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SDG Performance in EU Countries: A Multi-Criteria Analysis of Economic, Social, Environmental, and Overall Sustainability

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Abstract: Examining EU sustainable development levels provides valuable perspectives for European planning research. This study offers a simple approach to evaluating the SDG performance of European Union member states for 2017–2021, using only World Bank data. To represent the three pillars of sustainability – economic, social, and environmental – 29 indicators were chosen. The CoCoSo (Combined Compromise Solution) method was used to assess the sustainability performance for each pillar and overall. The results show notable disparities: Northern and Western European countries, particularly Sweden, Denmark, and Finland, exhibit the highest sustainability levels; however, Eastern and Southern European countries lag behind. Moreover, achieving a high level of economic sustainability alone does not ensure overall sustainability. Sweden's leading position primarily stems from its strong social and environmental performance. Two robustness analyses were performed to check whether the results are consistent. First, the results were compared with a well-known report, and second, they were compared with an alternative multi-criteria decision-making method, VIKOR. Spearman rank correlation analysis shows the results are reliable and consistent ($\rho = 0.8024$ and $\rho = 0.8530$). The findings outline the multidimensional nature of sustainability and the necessity for balanced progress across the three pillars.

Keywords: Sustainable Development Goals (SDGs), Multi-Criteria Decision-Making (MCDM), CoCoSo method, SDG performance, European Union

1. Introduction

In 2015, the United Nations announced the 17 Sustainable Development Goals (SDGs) and 169 targets to address global challenges such as poverty, hunger, health, inequality, climate change, and peace. These goals aim to build a better, more sustainable future for all. Each goal, with specific targets, is expected to be achieved by 2030. The plan is also expected to be implemented by all nations and all parties involved in a cooperative partnership. (United Nations, 2015).

Sustainable development indicators capture the performance of each of the three pillars of sustainability. These indicators include economic indicators such as GDP per capita and unemployment rate, environmental indicators which may be related to air quality, forest areas, water productivity, and social indicators such as education, healthcare expenditures, reduced inequalities, etc. From this perspective, evaluations focusing on SDG measurement can provide a comprehensive approach to assessing people's well-being and quality of life.

Compared with other countries worldwide, European Union countries perform better on the SDGs. The first and most important reason for this progress is the existence of a strong policy framework. For example, the adoption of the European Green Deal (European Commission, 2019), a response to climate- and environment-related challenges, was an important step toward a more sustainable future. The second reason for this progress is economic power. According to World Bank data, EU countries ranked highly in 2023 in terms of GDP per capita (current US$) (World Bank, 2025). In a sense, although policies towards sustainable development may be costly in some cases, this does not pose much of a problem for the European Union compared to other countries. The third reason is the joint efforts of the countries. EU countries can act together to implement regulations as they come into force. In addition, public awareness and a high level of education can be seen as a fourth reason.

Since EU countries lead in sustainable development, it is important for EU member states to surpass other EU member states. Therefore, in this study, the sustainable development levels of the European Union member countries were examined with their economic, social and environmental dimensions separately and as a whole using a multi-criteria decision-making method. In addition, countries were classified as Western Europe, Eastern Europe, Southern Europe, and Northern Europe by location and compared in terms of sustainable development scores.

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The CoCoSo method was chosen as the MCDM approach because it provides a transparent and replicable framework for integrating diverse indicators, making it suitable for sustainability measurement and social indicators research.

This study makes a significant contribution to sustainable development and European planning literature. First, it develops an indicator-based assessment of sustainable development within EU member states by selecting appropriate indicators that represent the goals and targets reported by the United Nations (2015) and by implementing a transparent, replicable MCDM technique. These indicators are publicly available and can easily be obtained from the World Bank. Second, it enhances the understanding of regional disparities in sustainable development and their implications for social well-being at both country and regional levels. Third, as a result, it enables policymakers to better analyze, understand, and address challenges related to sustainable development and social well-being.

The rest of the study is structured as follows: Section 2 briefly reviews the literature. Section 3 presents the data and methodology. Section 4 provides the results and discussion. Section 5 conducts robustness checks, and section 6 presents a sensitivity analysis. Sections 7, 8, and 9 address the study's limitations, policy implications, and conclusions, respectively.

2. Literature Review

Numerous studies have assessed regional sustainability using multi-criteria decision-making (MCDM) methods at various scales, including country, state, and smaller units. For example, Dwivedi and Sharma (2025) examined the sustainable development performance of Indian states by employing the SWI MCDM methods. Stanković et al. (2021) explored the sustainability of 37 port regions from 2014 to 2018. Esfandiary Abdolmaleki et al. (2023) investigated the sustainability performance of autonomous communities in Spain. Yi et al. (2019) examined city sustainability in China. Paz et al. (2021) assessed sustainable development at the municipality level. Viteikienė and Zavadskas (2007) evaluated the sustainability of residential areas. Phillis et al. (2011) ranked the sustainability of 128 countries using 75 indicators and a method called SAFE. Covering 1990–2005, the results indicate that Switzerland ranked first. In addition, all top ten countries in the ranking are in Europe. Jankovic Šoja et al. (2016) ranked EU countries according to their achievement of the Sustainable Development Strategy using the I-distance method. The results indicated that Luxembourg holds the leading position, with Sweden and Finland occupying the second and third ranks, respectively. Antanasijevic et al. (2017) assessed the sustainability performance of European countries using a PROMETHEE-based differential multi-criteria analysis for the period 2004–2014. They state that most European countries advanced in sustainability during the period analyzed. Senir (2024) ranked Eastern European countries based on their environmental sustainability level with MCDM methods. In the study, while the criteria weights were determined with the ENTROPY method, final rankings were made with COPRAS and WASPAS. According to COPRAS results, Greece, Turkey, Slovenia, Poland, and Latvia ranked highest, while according to WASPAS results, Latvia and Slovenia were the best. Strezov et al. (2017) developed a normalized average sustainability index (NASI) using nine selected sustainability indices to assess how each index differed from the overall average. The results showed that Switzerland ranked the highest, with Norway and Sweden following closely behind. Sun et al. (2020) investigated the environmental sustainability performance of South Asian countries for 2001–2015 and concluded that Bhutan performed better than all other countries in the dataset. Campagnolo et al. (2018) created a composite, multidimensional index using 26 indicators and provided a global country-level sustainability ranking. According to the study results, Sweden ranks first among 139 countries, followed by Norway and Switzerland. Tan et al. (2017) employed the ANFIS methodology to evaluate sustainability at the country level. Their analysis found that in the 2005 ANFIS-based ranking, Sweden, Switzerland, and Finland ranked first, second, and third, respectively, among 128 countries. By 2011, the top three positions shifted, with Germany ranking first, followed by Sweden and Switzerland. Brodny and Tutak (2023) assessed the energy and climate sustainability performance of European Union member states in 2010, 2015, and 2020 using five multi-criteria decision-making (MCDM) methods. In the 2010 analysis, one method identified Denmark as the top-performing country, whereas the remaining four methods consistently ranked Sweden highest. For both 2015 and 2020, all methods unanimously identified Sweden as the most sustainable country. Cucchiella et al. (2017) analyzed the environmental and energy performance of European countries and developed a comprehensive sustainability index. Their findings indicate that Sweden ranks highest in sustainability, followed by Denmark, Finland, and Austria. Kaya (2020) conducted an MCDM analysis of the sustainability levels of 33 OECD countries using data from the second quarters of 2019 and 2020. According to the results, the United States led in sustainability in the second quarter of 2020, followed by Germany. Dias et al. (2017) conducted a sustainability assessment covering 175 countries using the AHP-TOPSIS method. Using data from 2013–2014, they ranked countries according to economic, social, and environmental indicators. The study also produced an overall ranking, in which Switzerland ranked first, followed by Norway,

Sweden, and Denmark. Mateusz et al. (2018) assessed the sustainable development performance of European Union member states for 2016 using the TOPSIS and VIKOR multi-criteria decision-making methods. The analysis identified Austria, Belgium, Germany, Denmark, and Italy as first-class countries according to the rankings produced by both methodologies. There are also a few countries for which the two methods differ in their classification as first-class countries. D'Adamo et al. (2025) evaluated the sustainability of European countries using the min-max method and TOPSIS for 2022. According to the study's baseline model, Sweden ranked 1st in overall ranking under both methods. Ersoy et al. (2026) assessed the SDGs of EU countries using a MPSI-RAPS model for 2019–2021. According to study results, Sweden ranked 1st in 2020, 2021, and in the final ranking. To the best of our knowledge, no other study calculates SDG scores in a way that is largely consistent with previous studies and reports, where all indicators are explained in detail with the 17 goals and targets and computed solely using publicly available data through a simple MCDM method.

3. Data and Methodology

3.1. Data

This study aims to measure the sustainable development levels of EU member states for the period 2017–2021. The necessary data for the analysis were obtained from the World Development Indicators (WDI) database (World Bank, 2025). From among many indicators, 29 criteria were selected based on a comprehensive literature review, expert input, relevance, and data availability.

3.1.1. Economic Dimension

The 8th goal for sustainable development is "decent work and economic growth". Maintaining economic growth per person aligned with each country's specific conditions; increasing economic output by promoting diversification, advancing technology, fostering innovation, and encouraging policies that support development are key targets in Goal 8 (United Nations, 2015). To represent Goal 8, GDP per capita (Target 8.1), unemployment as a percentage of the total labor force (Target 8.5), inflation rate (Target 8.1), employment-to-population ratio (Target 8.5), and gross capital formation (Target 8.1) were used. At first glance, inflation may seem unrelated to this goal, but sustainable growth requires price stability. Goal 9 focuses on developing strong infrastructure, supporting inclusive and sustainable industrial growth, and fostering innovation. Innovation can be fostered with R&D expenses (Target 9.5). On the other hand, high-tech exports (Target 9.5) can indicate how innovative the country is. Progress in reducing inequalities, which relate to Goal 10, was assessed using the Gini index (Target 10.1) and the income share held by the lowest 20 percent of the population (Target 10.1). Both indicators fall under the social dimension. However, given their primary relevance to economic outcomes and to avoid redundancy, they were analyzed under the economic dimension.

3.1.2. Social Dimension

Sustainable Development Goal 3 aims to ensure healthy lives and promote well-being for individuals at all ages. To evaluate progress toward this goal in the social dimension, two key indicators are considered: life expectancy at birth, associated with Targets 3.1, 3.2, 3.3, 3.4, and 3.8, and healthcare quality, measured by domestic general government health expenditure (% of GDP), which is closely related to Target 3.8 on achieving universal health coverage.

While Goal 1 (No Poverty) and Goal 2 (Zero Hunger) are frequently classified within the economic dimension, in this context they are conceptualized as components of the social dimension. These are operationalized through the Poverty Gap (Target 1.1) and the Prevalence of Undernourishment (Target 2.1) indicators, respectively.

Gender equality was assessed using Women Business and the Law Index (Target 5.1), quality education was measured by three indicators, educational attainment, at least completed upper secondary level, population 25+ (Target 4.4), educational attainment, at least Master's or equivalent, population 25+ (Target 4.3); and Government expenditure on education, total (% of GDP) (Target 4.a, 4.b and 4.c). Industry, innovation, and infrastructure (Goal 9) and partnerships for the goals (Goal 17) were captured through Individuals using the Internet (% of population) (Target 9.c and Target 17.8). Peace, justice, and strong institutions (Goal 16) are represented by Rule of Law (Target 16.3).

3.1.3. Environmental Dimension

Clean water and sanitation (Goal 6) is represented by Water productivity (Target 6.4), and sustainable cities and communities (Goal 11) are evaluated using PM2.5 air pollution (Target 11.6). Goal 12 promotes sustain-

able consumption and production patterns. Specifically, Target 12.2 focuses on the efficient use and sustainable management of natural resources. Consequently, the indicator 'adjusted savings: natural resources depletion' was selected as a suitable proxy for monitoring progress toward this goal.

One of the most important goals in the environmental dimension is Goal 13: climate action. CO_2 emissions excluding LULUCF per capita (Target 13.2), carbon intensity of GDP (Target 13.2 and Target 9.4), and total greenhouse gas emissions excluding LULUCF per capita (Target 13.2) were utilized for Goal 13. Goal 7 focuses on ensuring access to affordable, reliable, sustainable, and modern energy and is best represented by the share of renewable energy in total final energy consumption (Target 7.2). Additionally, several indicators were considered as criteria to represent specific Sustainable Development Goals (SDGs), including: terrestrial protected areas as a percentage of land area for life on land (Target 15.1); forest area as a percentage of land area (Target 15.2); terrestrial and marine protected areas as a percentage of total territorial area (Target 14.5).

Table 1 presents all the criteria, corresponding dimensions, and relevant Sustainable Development Goals (SDGs) utilized in the Multi-Criteria Decision-Making (MCDM) analysis to assess the sustainable development levels of EU member states. The study excluded 2022, 2023, and 2024 because data for several criteria were unavailable during this period. For instance, Adjusted savings: natural resources depletion (% of GNI) and renewable energy consumption (% of total final energy consumption) data were not available for these years, and government expenditure on education data was largely missing. Malta was also excluded because adjusted savings data were unavailable. We estimated six missing observations for 2021 using linear trend extrapolation. Furthermore, because PM2.5 air pollution data for 2021 were unavailable for all countries, we assumed the 2021 values for this criterion were the same as those recorded in 2020. This approach avoided introducing an additional extrapolation assumption for an environmental indicator and maintained a complete dataset for the analysis.

As shown in Table 1, some indicators may be relevant to more than one sustainability dimension. For instance, the employment-to-population ratio can be associated with both the economic and social dimensions, while water productivity pertains to both economic and environmental aspects. Nonetheless, assigning these indicators to multiple dimensions may distort the overall assessment of SDG performance.

Table 1. Performance Evaluation Criteria

No	Criteria	Related Goal	Source	Direction	Sustainability Dimension
1	GDP per capita (current US$)	Goal 8, Goal 1	WDI, World Bank	Maximize	Economic
2	Research and development expenditure (% of GDP)	Goal 9	WDI, World Bank	Maximize	Economic
3	Unemployment, total (% of total labor force) (modeled ILO estimate)	Goal 8	WDI, World Bank	Minimize	Economic
4	Inflation, consumer prices (annual %)	Goal 8	WDI, World Bank	Minimize	Economic
5	Employment to population ratio, 15+, total (%) (modeled ILO estimate)	Goal 8	WDI, World Bank	Maximize	Economic
6	High-technology exports (% of manufactured exports)	Goal 9	WDI, World Bank	Maximize	Economic
7	Gross capital formation (% of GDP)	Goal 8	WDI, World Bank	Maximize	Economic
8	Gini index	Goal 10	WDI, World Bank	Minimize	Economic
9	Income share held by lowest 20%	Goal 10	WDI, World Bank	Maximize	Economic
10	Life expectancy at birth, total (years)	Goal 3	WDI, World Bank	Maximize	Social
11	Educational attainment, at least completed upper secondary, population 25+, total (%) (cumulative)	Goal 4	WDI, World Bank	Maximize	Social
12	Educational attainment, at least Master's or equivalent, population 25+, total (%) (cumulative)	Goal 4	WDI, World Bank	Maximize	Social
13	Prevalence of undernourishment (% of population)	Goal 2	WDI, World Bank	Minimize	Social
14	Domestic general government health expenditure (% of GDP)	Goal 3	WDI, World Bank	Maximize	Social
15	Government expenditure on education, total (% of GDP)	Goal 4	WDI, World Bank	Maximize	Social
16	Individuals using the Internet (% of population)	Goal 9, Goal 17	WDI, World Bank	Maximize	Social
17	Poverty gap at $3.65 a day (2017 PPP) (%)	Goal 1	WDI, World Bank	Minimize	Social
18	Rule of Law: Estimate	Goal 16	WDI, World Bank	Maximize	Social
19	Women Business and the Law Index Score (scale 1–100)	Goal 5	WDI, World Bank	Maximize	Social

Table 1. cont.

No	Criteria	Related Goal	Source	Direction	Sustainability Dimension
20	PM2.5 air pollution, mean annual exposure (micrograms per cubic meter)	Goal 11, Goal 3	WDI, World Bank	Minimize	Environmental
21	Carbon dioxide (CO_2) emissions excluding LULUCF per capita (t CO2e/capita)	Goal 13	WDI, World Bank	Minimize	Environmental
22	Carbon intensity of GDP (kg CO2e per constant 2015 US$ of GDP)	Goal 13, Goal 9	WDI, World Bank	Minimize	Environmental
23	Forest area (% of land area)	Goal 15	WDI, World Bank	Maximize	Environmental
24	Renewable energy consumption (% of total final energy consumption)	Goal 7	WDI, World Bank	Maximize	Environmental
25	Terrestrial protected areas (% of total land area)	Goal 15	WDI, World Bank	Maximize	Environmental
26	Total greenhouse gas emissions excluding LULUCF per capita (t CO2e/capita)	Goal 13	WDI, World Bank	Minimize	Environmental
27	Water productivity, total (constant 2015 US$ GDP per cubic meter of total freshwater withdrawal)	Goal 6	WDI, World Bank	Maximize	Environmental
28	Adjusted savings: natural resources depletion (% of GNI)	Goal 12	WDI, World Bank	Minimize	Environmental
29	Terrestrial and marine protected areas (% of total territorial area)	Goal 14	WDI, World Bank	Maximize	Environmental

Table 2 presents the descriptive statistics for the selected data. Variation among EU member states is high, even though they are governed under a common institutional framework and implement aligned policies. For example, gross domestic product (GDP) per capita ranges from $8,382 to $133,712, indicating substantial differences. Similarly, other indicators show notable variation, including water productivity, high-technology exports, educational attainment, and the share of renewable energy consumption. Although EU member countries implement similar policies, statistical differences in key criteria may lead to important differences in SDG scores.

Table 2. Descriptive Statistics for 2017–2021

Number	Criteria	Obs	Mean	Std Deviation	Min	Max
1	GDP per capita (current US$)	130	36,445	24685	8,382	133,712
2	Research and development expenditure (% of GDP)	130	1.716	0.878	0.465	3.490
3	Unemployment, total (% of total labor force) (modeled ILO estimate)	130	6.879	3.433	2.015	21.413
4	Inflation, consumer prices (annual %)	130	1.809	1.235	-1.248	5.111
5	Employment to population ratio, 15+, total (%) (modeled ILO estimate)	130	54.662	5.214	40.096	64.367
6	High-technology exports (% of manufactured exports)	130	13.670	5.750	5.284	29.334
7	Gross capital formation (% of GDP)	130	22.747	4.780	11.888	53.714
8	Gini index	130	30.982	3.921	23.200	41.300
9	Income share held by lowest 20%	130	7.943	1.236	5.300	10.300
10	Life expectancy at birth, total (years)	130	79.682	3.047	71.212	83.832
11	Educational attainment, at least completed upper secondary, population 25+, total (%) (cumulative)	130	75.701	12.179	37.080	91.434
12	Educational attainment, at least Master's or equivalent, population 25+, total (%) (cumulative)	130	14.617	4.177	2.821	27.709
13	Prevalence of undernourishment (% of population)	130	2.545	0.196	2.500	4.100
14	Domestic general government health expenditure (% of GDP)	130	6.316	1.771	2.746	10.203
15	Government expenditure on education, total (% of GDP)	130	4.899	1.099	3.006	7.926
16	Individuals using the Internet (% of population)	130	84.448	8.357	63.100	98.900
17	Poverty gap at $3.65 a day (2017 PPP) (%)	130	0.361	0.442	0.000	2.900
18	Rule of Law: Estimate	130	1.043	0.591	-0.128	2.034
19	Women Business and the Law Index Score (scale 1-100)	130	96.264	3.524	85.000	100.000

Table 2. cont.

Number	Criteria	Obs	Mean	Std Deviation	Min	Max
20	PM2.5 air pollution, mean annual exposure (micrograms per cubic meter)	130	12.315	4.031	4.895	22.409
21	Carbon dioxide (CO_2) emissions excluding LULUCF per capita (t CO2e/capita)	130	6.811	2.668	3.650	16.913
22	Carbon intensity of GDP (kg CO2e per constant 2015 US$ of GDP)	130	0.284	0.178	0.070	0.916
23	Forest area (% of land area)	130	36.160	15.923	10.891	73.733
24	Renewable energy consumption (% of total final energy consumption)	130	23.704	11.950	6.400	57.900
25	Terrestrial protected areas (% of total land area)	130	27.170	10.413	11.200	53.623
26	Total greenhouse gas emissions excluding LULUCF per capita (t CO2e/capita)	130	8.890	2.870	5.027	20.041
27	Water productivity, total (constant 2015 US$ GDP per cubic meter of total freshwater withdrawal)	130	157.146	256.580	9.506	1478.653
28	Adjusted savings: natural resources depletion (% of GNI)	130	0.161	0.187	0.002	0.799
29	Terrestrial and marine protected areas (% of total territorial area)	130	23.529	11.623	1.687	55.073

The World Bank uses 2.5% as a floor value for Prevalence of undernourishment (% of population). This may reduce the variability this criterion contributes to the overall sustainability measurement.

3.2. Methodology

In this study, the Combined Compromise Solution (CoCoSo) method was employed to assess the sustainable development performance of European Union member states. Compared to widely used methods such as TOPSIS and VIKOR, CoCoSo represents a relatively recent advancement in multi-criteria decision-making techniques. In this study, equal weights were assigned to all criteria. The methodological steps are outlined below (Yazdani et al., 2019).

In the first step, the decision matrix is constructed as shown below (Yazdani et al., 2019):

$$X_{ij} = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix}; \quad \text{i=1,2,…,m; j=1,2,…,n.} \tag{1}$$

In the second step, the criteria values are subjected to a normalization process, as outlined below (Yazdani et al., 2019; also see Zeleny, 1973):

$$r_{ij} = \frac{x_{ij} - \min_i x_{ij}}{\max_i x_{ij} - \min_i x_{ij}}; \text{ for the benefit criterion} \tag{2}$$

$$r_{ij} = \frac{\max_i x_{ij} - x_{ij}}{\max_i x_{ij} - \min_i x_{ij}}; \text{ for the cost criterion} \tag{3}$$

After that S_i and P_i values are calculated as follows. (Yazdani et al., 2019):

$$S_i = \sum_{j=1}^{n} (w_j r_{ij}) \tag{4}$$

$$P_i = \sum_{j=1}^{n} (r_{ij})^{w_j} \tag{5}$$

The computation of the relative weights of the alternatives is carried out using the following aggregation strategies (Yazdani et al., 2019):

$$k_{ia} = \frac{P_i + S_i}{\sum_{i=1}^{m} (P_i + S_i)} \tag{6}$$

$$k_{ib} = \frac{S_i}{\min_i S_i} + \frac{P_i}{\min_i P_i} \tag{7}$$

$$k_{ic} = \frac{\lambda(S_i) + (1-\lambda)(P_i)}{(\lambda \max_i S_i + (1-\lambda) \max_i P_i)}; \; 0 \le \lambda \le 1 \tag{8}$$

The final ranking of the alternatives is established based on the k_i values, where higher values indicate better performance (Yazdani et al., 2019):

$$k_i = (k_{ia}k_{ib}k_{ic})^{\frac{1}{3}} + \frac{1}{3}(k_{ia} + k_{ib} + k_{ic}) \quad (9)$$

This method combines different aggregation strategies to evaluate alternatives based on multiple criteria. It is suitable for sustainability assessment, where economic, social, and environmental indicators may differ substantially. Nevertheless, as with other MCDM methods, the results may be affected by the selected criteria, weighting scheme, normalization procedure, parameter values, and extreme observations. Therefore, the results should be interpreted in conjunction with the characteristics of the underlying indicators and the methodological assumptions. In addition, The CoCoSo scores were calculated separately for each year from 2017 to 2021. Therefore, each annual ranking reflects the relative sustainability performance of EU member states for that year.

4. Results & Discussion

The analysis was performed using Microsoft Excel, and the figure was prepared using RStudio. The parameter λ is set to 0.5. Table 3 ranks European Union member states for 2021. In the overall ranking, all 29 criteria were considered collectively, and the analysis was repeated. According to the overall ranking, Sweden takes the lead. Accordingly, this result aligns with Campagnolo et al. (2018), Brodny and Tutak (2023), and Cucchiella et al. (2017). According to Table 3, Bulgaria and Romania ranked lowest in terms of overall performance. These findings are consistent with the results calculated by Janković Šoja et al. (2016).

Table 3. Ranking of EU Member States by SDG Performance in 2021

		2021 Economic SDG		2021 Social SDG		2021 Environmental SDG		2021 Overall SDG	
	Countries	ki	Rank	ki	Rank	ki	Rank	ki	Rank
1	Austria	2.140	8	2.179	7	1.834	4	1.941	4
2	Belgium	2.284	4	2.244	4	1.455	22	1.870	8
3	Bulgaria	1.261	24	1.361	25	1.326	26	1.308	26
4	Croatia	1.756	19	1.784	19	1.726	13	1.717	18
5	Cyprus	1.923	15	2.028	13	1.685	15	1.811	12
6	Czechia	2.270	5	2.041	12	1.488	20	1.826	10
7	Denmark	2.306	2	2.326	2	1.765	11	2.000	2
8	Estonia	2.045	12	2.068	11	1.470	21	1.774	14
9	Finland	2.183	7	2.265	3	1.773	10	1.952	3
10	France	2.055	11	2.157	9	1.852	3	1.925	7
11	Germany	2.116	9	2.214	5	1.791	7	1.934	5
12	Greece	1.261	25	1.608	22	1.684	16	1.518	24
13	Hungary	1.933	13	1.777	21	1.575	18	1.696	20
14	Ireland	2.287	3	1.937	16	1.393	25	1.764	15
15	Italy	1.563	22	1.599	23	1.651	17	1.595	23
16	Latvia	1.769	18	1.978	15	1.871	2	1.820	11
17	Lithuania	1.592	21	1.864	17	1.777	9	1.721	17
18	Luxembourg	1.792	17	2.191	6	1.707	14	1.809	13
19	Netherlands	2.363	1	2.159	8	1.431	23	1.856	9
20	Poland	1.797	16	1.781	20	1.416	24	1.615	22
21	Portugal	1.756	20	1.842	18	1.810	6	1.753	16
22	Romania	1.259	26	1.326	26	1.525	19	1.396	25
23	Slovak Rep.	1.927	14	1.504	24	1.757	12	1.663	21
17	Lithuania	1.592	21	1.864	17	1.777	9	1.721	17
18	Luxembourg	1.792	17	2.191	6	1.707	14	1.809	13

Table 3. cont.

		2021 Economic SDG		2021 Social SDG		2021 Environmental SDG		2021 Overall SDG	
	Countries	ki	Rank	ki	Rank	ki	Rank	ki	Rank
20	Poland	1.797	16	1.781	20	1.416	24	1.615	22
21	Portugal	1.756	20	1.842	18	1.810	6	1.753	16
22	Romania	1.259	26	1.326	26	1.525	19	1.396	25
23	Slovak Rep.	1.927	14	1.504	24	1.757	12	1.663	21
24	Slovenia	2.113	10	2.123	10	1.832	5	1.925	6
25	Spain	1.369	23	2.007	14	1.785	8	1.704	19
26	Sweden	2.186	6	2.333	1	1.931	1	2.030	1

The results for 2021 indicate that economic success alone may not be sufficient to achieve overall performance in terms of sustainability. For instance, the Netherlands appears to lead in economic performance, but when social and environmental performance is considered, the country loses its advantage. Conversely, Sweden shows above-average economic performance but becomes a leader when other aspects are taken into account. Luxembourg, which ranks sixth best in social sustainability, loses its advantage and ranks 13th in overall performance when economic and environmental performance are also considered.

The table also highlights the importance of social SDG performance. A strong social SDG performance tends to positively affect a country's overall ranking. For example, Denmark ranked second in social SDG performance and eleventh in environmental performance, yet it ranked second overall. Similarly, Finland ranked third in social performance, seventh in economic performance, and tenth in environmental performance, resulting in an overall ranking of third. The results indicate that life expectancy, education, the healthcare system, the poverty gap, and the role of women are extremely important indicators for achieving sustainable development goals. These indicators determine quality of life, which supports human development, productivity, and social stability. Economic success is meaningful when wealth is shared, and inequality is reduced. Without social success, countries cannot succeed on economic issues in the long run.

Table 4. Ranking of EU Member States by Economic SDG Performance (2017–2021)

		2017 Economic SDG		2018 Economic SDG		2019 Economic SDG		2020 Economic SDG		2021 Economic SDG	
	Countries	ki	Rank	ki	Rank	ki	Rank	ki	Rank	ki	Rank
1	Austria	2.355	8	2.199	8	2.243	9	2.118	10	2.140	8
2	Belgium	2.260	10	2.177	9	2.279	7	2.211	4	2.284	4
3	Bulgaria	1.410	25	1.337	24	1.193	25	1.316	24	1.261	24
4	Croatia	1.826	18	1.802	19	1.862	19	1.786	17	1.756	19
5	Cyprus	2.060	16	1.964	15	2.146	12	1.955	13	1.923	15
6	Czechia	2.414	5	2.316	2	2.324	4	2.149	8	2.270	5
7	Denmark	2.465	4	2.314	4	2.391	2	2.254	3	2.306	2
8	Estonia	2.118	13	2.074	12	2.113	13	2.144	9	2.045	12
9	Finland	2.393	6	2.227	6	2.247	8	2.152	7	2.183	7
10	France	2.300	9	2.099	11	2.180	10	2.051	12	2.055	11
11	Germany	2.383	7	2.209	7	2.287	6	2.159	6	2.116	9
12	Greece	1.175	26	1.203	25	1.248	24	1.205	26	1.261	25
13	Hungary	2.116	14	2.064	13	2.006	15	1.894	14	1.933	13
14	Ireland	2.616	1	2.361	1	2.531	1	2.423	1	2.287	3
15	Italy	1.712	21	1.647	22	1.671	22	1.595	22	1.563	22
16	Latvia	1.780	19	1.858	18	1.797	20	1.807	16	1.769	18
17	Lithuania	1.589	23	1.789	20	1.786	21	1.690	20	1.592	21
18	Luxembourg	2.092	15	1.909	17	1.882	18	1.761	18	1.792	17
19	Netherlands	2.503	2	2.315	3	2.340	3	2.328	2	2.363	1
20	Poland	2.016	17	1.943	16	1.970	16	1.689	21	1.797	16

Table 4. cont.

		2017 Economic SDG		2018 Economic SDG		2019 Economic SDG		2020 Economic SDG		2021 Economic SDG	
	Countries	ki	Rank	ki	Rank	ki	Rank	ki	Rank	ki	Rank
21	Portugal	1.768	20	1.703	21	1.899	17	1.743	19	1.756	20
22	Romania	1.517	24	1.180	26	1.174	26	1.299	25	1.259	26
23	Slovak Rep.	2.216	12	1.985	14	2.015	14	1.875	15	1.927	14
24	Slovenia	2.233	11	2.110	10	2.166	11	2.116	11	2.113	10
25	Spain	1.636	22	1.616	23	1.618	23	1.506	23	1.369	23
26	Sweden	2.475	3	2.248	5	2.288	5	2.196	5	2.186	6

Economic sustainability matters because it ensures resources and economic activities are used in ways that support long-term growth and stability. It is reflected in indicators such as higher GDP per capita, lower unemployment rates, and controlled inflation, etc. By fostering an inclusive economy, economic sustainability also helps advance social and environmental goals.

Table 4 provides economic SDG scores and the progress of EU member countries for the period 2017–2021. In the economic pillar, Ireland emerges as the best-performing country in 2017–2020. It drops to third place in 2021. Over the period examined, Ireland's economic sustainability success may reflect low corporate taxes and high net foreign direct investment inflows as a percentage of GDP. The Netherlands maintains its position among the top three and reaches the top position in 2021. Sweden and Denmark consistently rank in the top six, indicating their institutional and economic resilience. Belgium shows improvements in terms of economic sustainability.

Conversely, Eastern European countries perform worse. Bulgaria and Romania rank among the bottom three, suggesting these countries need economic support from the European Union to reach the economic SDG levels of their Western counterparts. Austria, Finland, and Germany also show strong economic SDG performance, ranking in the top ten in all years. However, the gap between Western/Northern states and their Southern/Eastern counterparts demonstrates the need for targeted policy interventions and economic support within the EU framework.

Table 5. Ranking of EU Member States by Social SDG Performance (2017–2021)

		2017 Social SDG		2018 Social SDG		2019 Social SDG		2020 Social SDG		2021 Social SDG	
	Countries	ki	Rank	ki	Rank	ki	Rank	ki	Rank	ki	Rank
1	Austria	2.255	9	2.268	10	2.719	9	2.295	10	2.179	7
2	Belgium	2.360	3	2.423	3	2.921	3	2.425	4	2.244	4
3	Bulgaria	1.396	25	1.224	25	1.074	26	1.143	26	1.361	25
4	Croatia	1.818	20	1.896	20	2.266	20	1.957	20	1.784	19
5	Cyprus	1.728	21	1.868	22	2.223	21	2.151	13	2.028	13
6	Czechia	2.045	14	2.137	11	2.562	12	2.212	12	2.041	12
7	Denmark	2.448	2	2.521	2	3.035	2	2.523	2	2.326	2
8	Estonia	2.208	10	2.273	9	2.704	10	2.281	11	2.068	11
9	Finland	2.341	4	2.417	4	2.906	4	2.474	3	2.265	3
10	France	2.284	6	2.344	7	2.809	7	2.339	8	2.157	9
11	Germany	2.273	7	2.383	5	2.888	5	2.419	5	2.214	5
12	Greece	1.624	24	1.714	24	1.956	24	1.756	24	1.608	22
13	Hungary	1.818	19	1.869	21	2.164	22	1.894	21	1.777	21
14	Ireland	2.094	11	2.132	12	2.423	15	2.096	15	1.937	16
15	Italy	1.712	23	1.938	17	2.118	23	1.877	22	1.599	23
16	Latvia	1.839	18	1.942	16	2.473	14	2.026	17	1.978	15
17	Lithuania	1.854	17	1.897	19	2.301	19	1.997	18	1.864	17
18	Luxembourg	2.288	5	2.356	6	2.861	6	2.375	6	2.191	6
19	Netherlands	2.271	8	2.317	8	2.780	8	2.341	7	2.159	8

Table 5. cont.

		2017 Social SDG		2018 Social SDG		2019 Social SDG		2020 Social SDG		2021 Social SDG	
	Countries	ki	Rank	ki	Rank	ki	Rank	ki	Rank	ki	Rank
20	Poland	1.979	15	2.011	14	2.418	16	2.050	16	1.781	20
21	Portugal	1.899	16	1.906	18	2.347	17	1.970	19	1.842	18
22	Romania	1.233	26	1.192	26	1.517	25	1.478	25	1.326	26
23	Slovak Rep.	1.727	22	1.743	23	2.344	18	1.817	23	1.504	24
24	Slovenia	2.068	13	2.002	15	2.618	11	2.295	9	2.123	10
25	Spain	2.070	12	2.101	13	2.537	13	2.142	14	2.007	14
26	Sweden	2.486	1	2.537	1	3.077	1	2.564	1	2.333	1

Table 5 shows the social SDG performances of EU member states. These performances cover social issues such as education, health, and inequality. In all years, Sweden consistently leads the EU. It is followed by Denmark, Finland and Belgium. The success of the Nordic states stems from social equality, a fair tax system, and free or low-cost education.

By contrast, Romania and Bulgaria remain near the bottom of the rankings, suggesting that the EU should pay more attention to these countries to create a more uniform structure across the union. Greece and Italy show similarly weak results in this pillar. Austria, France, Germany, Luxembourg, and the Netherlands consistently appear in the top ten. Meanwhile, Ireland's position has declined slightly over time.

Overall, the strong performance of the Nordic states and the weak performance of some Eastern European countries indicate uneven progress in the EU on the social SDGs. This heterogeneity in the EU should be taken into account when determining new strategies and policies.

Table 6. Ranking of EU Member States by Environmental SDG Performance (2017–2021)

		2017 Environmental SDG		2018 Environmental SDG		2019 Environmental SDG		2020 Environmental SDG		2021 Environmental SDG	
	Countries	ki	Rank	ki	Rank	ki	Rank	ki	Rank	ki	Rank
1	Austria	2.053	5	2.245	5	1.784	5	1.899	4	1.834	4
2	Belgium	1.825	16	2.000	17	1.594	17	1.584	20	1.455	22
3	Bulgaria	1.479	24	1.775	24	1.367	25	1.383	26	1.326	26
4	Croatia	1.748	19	2.064	14	1.683	13	1.730	15	1.726	13
5	Cyprus	1.658	22	1.813	22	1.500	20	1.726	16	1.685	15
6	Czechia	1.691	20	1.855	21	1.491	21	1.477	23	1.488	20
7	Denmark	1.935	13	2.080	13	1.696	12	1.826	11	1.765	11
8	Estonia	1.249	26	1.145	26	1.372	24	1.529	21	1.470	21
9	Finland	2.088	3	2.264	3	1.716	11	1.827	10	1.773	10
10	France	2.030	7	2.229	7	1.792	4	1.925	3	1.852	3
11	Germany	1.991	9	2.187	8	1.754	7	1.856	6	1.791	7
12	Greece	1.838	15	2.025	16	1.621	16	1.731	14	1.684	16
13	Hungary	1.795	17	1.941	19	1.563	19	1.632	19	1.575	18
14	Ireland	1.668	21	1.864	20	1.482	22	1.454	24	1.393	25
15	Italy	1.882	14	2.044	15	1.628	14	1.722	17	1.651	17
16	Latvia	2.126	2	2.256	4	1.805	3	1.932	2	1.871	2
17	Lithuania	2.015	8	2.181	10	1.732	10	1.816	12	1.777	9
18	Luxembourg	2.036	6	2.232	6	1.625	15	1.776	13	1.707	14
19	Netherlands	1.332	25	1.478	25	1.332	26	1.420	25	1.431	23
20	Poland	1.600	23	1.785	23	1.455	23	1.504	22	1.416	24
21	Portugal	1.989	10	2.184	9	1.761	6	1.832	9	1.810	6
22	Romania	1.772	18	1.947	18	1.590	18	1.679	18	1.525	19
23	Slovak Rep.	1.959	12	2.130	12	1.737	8	1.835	8	1.757	12

Table 6. cont.

		2017 Environmental SDG		2018 Environmental SDG		2019 Environmental SDG		2020 Environmental SDG		2021 Environmental SDG	
	Countries	ki	Rank	ki	Rank	ki	Rank	ki	Rank	ki	Rank
24	Slovenia	2.081	4	2.275	2	1.844	2	1.839	7	1.832	5
25	Spain	1.963	11	2.149	11	1.735	9	1.860	5	1.785	8
26	Sweden	2.233	1	2.436	1	1.943	1	2.076	1	1.931	1

Climate resilience, ecosystem protection, green energy, and natural resources fall under the environmental pillar of sustainable development. As with social SDG performance, Sweden is also the leading country in environmental SDG performance (Table 6) for the period 2017–2021. This performance may result from long-standing policies that prioritize renewable energy, efficient resource management, and environmental innovation. Latvia, France, and Slovenia are other countries that show strong performance. Latvia's success may be attributed to forest conservation and low CO_2 emissions. Slovenia ranked second in 2018 and 2019 and fifth in 2021, suggesting that national environmental strategies have achieved remarkable success in improving environmental SDG scores. France also appears to be performing well. At the bottom of the list are Bulgaria, Estonia, and the Netherlands. Despite its economic SDG performance and technological advancements, the Netherlands still faces issues with agricultural emissions and energy consumption patterns. For example, in 2021, renewable energy consumption as a percentage of total energy consumption was 12.2%, lower than in previous years. Bulgaria appears to be at the bottom in 2020 and 2021, which may be due to high carbon intensity and low water productivity. With moderately high rankings, Austria and Germany have shown stability in environmental SDG performance. Between 2017 and 2021, Portugal advanced from tenth to sixth position, and Spain improved from eleventh to eighth. In contrast, Ireland declined over the five years, dropping from 21st to 25th position. Despite its success in economic SDG performance, the country faces environmental challenges.

Overall, environmental SDG scores vary widely across EU member states. While some countries have consistently performed well, many others lag behind or show inconsistent progress. This picture clearly demonstrates the need for environmental regulations, EU-wide coordination, and knowledge sharing.

Table 7. Ranking of EU Member States by Overall SDG Performance (2017–2021)

		2017 Overall SDG		2018 Overall SDG		2019 Overall SDG		2020 Overall SDG		2021 Overall SDG	
	Countries	ki	Rank	ki	Rank	ki	Rank	ki	Rank	ki	Rank
1	Austria	1.926	4	1.934	5	2.090	6	1.987	6	1.941	4
2	Belgium	1.878	8	1.912	7	2.082	7	1.959	8	1.870	8
3	Bulgaria	1.313	26	1.298	25	1.209	26	1.252	26	1.308	26
4	Croatia	1.622	21	1.708	18	1.869	19	1.770	20	1.717	18
5	Cyprus	1.600	23	1.658	22	1.840	21	1.863	13	1.811	12
6	Czechia	1.789	11	1.834	11	1.969	10	1.851	14	1.826	10
7	Denmark	1.970	2	1.988	2	2.170	2	2.065	2	2.000	2
8	Estonia	1.646	20	1.605	23	1.909	16	1.873	10	1.774	14
9	Finland	1.969	3	1.988	3	2.108	4	2.018	4	1.952	3
10	France	1.919	6	1.929	6	2.104	5	1.995	5	1.925	7
11	Germany	1.921	5	1.952	4	2.130	3	2.021	3	1.934	5
12	Greece	1.428	24	1.475	24	1.588	24	1.539	24	1.518	24
13	Hungary	1.700	16	1.732	16	1.838	22	1.754	21	1.696	20
14	Ireland	1.843	10	1.856	9	1.983	9	1.863	12	1.764	15
15	Italy	1.606	22	1.679	21	1.764	23	1.709	22	1.595	23
16	Latvia	1.721	14	1.770	12	1.951	13	1.847	15	1.820	11
17	Lithuania	1.652	19	1.733	15	1.878	18	1.785	18	1.721	17
18	Luxembourg	1.886	7	1.894	8	1.964	11	1.866	11	1.809	13
19	Netherlands	1.740	12	1.758	13	1.953	12	1.889	9	1.856	9

Table 7. cont.

		2017 Overall SDG		2018 Overall SDG		2019 Overall SDG		2020 Overall SDG		2021 Overall SDG	
	Countries	ki	Rank	ki	Rank	ki	Rank	ki	Rank	ki	Rank
20	Poland	1.662	18	1.691	20	1.840	20	1.689	23	1.615	22
21	Portugal	1.679	17	1.694	19	1.915	15	1.787	17	1.753	16
22	Romania	1.379	25	1.294	26	1.444	25	1.481	25	1.396	25
23	Slovak Rep.	1.727	13	1.715	17	1.939	14	1.774	19	1.663	21
24	Slovenia	1.866	9	1.846	10	2.077	8	1.973	7	1.925	6
25	Spain	1.719	15	1.739	14	1.900	17	1.801	16	1.704	19
26	Sweden	2.063	1	2.065	1	2.249	1	2.139	1	2.030	1

Table 7 shows the ranking of overall SDG performance. Reflecting its social and environmental sustainability achievements, Sweden leads all EU countries in overall SDG performance during 2017–2021. Sweden's balanced strategy across the pillars of sustainability makes it a key player in shaping a sustainable future. Other Nordic countries – Finland and Denmark – along with Austria and Germany, demonstrated outstanding performance, placing them in the top six. Notable achievements in social SDG performance pushed Finland and Denmark into the top four among EU member states. While Germany follows a balanced approach, Austria's success may be attributed to its environmental commitment. Ireland's decline in overall performance stems from worsening social and environmental outcomes. Although Belgium showed positive outcomes in both economic and social SDGs, its weak performance on environmental issues places it 8th overall. If the country enacts suitable regulations and takes the necessary steps, it has strong potential to reach the top of the rankings and achieve the SDGs. Another outstanding country is Cyprus, which rose sharply from 23rd in 2017 to 12th in 2021. This rise mostly stems from the country's social and environmental gains. Bulgaria, Romania, and Greece performed poorly during the study period on overall SDG progress. These countries should follow their Nordic counterparts' policies and implementations to reach higher levels. The European Union should also analyze the reasons for these disparities across member states. In particular, these countries should improve their economic performance to reduce migration and labor flows to more sustainable countries such as Germany and France. In general, the EU should encourage countries to follow a balanced approach to the SDGs to create a more homogeneous future for Europe in terms of sustainability.

Table 8. Comparison of Overall Performance Scores and Rankings Across European Regions (2021)

Northern Europe			Western Europe			Southern Europe			Eastern Europe		
Country	ki	Rank	Country	ki	Rank	Country	ki	Rank	Country	ki	Rank
Denmark	2.000	2	Austria	1.941	4	Croatia	1.717	18	Bulgaria	1.308	26
Estonia	1.774	14	Belgium	1.870	8	Cyprus	1.811	12	Czechia	1.826	10
Finland	1.952	3	France	1.925	7	Greece	1.518	24	Hungary	1.696	20
Ireland	1.764	15	Germany	1.934	5	Italy	1.595	23	Poland	1.615	22
Latvia	1.820	11	Luxembourg	1.809	13	Portugal	1.753	16	Romania	1.396	25
Lithuania	1.721	17	Netherlands	1.856	9	Slovenia	1.925	6	Slovak Rep.	1.663	21
Sweden	2.030	1				Spain	1.704	19			
Average	1.866	9.0	Average	1.889	7.7	Average	1.718	16.9	Average	1.584	20.7
Std dev	0.125		Std dev	0.053		Std dev	0.134		Std dev	0.195	

If Europe is divided into regions (Table 8), performance can be analyzed more effectively, since regional characteristics indicate where the EU should intervene. The 2021 analysis reveals notable regional differences in achieving sustainability. Despite Nordic countries' success, Western Europe performs better on average. With strong performance by countries such as Austria, Germany, France, and Belgium, and a low standard deviation, this region leads in 2021. This finding shows consistent progress in integrating the three pillars –economic, social, and environmental – of sustainable development, and the low standard deviation indicates uniform performance across countries in this region. This achievement may be attributed to institutional quality and effective policies to promote sustainable development in this region. Northern Europe includes high-performing countries such as Sweden, Denmark, and Finland which boost the regional average. However, the relatively lower performance of other nations, including Estonia, Latvia, and Lithuania, places Northern Europe

slightly below Western Europe. On the other hand, Eastern Europe has the lowest average and the highest variability, with countries like Bulgaria and Romania. Except for Slovenia, Southern Europe also performs poorly, and its the standard deviation is high. The EU can implement region-specific strategies to reduce differences among countries and foster more balanced sustainable development. To better understand the situation and draw more accurate interpretations, Figure 1 visualizes the existing information for 2021.

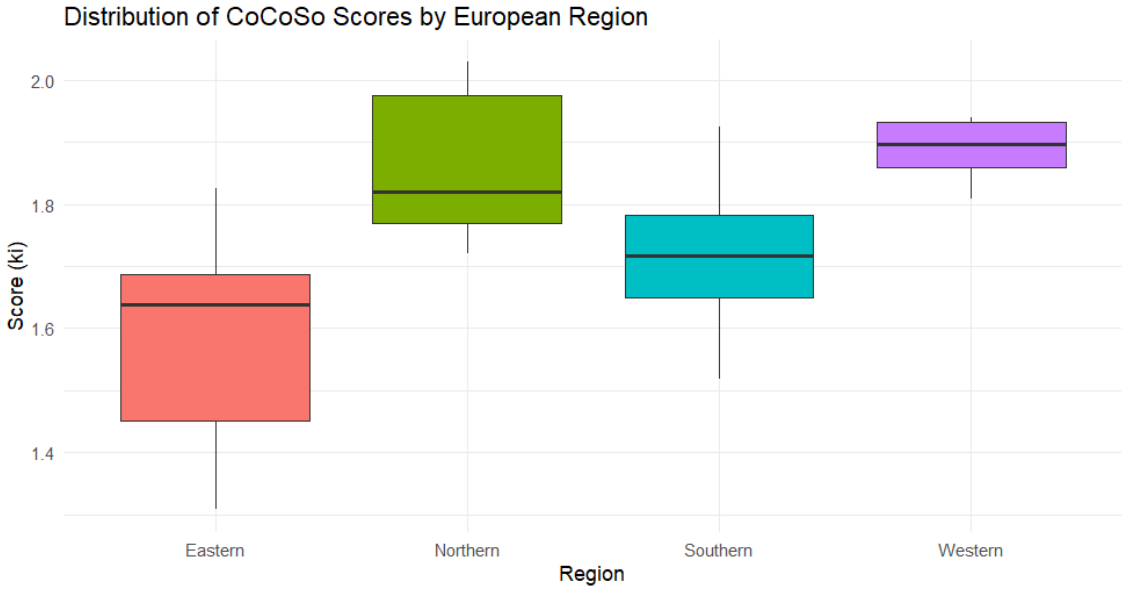

Fig. 1. Overall Sustainability Performance of EU Regions, 2021
Source: Authors' calculations based on World Bank data

The distribution of CoCoSo scores exhibits notable disparities across European regions. Although Northern and Western Europe show the highest median scores, Western Europe's lower variability suggests better performance. The wide interquartile range in Northern Europe indicates significant intra-regional differences in sustainability performance. Eastern Europe has the lowest median score (Figure 1) and the highest standard deviation (Table 8), reflecting both the region's overall lag and the fact that some countries fall well below the regional average. For that reason, Eastern Europe needs more support from the European Union. Southern Europe's median score falls between those of Eastern and Western Europe. The European Union should consider both regional and intra-regional disparities when formulating sustainable development policies. Policies should aim to create more uniform SDG performance across the EU, since achieving 2030 Agenda targets depends on the success of all countries.

5. Robustness Checks

This study identifies Sweden as the highest-performing EU member state in terms of sustainability, aligning with the findings of Campagnolo et al. (2018), Brodny and Tutak (2023), and Cucchiella et al. (2017). Furthermore, as shown in Table 3, Bulgaria and Romania had the lowest overall sustainability performance, consistent with the results reported by Janković Šoja et al. (2016).

To assess the robustness of the 2021 overall SDG performance ranking developed in this study, we calculated Spearman's rank correlation between the EU-only rankings derived here and the corresponding subset from Sachs et al. (2021). The SDG Index developed by Sachs et al. (2021) is a globally recognized, methodologically robust benchmark for evaluating country-level sustainability performance. It is widely used in both academic and policy contexts. A strong positive correlation ($\rho = 0.8024$) was found, suggesting strong agreement between the two independent assessments and reinforcing the reliability of the findings.

To test the robustness of the rankings obtained through the COCOSO method, the VIKOR method (Opricovic & Tzeng, 2004) was also applied using the same decision matrix. The resulting country rankings were compared using Spearman's rank correlation, which yielded a strong positive association ($\rho = 0.8530$). This consistency confirms the stability and reliability of the performance evaluation results.

6. Sensitivity Analysis

To assess whether the results are sensitive to the selection of λ, a sensitivity analysis was performed. For the λ values ranging from 0 to 0.6, the rankings remain unchanged. When λ is set to 0.8, only two countries' rankings change. Although some country rankings change when λ is set to 1, the Spearman rank correlation with the baseline ranking is 0.985. The results indicate that the rankings are highly stable and largely robust to the selection of λ.

Table 9. Sensitivity Analysis for Overall Performance Scores and Rankings (2021)

		λ = 0		λ = 0.2		λ = 0.4		λ = 0.5		λ = 0.6		λ = 0.8		λ = 1.0	
	Countries	ki	Rank	ki	Rank	ki	Rank	ki	Rank	ki	Rank	ki	Rank	ki	Rank
1	Austria	1.943	4	1.942	4	1.942	4	1.941	4	1.941	4	1.938	4	1.891	4
2	Belgium	1.871	8	1.871	8	1.870	8	1.870	8	1.869	8	1.867	8	1.822	8
3	Bulgaria	1.312	26	1.311	26	1.310	26	1.308	26	1.307	26	1.299	26	1.155	26
4	Croatia	1.721	18	1.720	18	1.719	18	1.717	18	1.715	18	1.707	18	1.554	20
5	Cyprus	1.813	12	1.813	12	1.811	12	1.811	12	1.809	12	1.803	13	1.696	14
6	Czechia	1.828	10	1.827	10	1.826	10	1.826	10	1.824	10	1.818	10	1.717	11
7	Denmark	2.001	2	2.001	2	2.001	2	2.000	2	2.000	2	1.999	2	1.983	2
8	Estonia	1.776	14	1.776	14	1.775	14	1.774	14	1.773	14	1.768	14	1.677	15
9	Finland	1.952	3	1.952	3	1.952	3	1.952	3	1.952	3	1.952	3	1.947	3
10	France	1.926	7	1.926	7	1.925	7	1.925	7	1.924	7	1.921	7	1.868	7
11	Germany	1.935	5	1.935	5	1.934	5	1.934	5	1.933	5	1.930	5	1.881	5
12	Greece	1.522	24	1.521	24	1.519	24	1.518	24	1.517	24	1.509	24	1.368	24
13	Hungary	1.699	20	1.699	20	1.697	20	1.696	20	1.695	20	1.687	20	1.561	18
14	Ireland	1.765	15	1.765	15	1.764	15	1.764	15	1.763	15	1.760	15	1.705	13
15	Italy	1.599	23	1.598	23	1.596	23	1.595	23	1.593	23	1.583	23	1.409	23
16	Latvia	1.823	11	1.822	11	1.821	11	1.820	11	1.819	11	1.813	11	1.711	12
17	Lithuania	1.725	17	1.724	17	1.723	17	1.721	17	1.720	17	1.711	17	1.561	19
18	Luxembourg	1.809	13	1.809	13	1.809	13	1.809	13	1.809	13	1.809	12	1.805	9
19	Netherlands	1.858	9	1.857	9	1.857	9	1.856	9	1.856	9	1.853	9	1.802	10
20	Poland	1.619	22	1.618	22	1.616	22	1.615	22	1.614	22	1.606	22	1.476	22
21	Portugal	1.756	16	1.755	16	1.754	16	1.753	16	1.752	16	1.747	16	1.649	16
22	Romania	1.401	25	1.400	25	1.398	25	1.396	25	1.394	25	1.383	25	1.190	25
23	Slovak Rep.	1.666	21	1.665	21	1.664	21	1.663	21	1.662	21	1.655	21	1.544	21
24	Slovenia	1.926	6	1.926	6	1.926	6	1.925	6	1.925	6	1.922	6	1.873	6
25	Spain	1.707	19	1.706	19	1.705	19	1.704	19	1.702	19	1.695	19	1.571	17
26	Sweden	2.030	1	2.030	1	2.030	1	2.030	1	2.030	1	2.030	1	2.030	1

7. Limitations

This study has several methodological limitations. First, the analysis relies on 29 World Bank indicators. Relying on a single data source may limit coverage of country-specific sustainability dimensions. Although the criteria used in this study cover the three dimensions of sustainability, alternative criteria sets and data sources, such as Eurostat, could also be used. Second, equal weights were assigned to all criteria. Although this approach is transparent and reproducible, alternative weighting schemes could be used. Third, a small number of missing observations required estimation. Specifically, only six observations were estimated using linear trend extrapolation based on available historical observations. In addition, PM2.5 air pollution data for 2021 were unavailable for all countries. Therefore, the 2021 values for this criterion were assumed to be the same as those recorded in 2020. Although this approach enables the analysis, it introduces uncertainty into environmental sustainability scores. Fourth, this study applied no additional outlier treatment; therefore, when interpreting the findings, consider the potential influence of extreme observations on the resulting sustainability scores. Finally, the criterion prevalence of undernourishment (% of population) has a lower bound of 2.5%, and most observations are concentrated at this level. This limits the criterion's contribution to overall sustainability scores.

8. Policy Implications

These findings have implications for countries at the national level and for the EU. First, the differences observed across EU member countries indicate that sustainability policies should consider the multidimensional nature of sustainable development, as focusing on a single dimension may be insufficient to achieve sustainable development goals. This study provides a complementary framework for identifying areas where EU member countries need more policy attention across the three dimensions of sustainable development.

Second, several Eastern and Southern European countries show relatively lower overall sustainability performance than Western and Northern countries. EU-level policies could place greater emphasis on reducing economic, social, and environmental disparities across EU regions. For example, for a country with relatively weak environmental performance, policy priorities should include energy efficiency, renewable energy use, emissions reduction, etc. For a country with relatively weak social sustainability performance, greater emphasis should be placed on areas such as education, health, poverty gap reduction, etc.

Third, the results indicate the importance of adopting a balanced approach across the three dimensions of sustainability. Strong performance in one dimension does not necessarily compensate for weaker performance in the other dimensions. Therefore, national and EU-level policy frameworks should consider economic, social, and environmental objectives simultaneously when designing and evaluating sustainability policies.

Finally, this research's findings and methodology can serve as a decision-making tool for policymakers at both national and EU levels, rather than as a direct basis for allocating funds, since funding decisions should depend on broader institutional, legal, socioeconomic, and regional considerations.

9. Conclusions

This study highlights the multi-faceted nature of sustainable development across European countries by examining economic, social, and environmental SDG performances from 2017 to 2021. While economic indicators often reflect a country's immediate prosperity and industrial strength, they do not fully capture broader sustainability outcomes. Our analysis shows that although Sweden is not the top performer in economic SDG rankings, it consistently leads in overall sustainable development when social and environmental dimensions are integrated. Sweden's leading position in the overall SDG index underscores the critical importance of a balanced approach that equally prioritizes social welfare and environmental stewardship alongside economic growth. This aligns with existing literature emphasizing integrated policy frameworks as essential for achieving sustainable development goals effectively. Countries that excel economically but lag in social or environmental dimensions tend to rank lower overall, demonstrating the risks of unbalanced development strategies.

The persistent gaps in Eastern and Southern European countries highlight the need for targeted interventions and international cooperation to promote inclusive, environmentally sound growth. Northern European countries like Sweden, Denmark, and Finland serve as exemplars in achieving this balance, providing valuable models for other regions aiming to enhance their sustainable development performance. These findings suggest that policymakers should adopt holistic, integrated strategies that foster not only economic advancement but also social equity and environmental sustainability.

For robustness checks, we applied Spearman correlation analysis to compare our results with those of Sachs et al. (2021), confirming a strong and statistically significant association between the rankings. Additionally, to ensure methodological robustness, we employed the VIKOR method—an entirely different multi-criteria decision-making approach. The consistency of findings across these diverse methods reinforces the reliability and validity of our sustainability assessment framework.

This study also contributes methodologically by demonstrating that a simplified approach to SDG index construction can still yield reliable insights. While many studies on SDG measurement require substantial effort to construct composite indices, this study streamlines the process by using only World Bank data to develop the SDG index. The results obtained closely align with those of existing studies.

In conclusion, the path to sustainable development demands comprehensive, multidimensional progress where economic prosperity, social inclusion, and environmental protection advance hand in hand, supported by robust and consistent analytical frameworks.

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