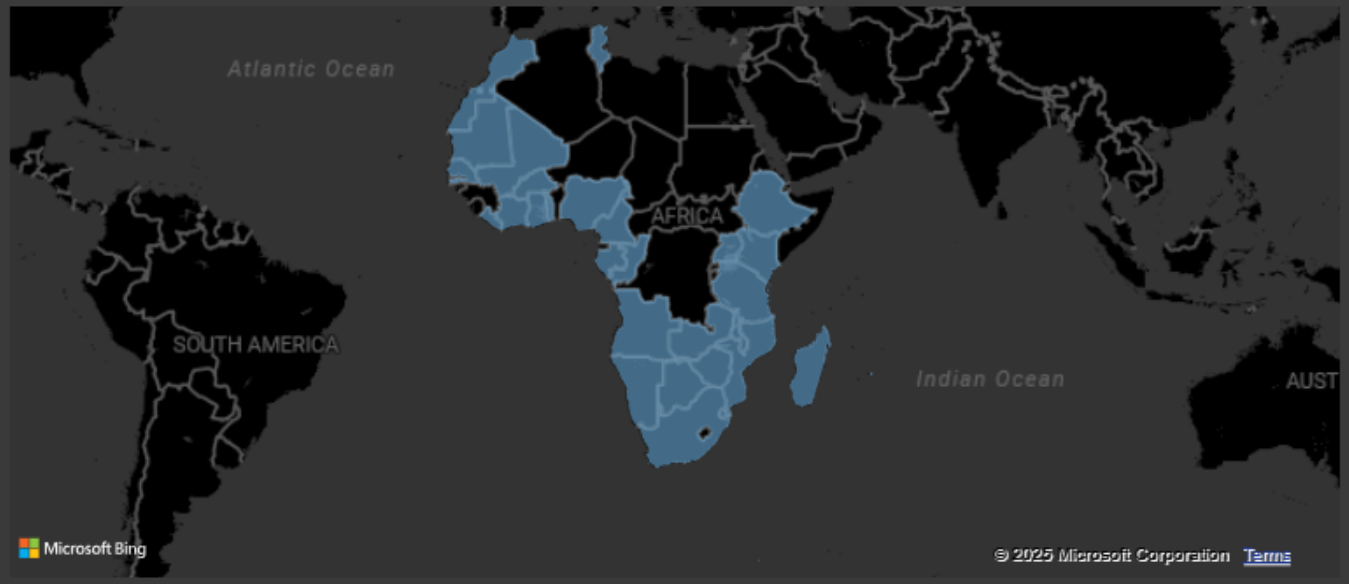
CO2 emissions (kt) over Time

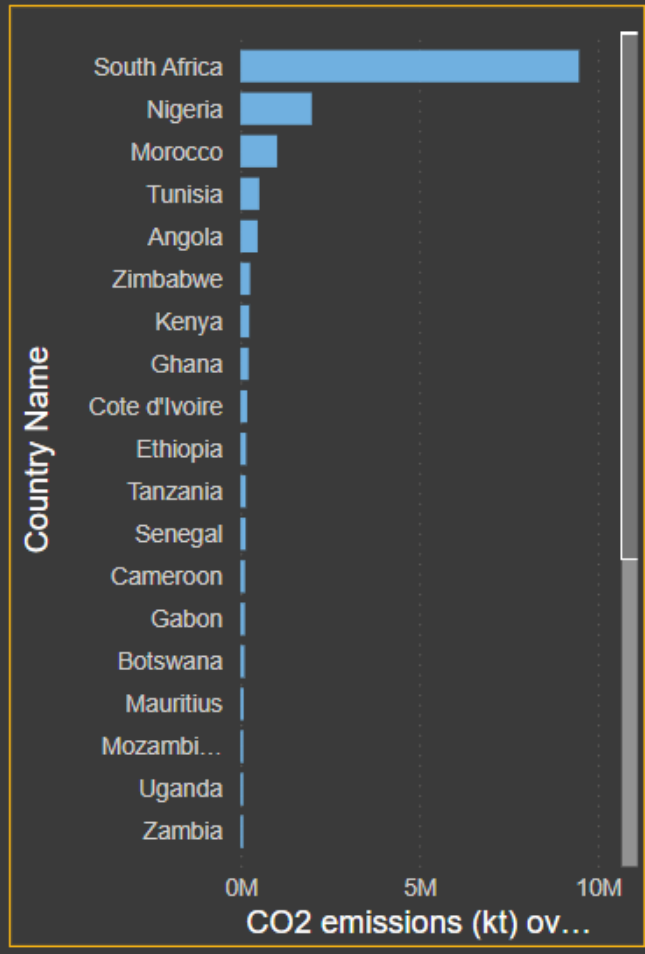
0,75

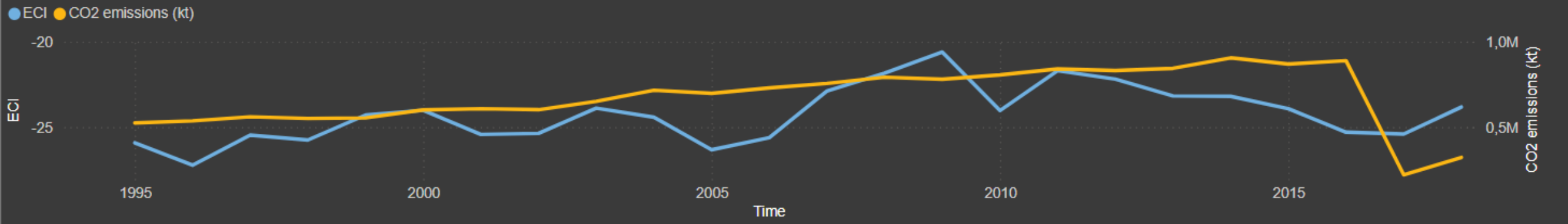
Energy Use per Capita

Carbon Intensity and Growth Rate

South Africa







Time Period (1995-2018)

All

Country Name

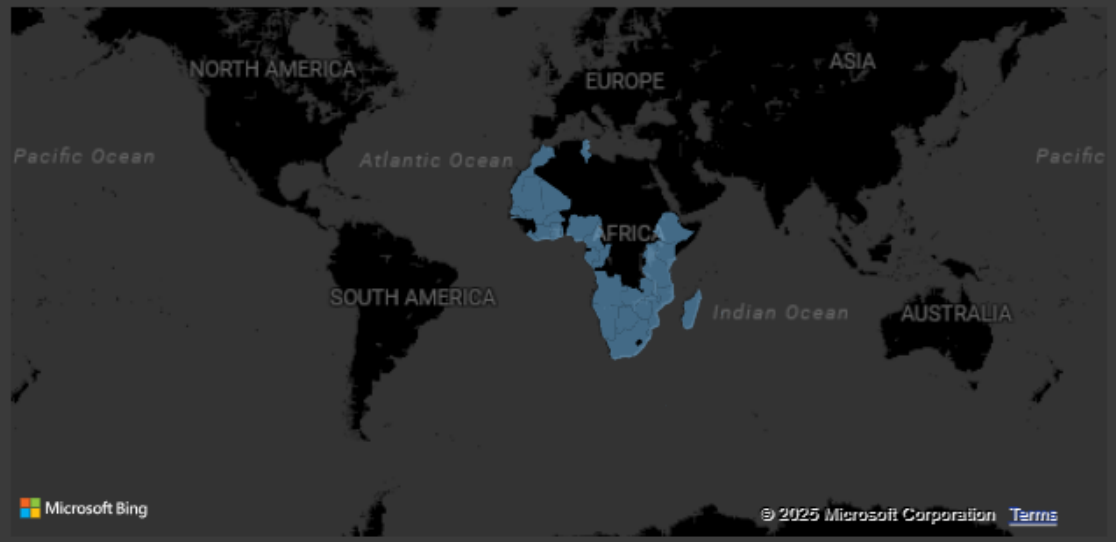
All

Region

All

Energy Use per Capita by Country

Eswatini 0.0401741 ▼ -106.03% Namibia 0.(



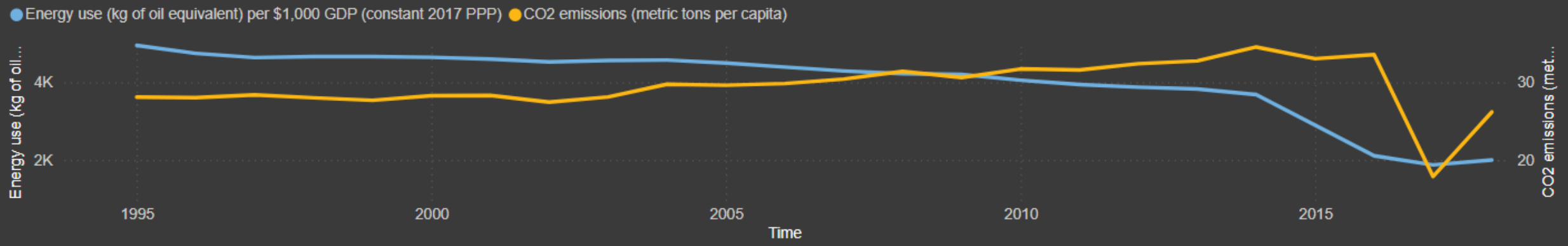
111,99
Tourism Contribution to GDP

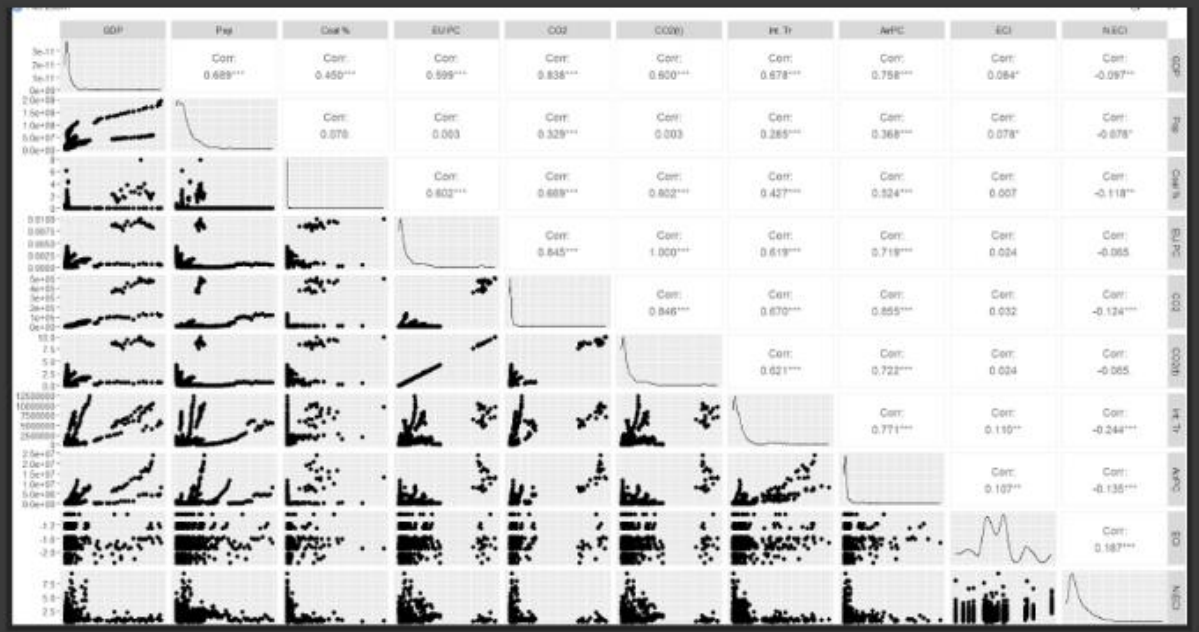
$1,59M
Average Spending per Tourist

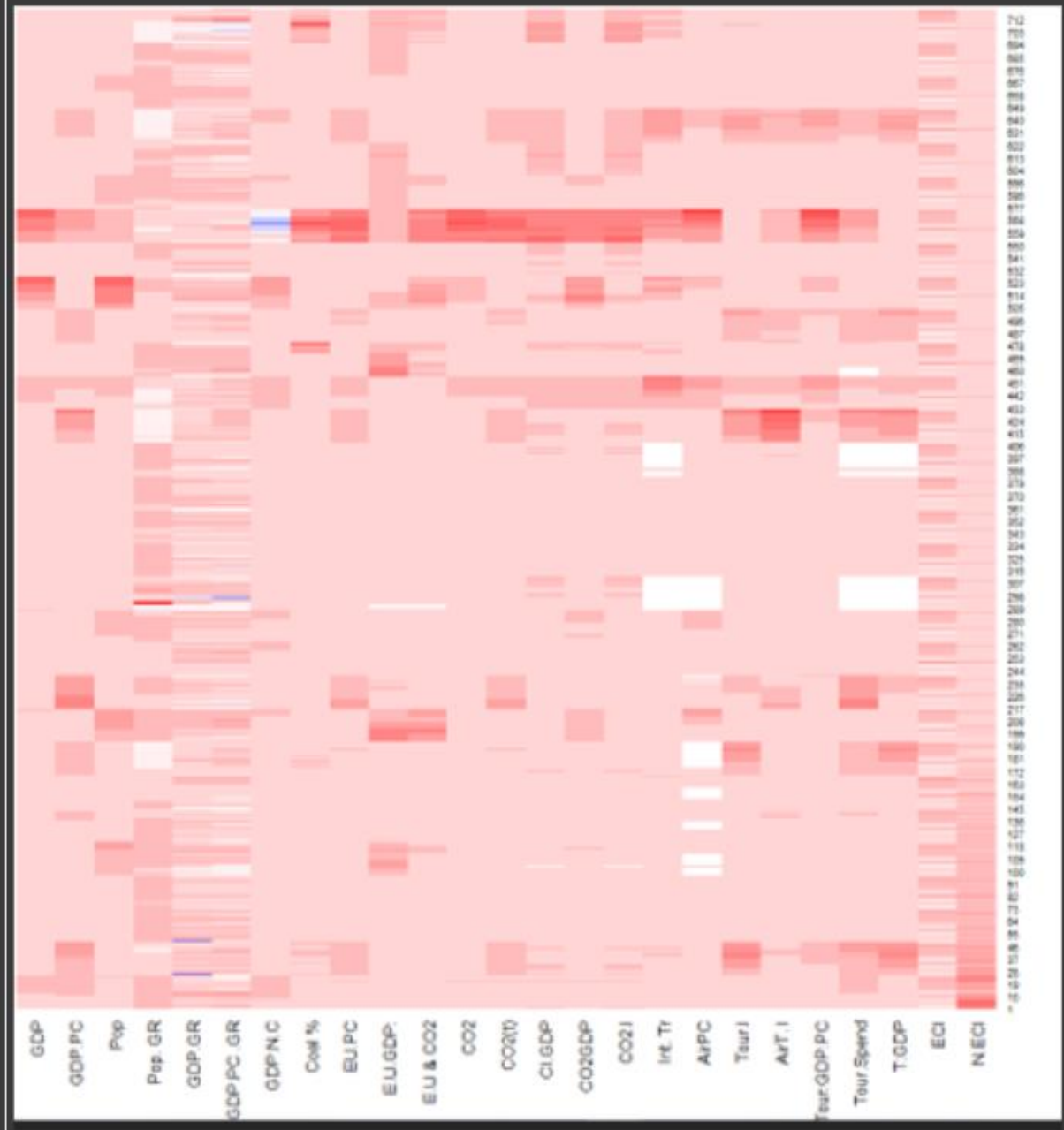
1bn
International tourism, number of arrivals

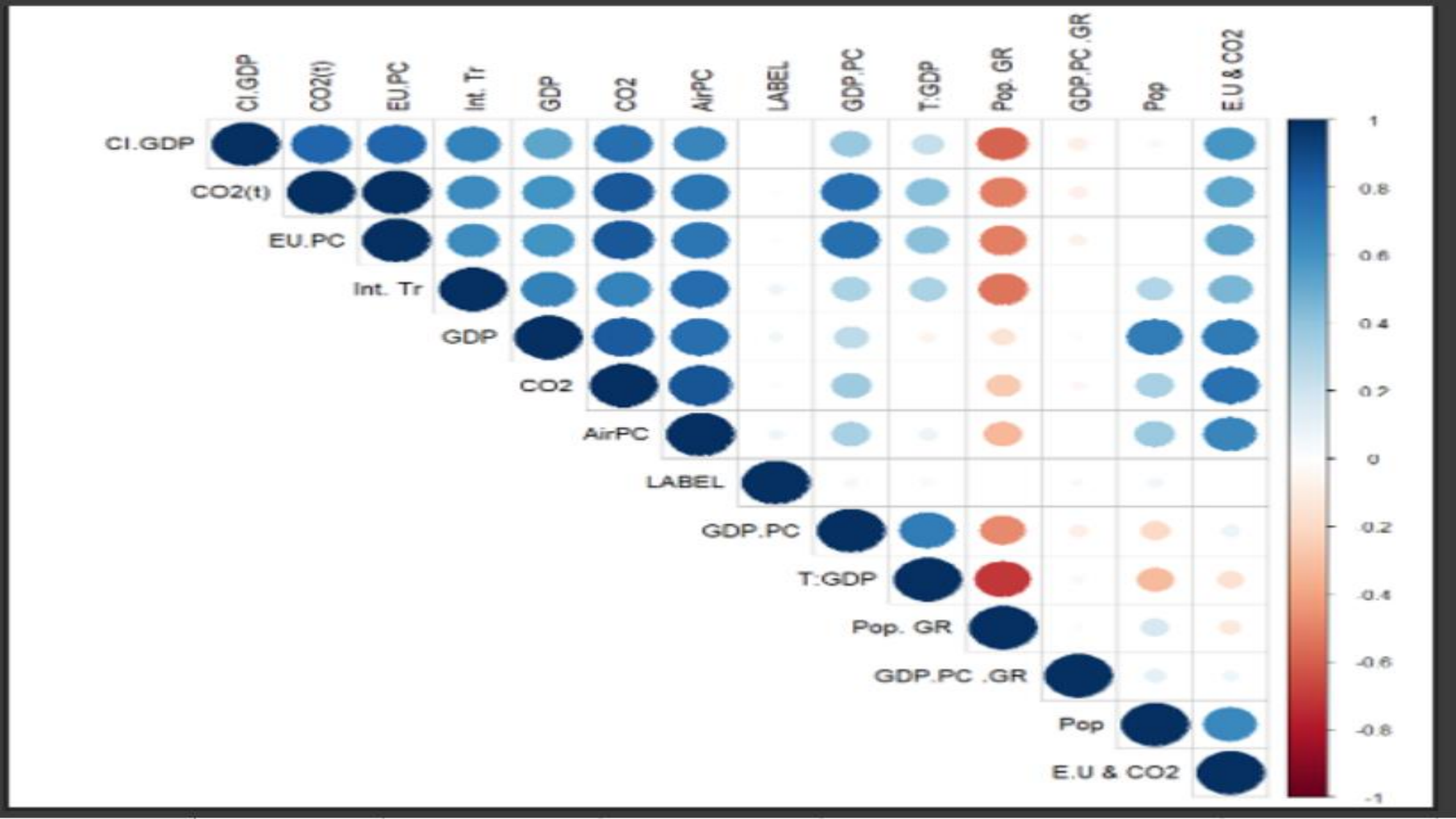
112,14
Tourism Intensity (tourists per capita)

Energy use (kg of oil equivalent) per $1,000 GDP (constant 2017 PPP) and CO2 emissions (metric tons per capita) by Time




GDP
Pop
Coal %
EU/PC
CO2
CO2(t)
Int. Tr
AirPC
ECI
N.ECI


GDP
GDP.PC
Pop
Pop.GR
GDP.GR
GDP.PC.GR
GDP.N.C
Coal %
EU.PC
EU.GDP
EU & CO2
CO2
CO2(t)
CI.GDP
CO2GDP
CO2.I
Int. Tr
AirPC
Tour.I
AirT..I
Tour.GDP.PC
Tour.Spend
T.GDP
ECI
N.ECI


Cl.GDP
CO2(t)
EU.PC
Int. Tr
GDP
CO2
AirPC
LABEL
GDP.PC
T:GDP
Pop. GR
GDP.PC .GR
Pop
E.U & CO2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1