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# ADVANCING THE SUSTAINABLE CONNECTIVITY THROUGH ENERGY & INNOVATION: HIGHLIGHTING SDG7, SDG9 AND SDG17

PRESENTED BY
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# THE SUSTAINABLE DEVELOPMENT GOALS: 17 SDGs

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Source: THE 17 GOALS | Department of Economic and Social Affairs. (2015). Retrieved from website: https://sdgs.un.org/goals

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# THE SUSTAINABLE DEVELOPMENT GOALS: 17 SDGs

**SDG 7: Affordable and clean energy**

SDG 7 is to: "Ensure access to affordable, reliable, sustainable and modern energy for all".

**SDG9: Industry, Innovation, and Infrastructure**

SDG 9 is to: "Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation"

**Goal 17: Partnerships for the goals**

SDG17 is to "Strengthen the means of implementation and revitalize the global partnership for sustainable development"

Source: THE 17 GOALS | Department of Economic and Social Affairs. (2015). Retrieved from website: https://sdgs.un.org/goals

# RESEARCH QUESTIONS

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1) SDG 7: WHICH COUNTRIES ARE LEADERS IN TERMS OF ENERGY CONNECTIVITY PILLAR?

2)SDG9: WHICH COUNTRIES ARE LEADERS IN TERMS OF INNOVATION CONNECTIVITY PILLAR?

3) SDG17: COLLABORATING FOR SUSTAINABILE CONNECTIVITY:

WHICH COUNTRIES HAVE BETTER OVERALL PHYSICAL CONNECTIVITY, ECONOMIC/FINANCIAL CONNECTIVITY, POLITICAL CONNECTIVITY, INSTITUTIONAL CONNECTIVITY, & PEOPLE-TO-PEOPLE CONNECTIVITY?

# DATA & METHODOLOGY

- All secondary data were obtained from the **ASEM Sustainable Connectivity Portal.**
- Data used for the analysis were intensive* and winsorised** raw data as well as intensive aggregated data obtained from the ASEM Sustainable Connectivity Portal dataset and "Indicator Explorer".
- The aggregated & raw data consist of Physical, Economic and Financial, Political, Institutional, People to People, Social, and Economic and Financial. For the current study, only **SDG7, SDG9 and SDG17** related variables were selected.
- The analyses used in this research were Biplot **Principle Component Analysis** (PCA) and **K-Means clustering**.

Source: Becker, W.; Dominguez-Torreiro, M.; Neves, A.R.; Tacão Moura, C. J.; Saisana, M., , Exploring ASEM Sustainable Connectivity – What brings Asia and Europe together?, 2018, ISBN 978-92-79-92901-4, doi:10.2760/77696, PUBSY JRC112998.

*Raw data (Intensive) Raw data denominated by indicator and country. Some indicators included in the Connectivity Index have been denominated by GDP, population, etc. in order to scale the indicator to the country size. This is called the intensive connectivity approach.

**Winsorised data (Intensive) Data refers to the intensive connectivity approach after outliers treatment. Outliers refer to extremely high or low values, which distort the indicators' distribution. Using the winsorisation approach, those values are assigned the next highest (or lowest) value. The criteria applied to detect the outliers was based on the combined thresholds for skewness (2) and kurtosis (3.5) of the distribution.

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# RESULTS

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# RESULTS (SDG 7): WHICH COUNTRIES ARE LEADERS IN TERMS OF ENERGY CONNECTIVITY PILLAR?

# INDICATORS OF ENERGY: DATA EXPLORATION FOR SDG 7

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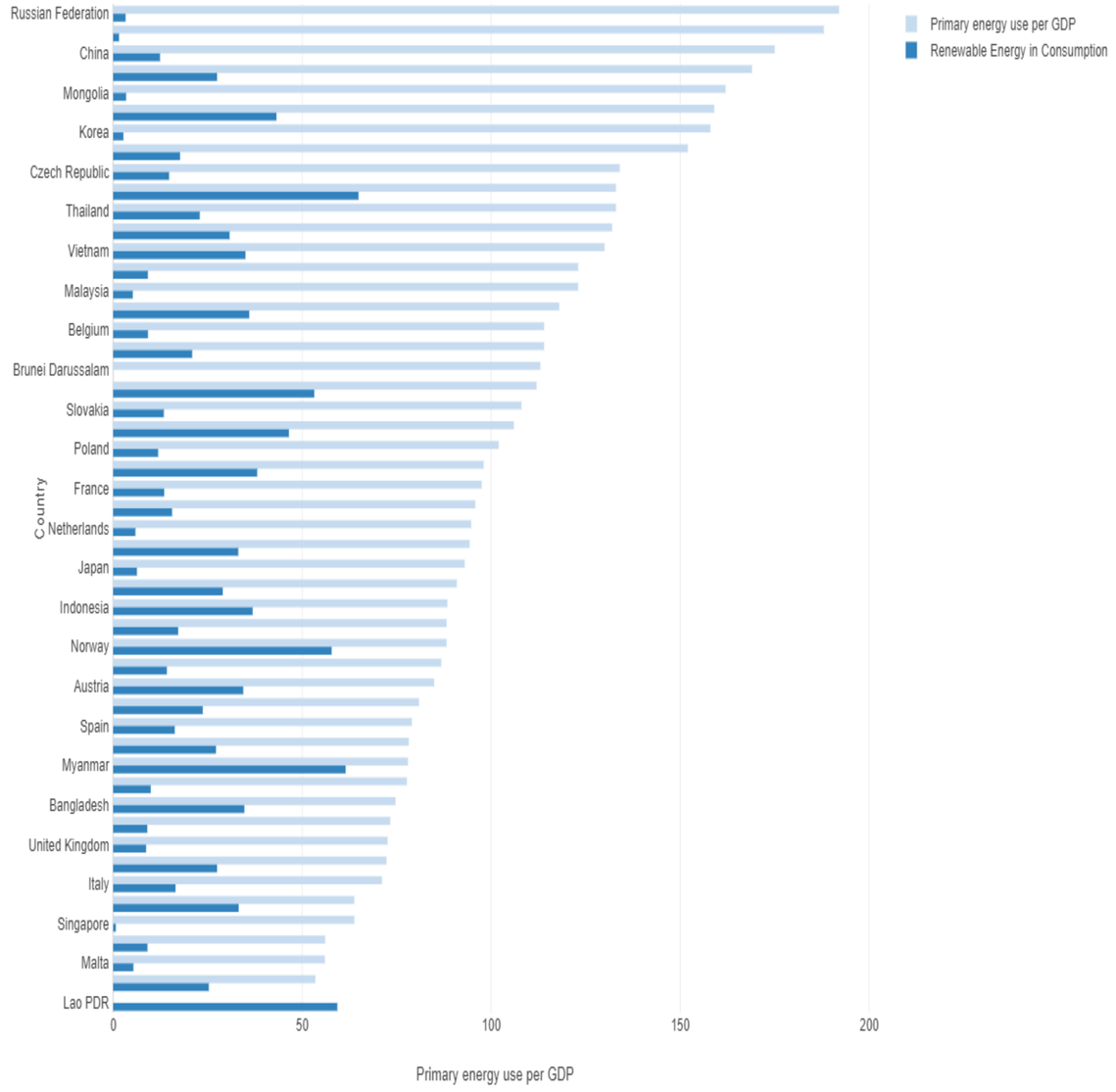
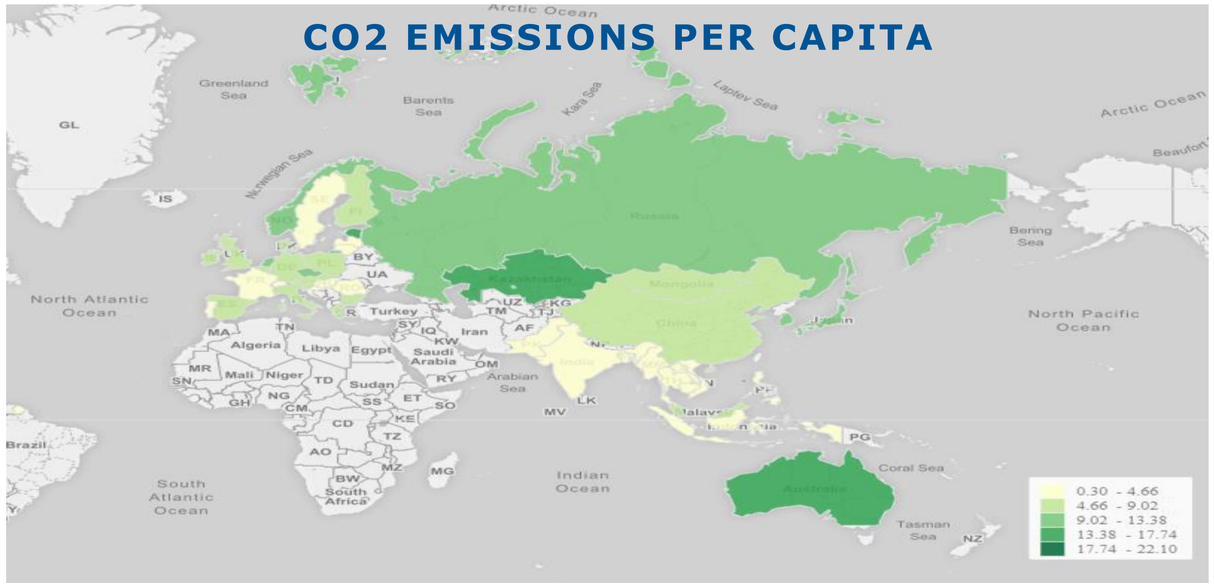
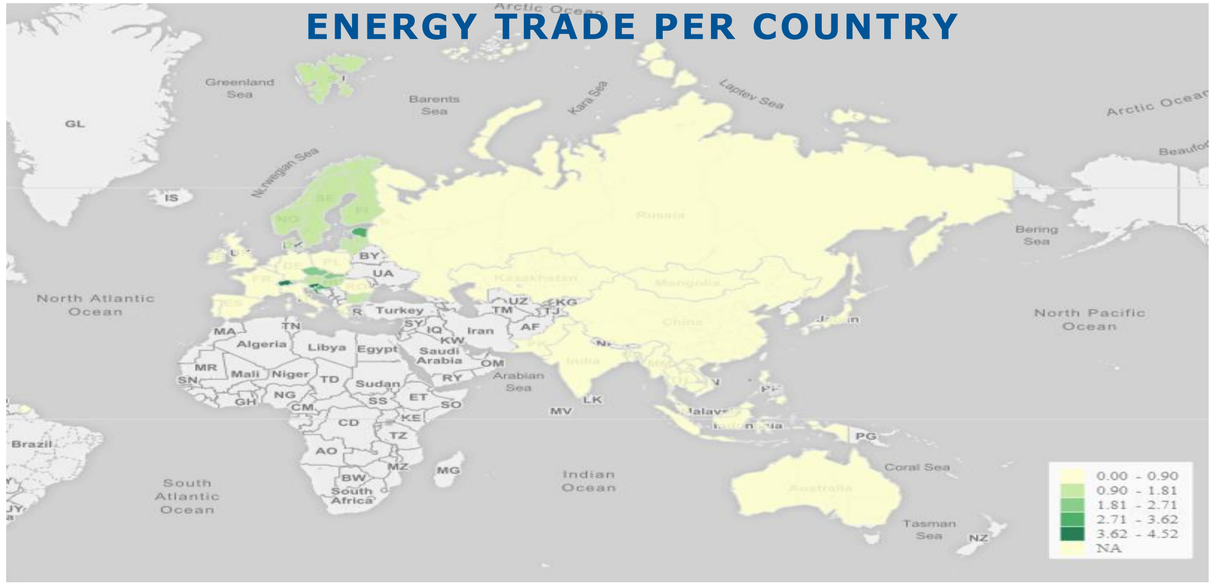
## RENEWABLE ENERGY CONSUMPTION



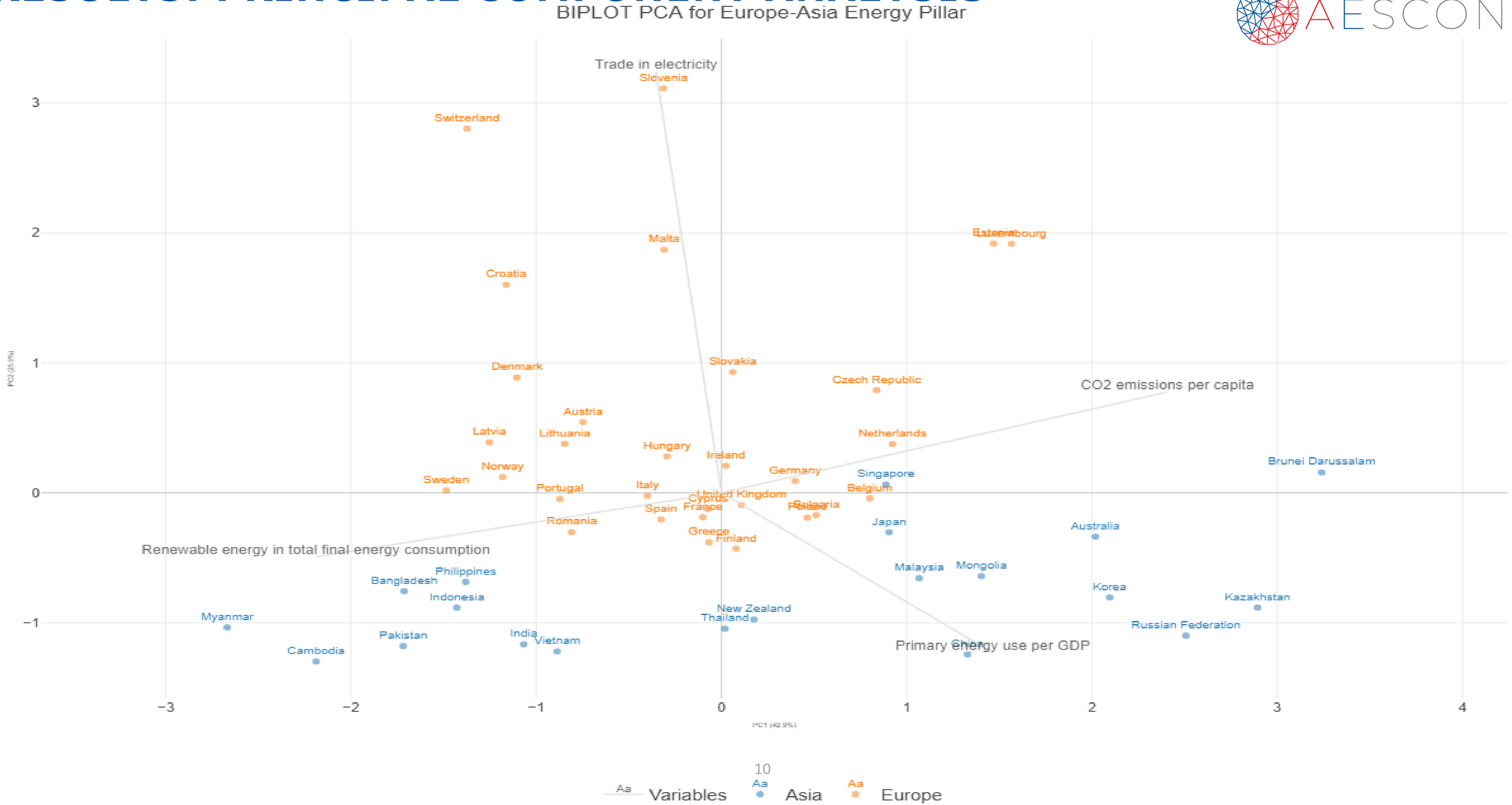

## CO2 EMISSIONS PER CAPITA



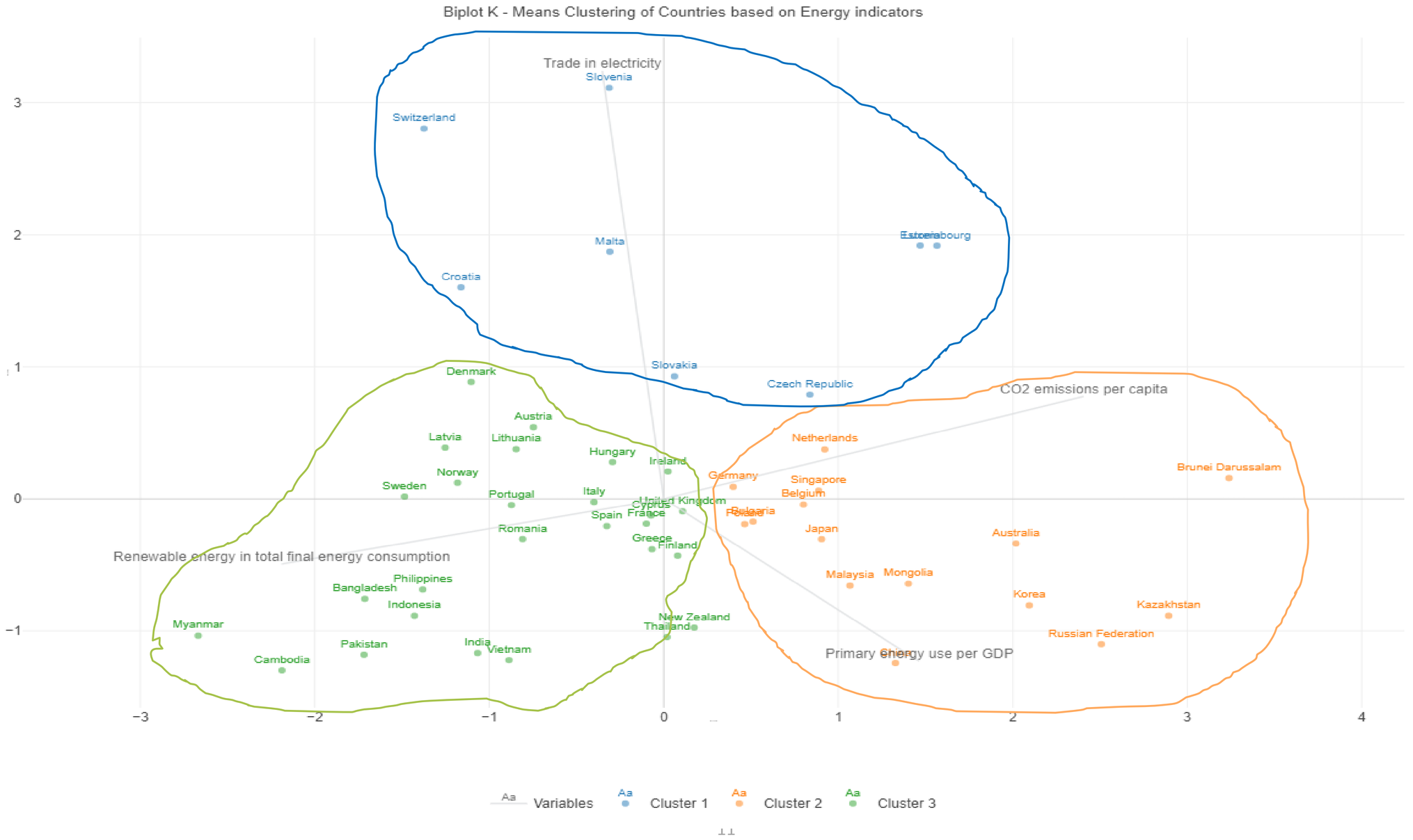

## ENERGY TRADE PER COUNTRY



# RESULTS: PRINCIPAL COMPONENT ANALYSIS



# RESULTS: K-MEANS CLUSTERING



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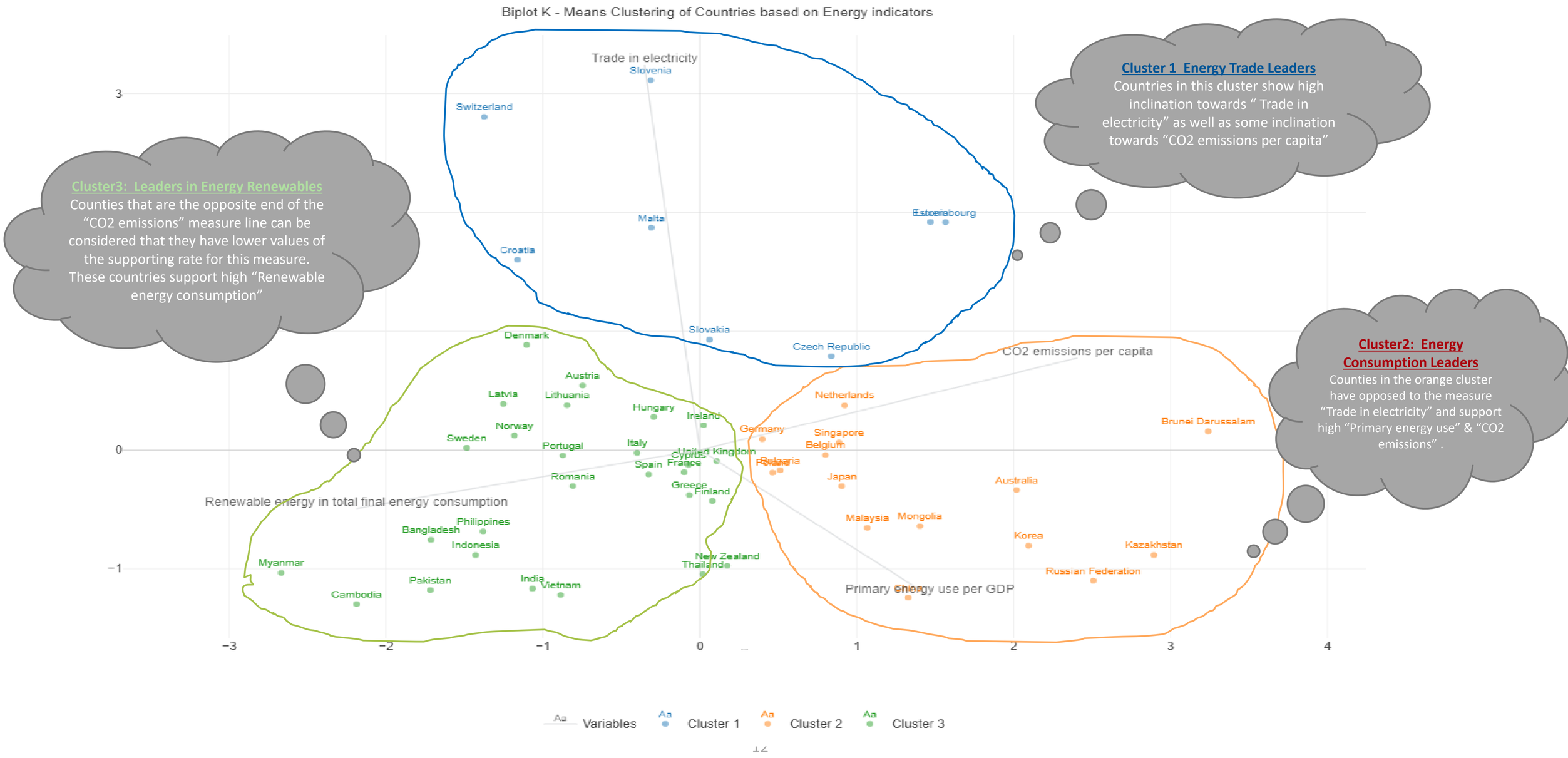


**Cluster 1 Energy Trade Leaders**

Countries in this cluster show high inclination towards " Trade in electricity" as well as some inclination towards "CO2 emissions per capita"

**Cluster3: Leaders in Energy Renewables**

Counties that are the opposite end of the "CO2 emissions" measure line can be considered that they have lower values of the supporting rate for this measure. These countries support high "Renewable energy consumption"

**Cluster2: Energy Consumption Leaders**

Counties in the orange cluster have opposed to the measure "Trade in electricity" and support high "Primary energy use" & "CO2 emissions" .

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# RESULTS (SDG9): WHICH COUNTRIES ARE LEADERS IN TERMS OF INNOVATION CONNECTIVITY PILLAR?

# INDICATORS OF INNOVATION: DATA EXPLORATION FOR SDG 9

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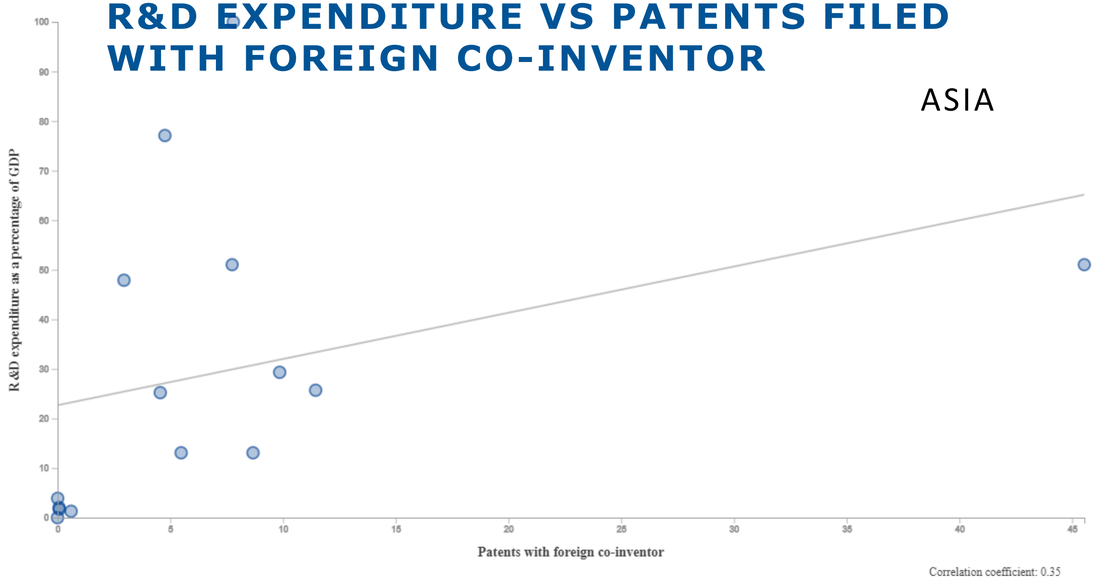
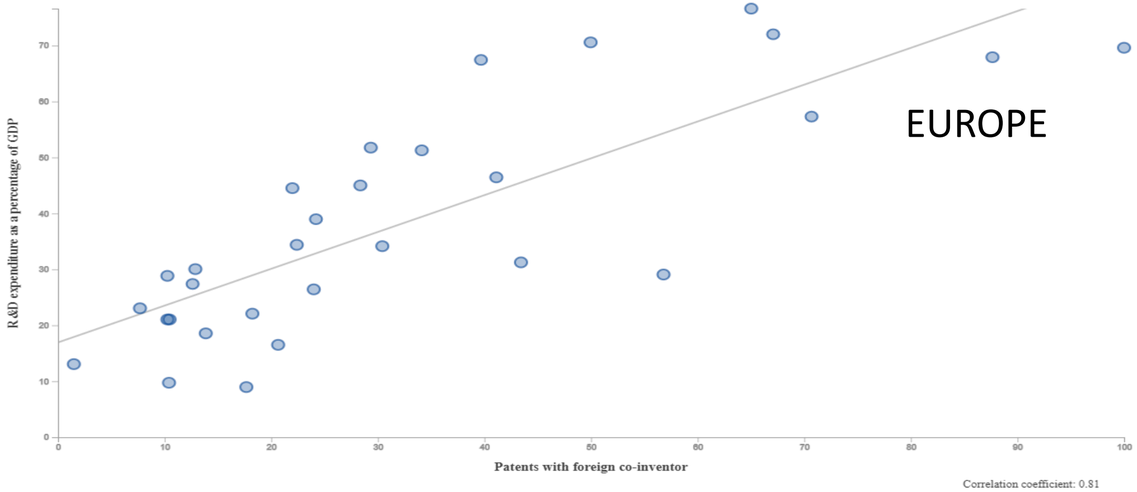
## R&D EXPENDITURE VS PATENTS FILED WITH FOREIGN CO-INVENTOR

ASIA



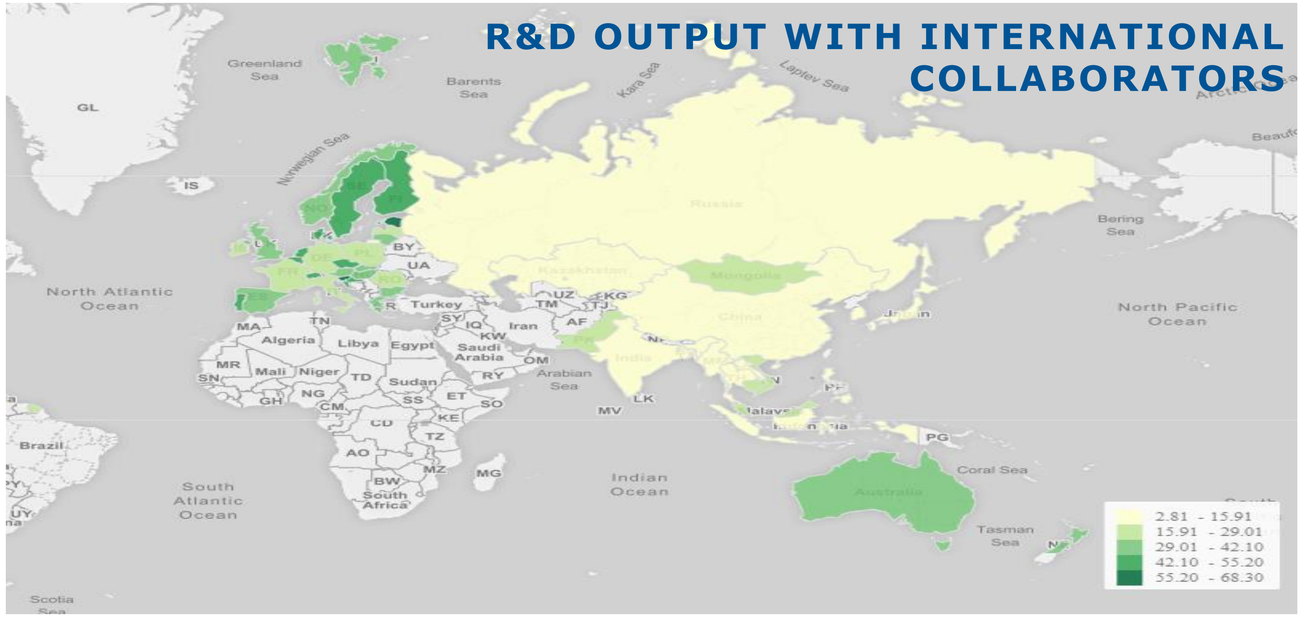

Correlation coefficient: 0.35

EUROPE

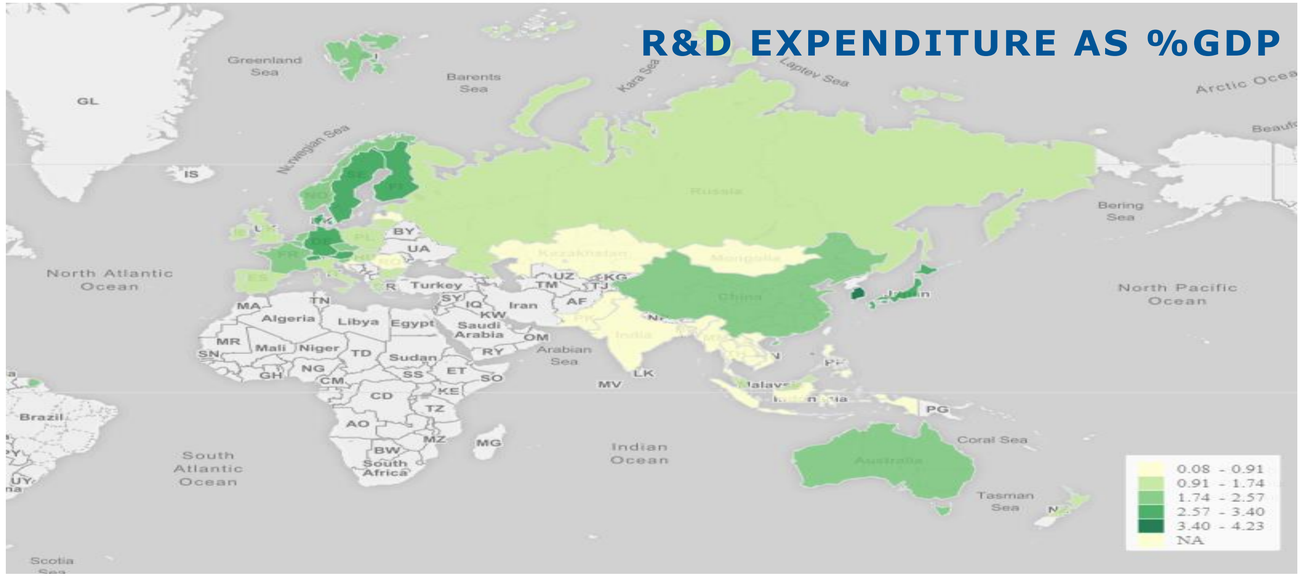



Correlation coefficient: 0.81

## R&D OUTPUT WITH INTERNATIONAL COLLABORATORS




## R&D EXPENDITURE AS %GDP



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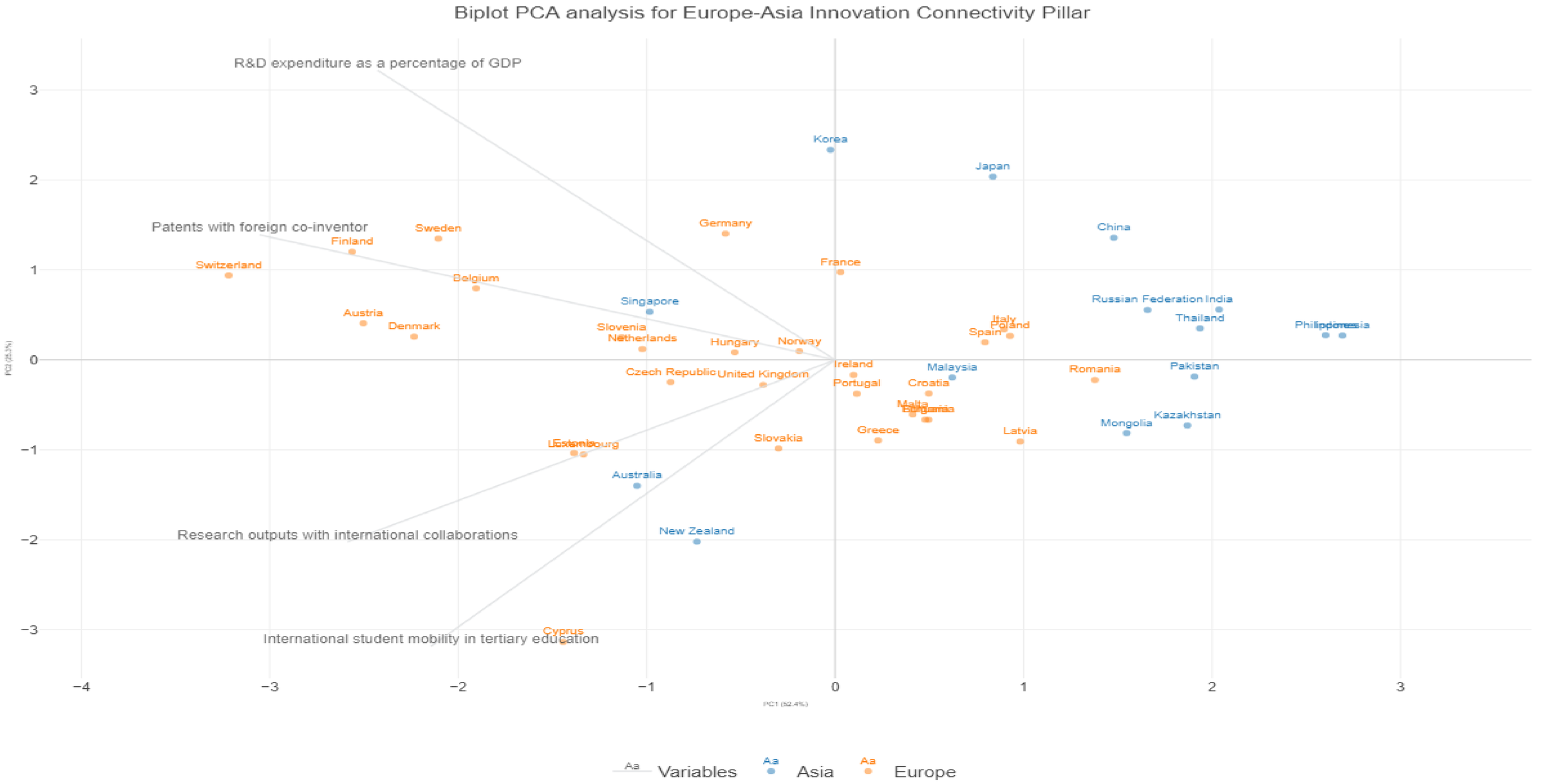

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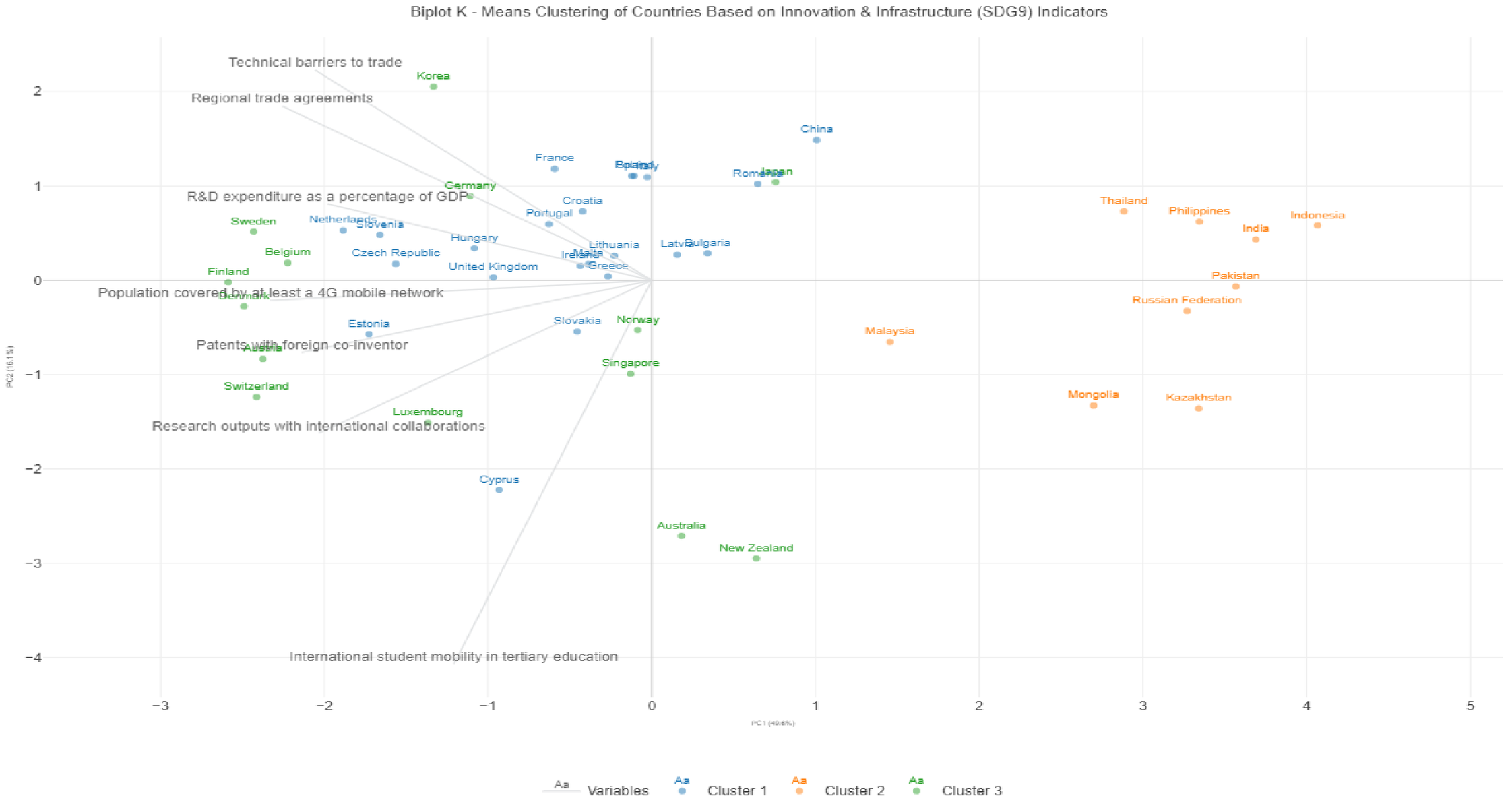

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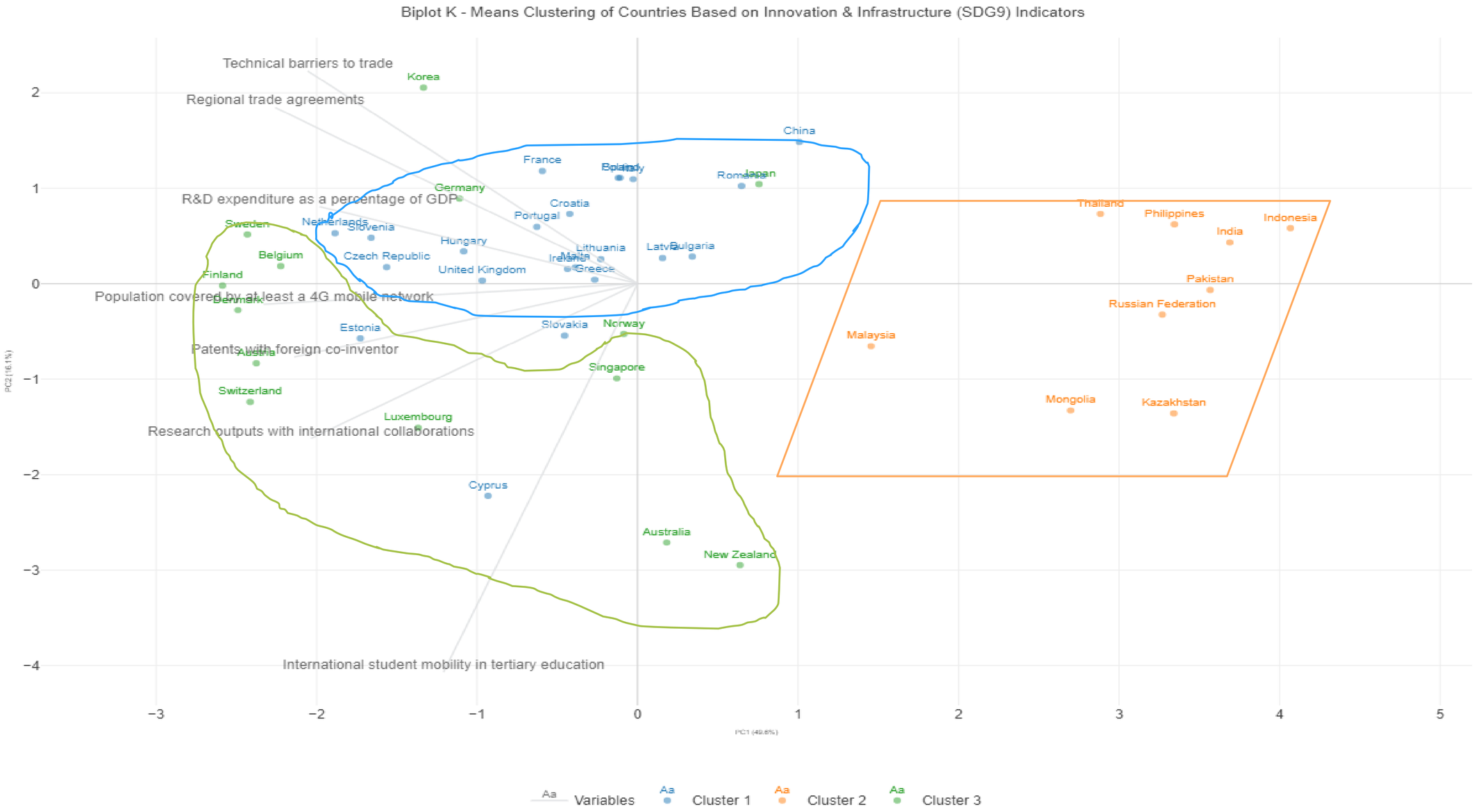

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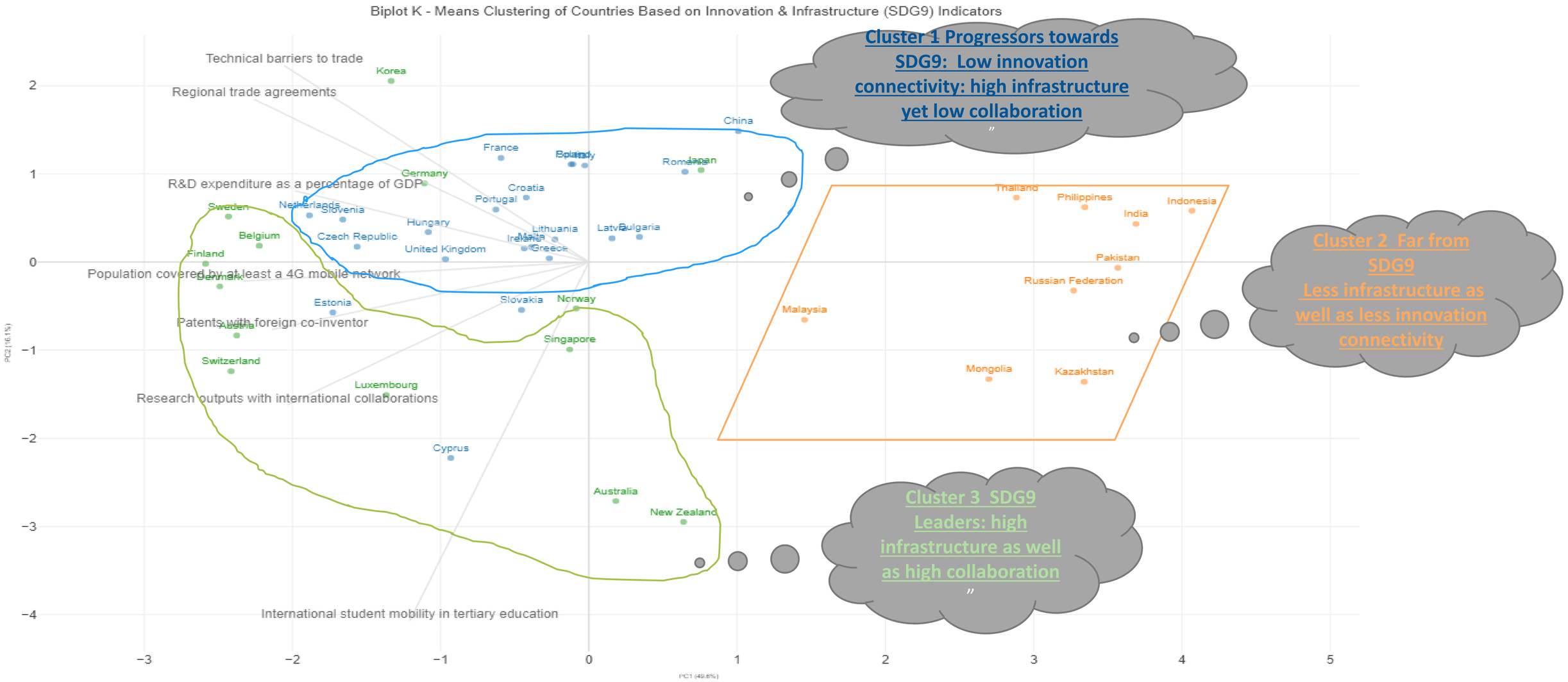


**Cluster 1 Progressors towards SDG9: Low innovation connectivity: high infrastructure yet low collaboration**

**Cluster 2 Far from SDG9 Less infrastructure as well as less innovation connectivity**

**Cluster 3 SDG9 Leaders: high infrastructure as well as high collaboration**

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# RESULTS

# (SDG17): COLLABORATING FOR SUSTAINABILE CONNECTIVITY: WHICH COUNTRIES HAVE BETTER OVERALL PHYSICAL CONNECTIVITY, ECONOMIC/FINANCIAL CONNECTIVITY, POLITICAL CONNECTIVITY, INSTITUTIONAL CONNECTIVITY, & PEOPLE-TO-PEOPLE CONNECTIVITY?

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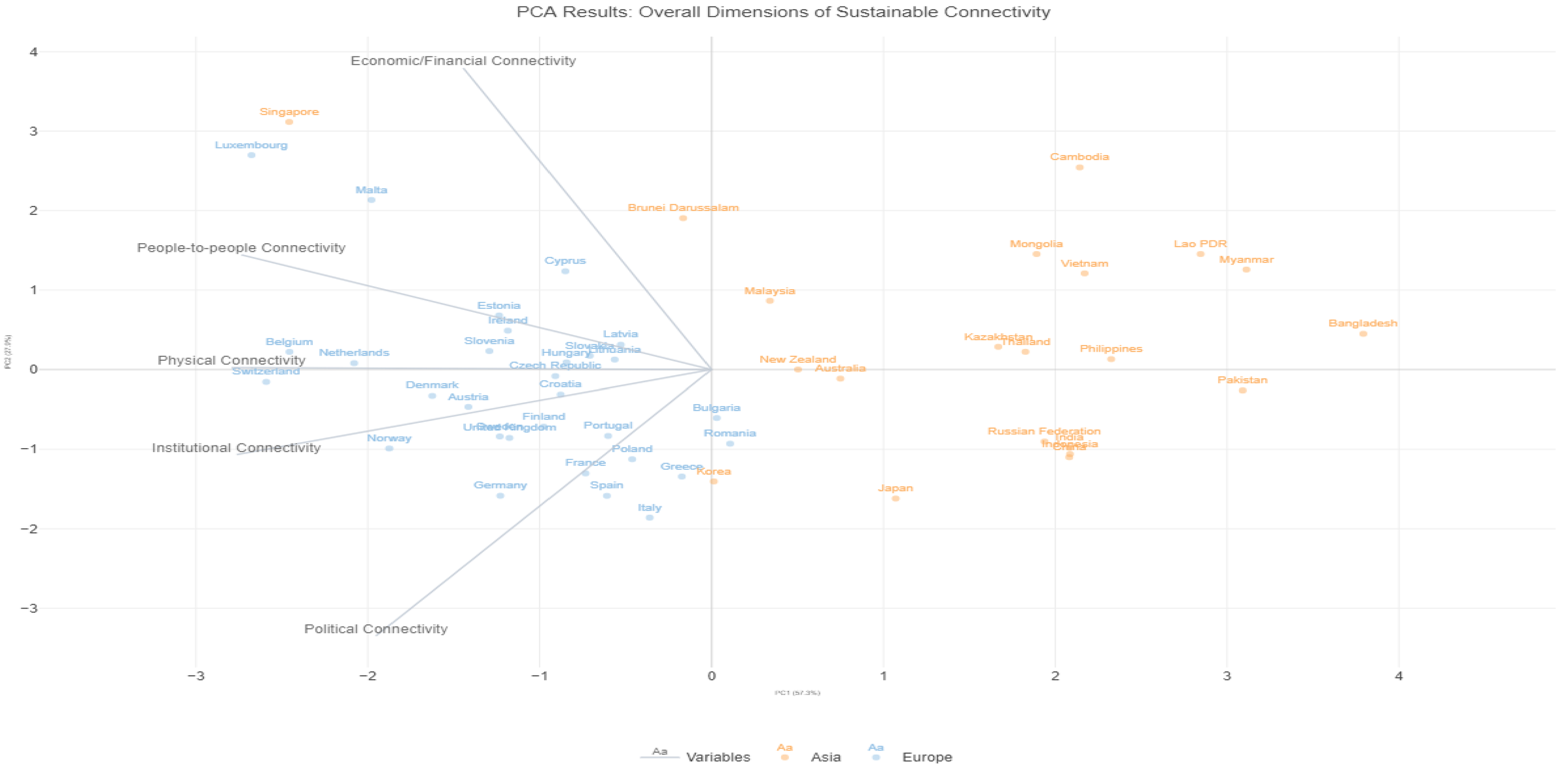

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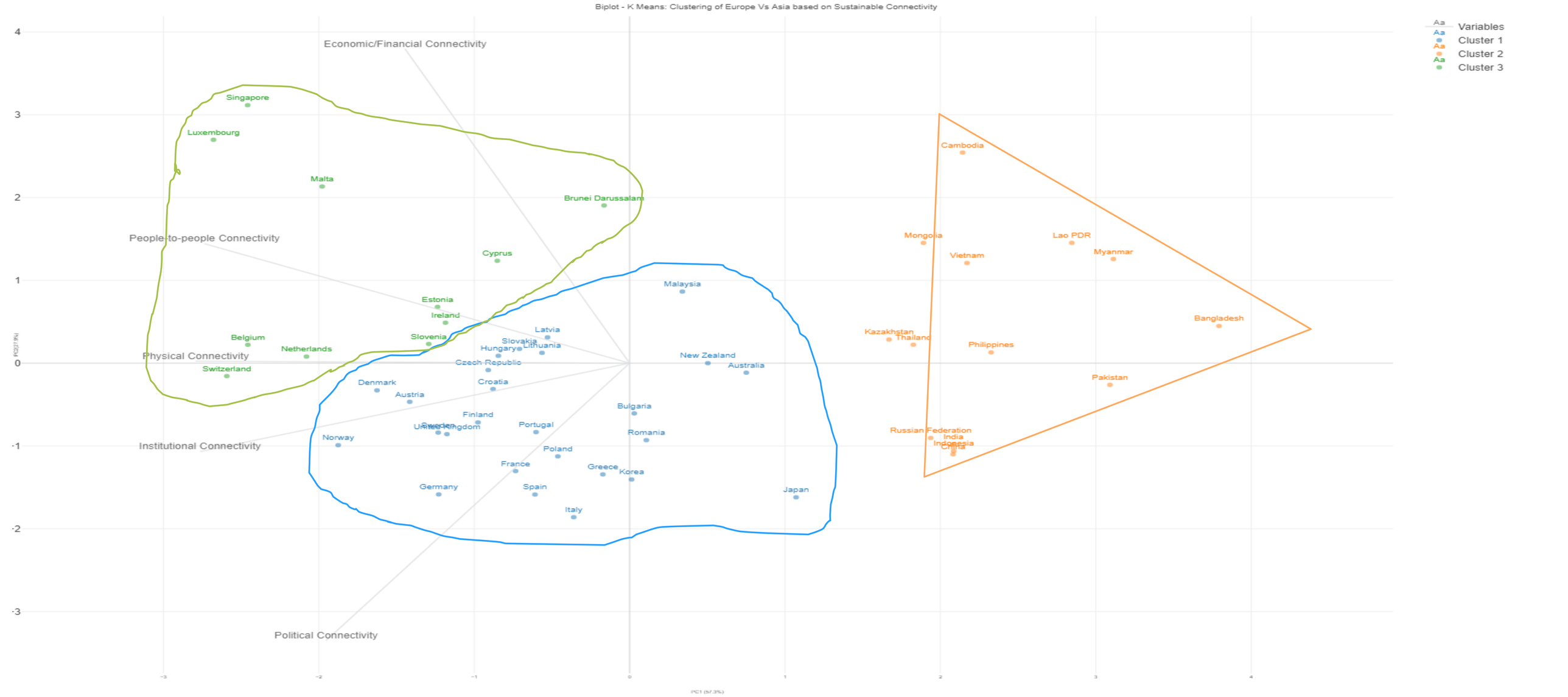

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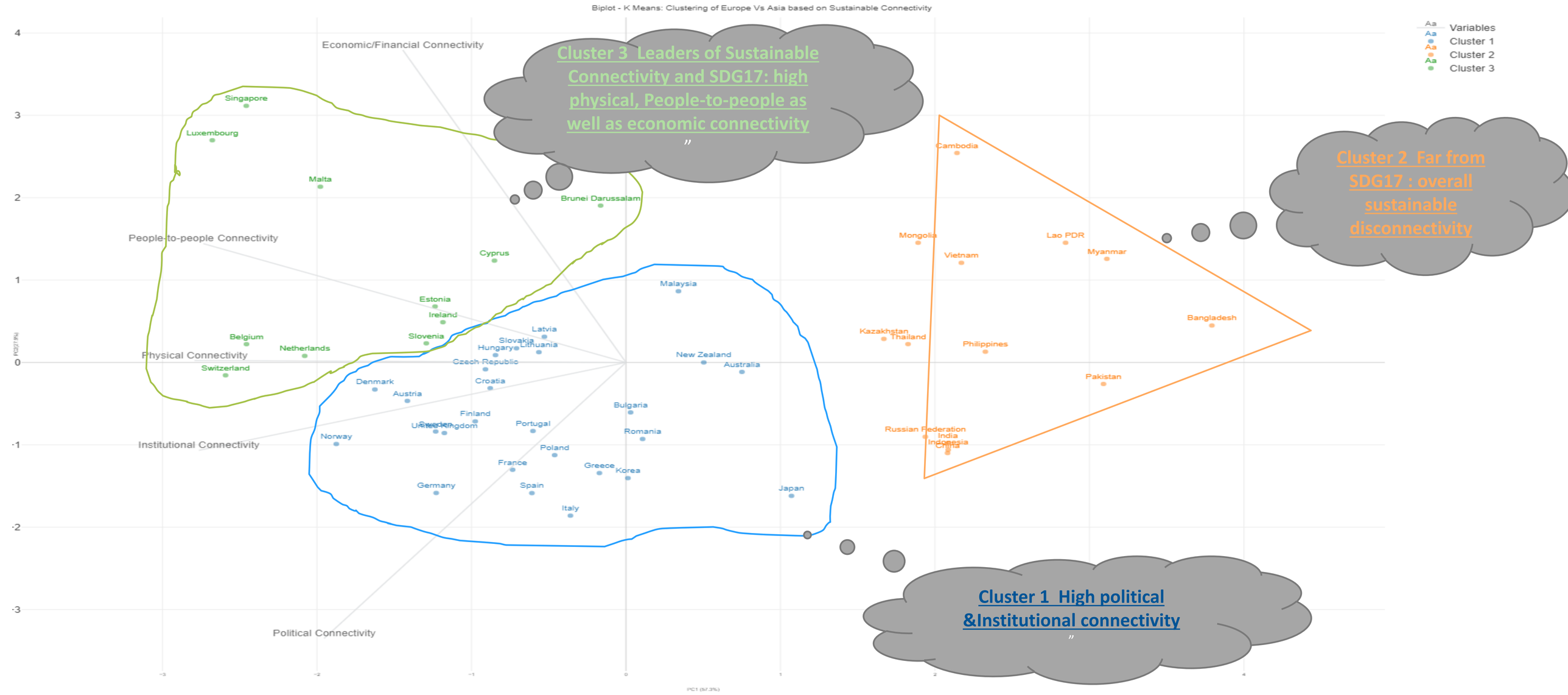
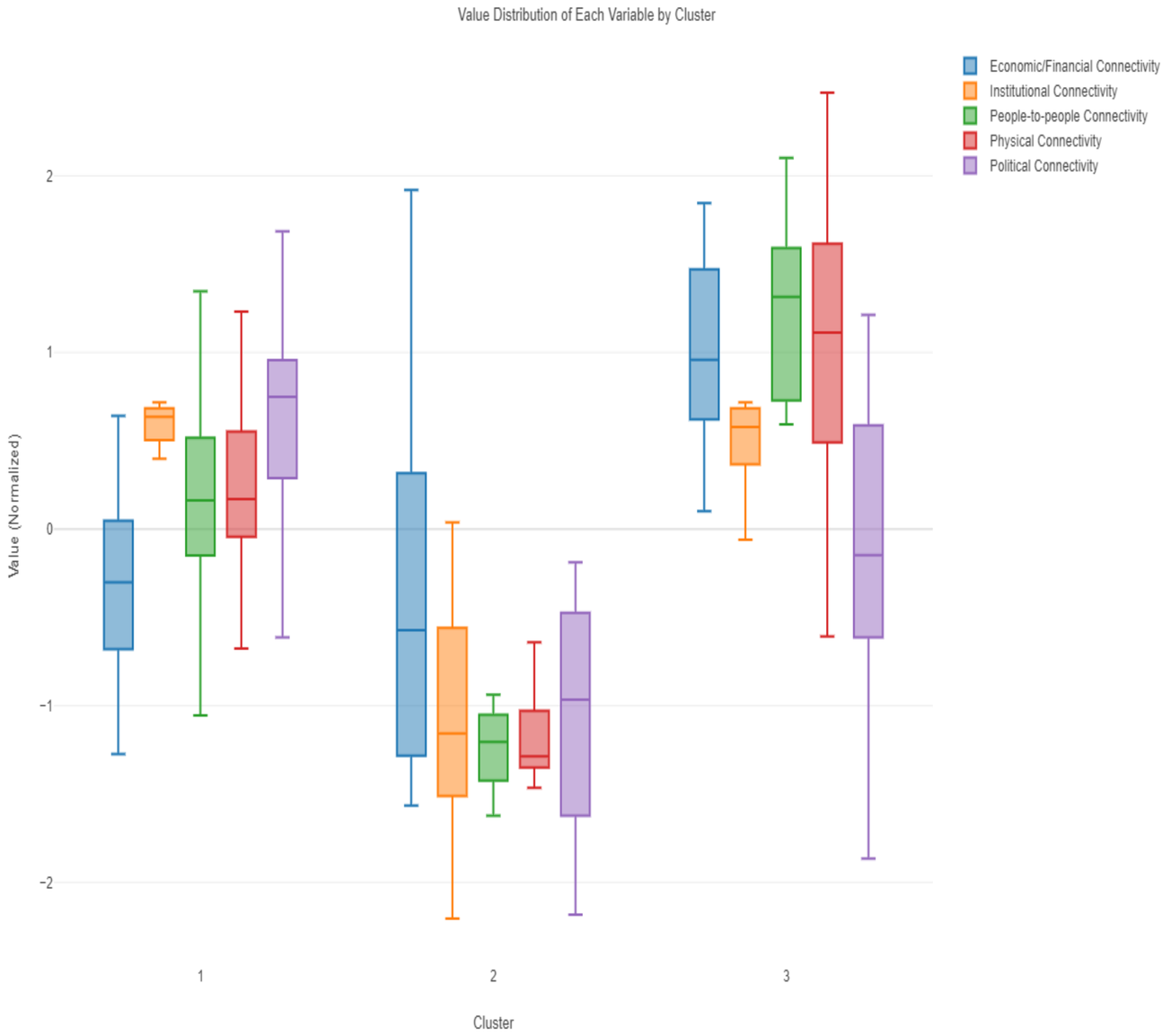


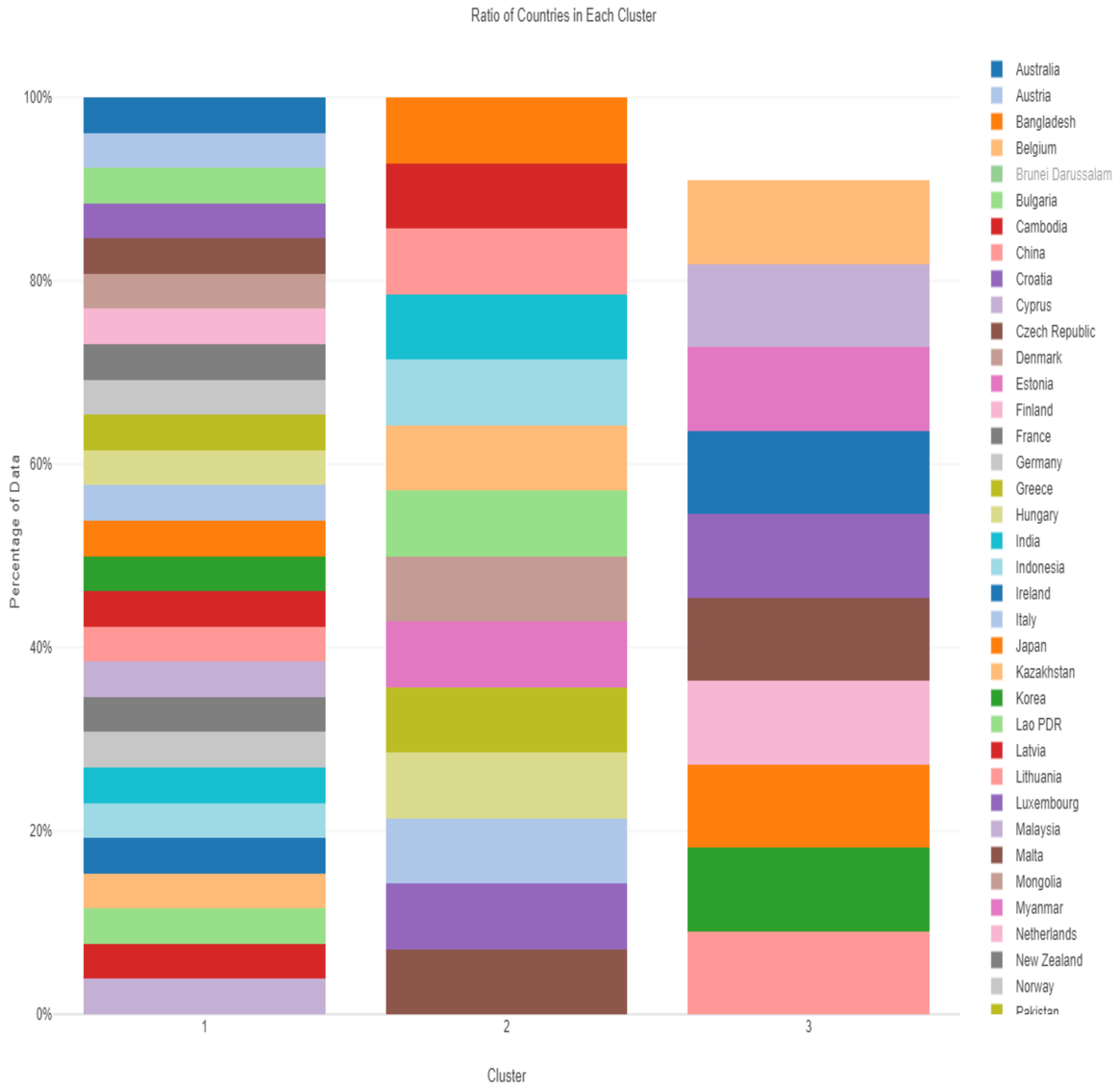

Cluster 3 Leaders of Sustainable Connectivity and SDG17: high physical, People-to-people as well as economic connectivity

Cluster 2 Far from SDG17 : overall sustainable disconnectivity

Cluster 1 High political &Institutional connectivity

# DETAILS INTO THE CLUSTERS: SDG17



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# THANK YOU

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