Chapter 1

Beyond Equal Weights: A WENSLO-CoCoSo Assessment of OECD Countries' SDG Performance

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Abstract

The Sustainable Development Goals (SDGs) represent a universal agenda for addressing pressing global challenges, yet assessing national progress remains complex due to methodological limitations in existing frameworks. This study evaluates the performance of OECD countries in achieving 15 SDGs using an integrated WENSLO (Weights by Envelope and Slope) and CoCoSo (Combined Compromise Solution) approach, addressing critiques of subjective weighting methods like the UN's equal-weighted index. WENSLO objectively assigns criterion weights based on statistical analysis, while CoCoSo ranks countries through a multi-criteria decision-making process. Results reveal Italy as the top performer, attributed to balanced advancements in economic, social, and environmental dimensions, followed by Austria, Spain, and Portugal. Conversely, Iceland, Luxembourg, and Greece, reflecting disparities in policy integration and socio-economic constraints. The study highlights synergies and trade-offs between SDGs, emphasizing the need for targeted resource allocation, technology transfer, and data standardization. By offering a transparent, adaptable framework, this research advances methodological rigor in sustainability assessments and provides actionable insights for policymakers to prioritize SDG implementation in heterogeneous high-income contexts.

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1. Introduction

Despite notable advancements in enhancing human well-being, the world continues to grapple with pressing social issues, including climate change, urban poverty, and increasing inequality. To motivate global governments to address these challenges, the United Nations has introduced 17 Sustainable Development Goals (SDGs) as a key component of the 2030 Global Agenda (Berrone et al., 2023). SDGs represent a significant transformation in the United Nations' approach, aiming to unify economic and social progress with the principles of environmental sustainability under a single, comprehensive framework (Biermann et al., 2017). UN member states are anticipated to embrace the SDG framework as a guiding blueprint to shape their development and investment strategies, while monitoring their advancements toward meeting the goals throughout the 15-year timeframe (Aly et al., 2022). The 17 SDGs are broken down into 169 interconnected targets, providing a comprehensive framework to guide global development strategies through 2030. These goals and targets address the economic, social, and environmental dimensions of sustainable development in an unprecedented manner. The SDGs integrate the human development focus of the Millennium Development Goals (MDGs) with the sustainability principles of the Rio+ process, while also expanding the scope and depth of the issues addressed. This signals a critical need for transformative changes in governance strategies (Breuer et al., 2019). Achieving the SDGs relies heavily on research, innovation, and sustainable education, which can only be accomplished through substantial investments from both public and private sectors (Salvia et al., 2019).

The SDGs strive to represent a globally shared vision of progress, aiming to create a safe, just, and sustainable environment for all. Grounded in the principle that every individual and nation has a role to play in achieving this vision, the focus extends beyond international collaboration to also address and eliminate discrimination and inequalities within individual countries (Leal Filho et al., 2019). The SDGs adopt a global perspective, but their implementation is carried out at the local level, varying based on each country's progress toward these goals. Furthermore, a nation's level of development and its dedication to sustainability shape its domestic priorities and actions (Salvia et al., 2019). A global indicator framework of 232 indicators is used to track progress on the SDGs. However, data has so far been collected for only 134 indicators. Variations in national data quality and availability across countries make it difficult to reliably assess progress on the SDGs and call into question the relevance of some indicators (Cernev & Fenner, 2020). Many nations have struggled to achieve the SDGs due to a range of obstacles, including insufficient financial investment from both governments and the private sector in sustainable development, particularly in low-income countries. Additional challenges include difficulties in transferring technology from developed to less developed regions and trade barriers that disproportionately affect middle- and low-income countries (Biglari et al., 2022).

It is important to monitor countries' progress towards the SDGs and identify areas where improvement is needed. For this purpose, many studies have used multi-criteria decision-making techniques such as TOPSIS and AHP. While these methods are reliable, they are often not computationally demanding and require a lot of subjective input (Dwivedi & Sharma, 2025). However, researchers have used methods such as Delphi technique, Principal Component Analysis, fuzzy AHP, Entropy and Data Envelopment Analysis to rank countries according to their SDG progress (Guo et al., 2024). Recently, Guo et al. (2024) assessed the progress of OECD countries on the SDGs using Hierarchical Data Envelopment Analysis. On the other hand, the SDG report published by the UN gives equal weight to each goal and each indicator, which is a highly subjective weighting method and does not correspond to the realities of countries with very different contexts. (Guo et al., 2024). Therefore, this study aims to make an objective assessment of the criteria and comprehensively evaluate the performance of OECD countries towards the Sustainable Development Goals using the integrated WENSLO (Weights by Envelope and Slope) - CoCoSo (Combined Compromise Solution) approach. There is no study in the literature that uses the integrated WENSLO-CoCoSo model to assess the progress of OECD countries towards the Sustainable Development Goals. In the current study, 15 of the 17 SDGs are used as criteria and OECD countries are ranked according to their performance in achieving the SDGs.

This study makes important contributions to the literature on performance assessment of OECD countries in the context of SDGs: By using the WENSLO-CoCoSo integrated model for the first time, it overcomes the limitations of the UN's criticized equal weighting method by adopting a statistically-based objective approach to criteria weighting, and provides a multidimensional and integrated analysis of the 15 SDGs in high-income economies with heterogeneous sustainability profiles, such as OECD countries. The study reveals synergies and trade-offs between economic, social and environmental indicators, while highlighting countries' relative weaknesses and policy priorities, providing concrete guidance on resource allocation, technology transfer and financing. It also highlights the lack and quality of data on SDG indicators, reinforces the need for international cooperation and standardization, and provides a new framework for future research with its methodological transparency and adaptability.

2. Literature

The detailed framework of targets and indicators supporting the Sustainable Development Goals (SDGs) was introduced in 2015, marking a pivotal moment for both developing and developed nations to advance toward sustainable development. With 17 goals and 169 targets, the SDGs are designed to tackle the diverse and interconnected challenges confronting humanity (Pradhan et al., 2017). Additionally, an initial set of 330 indicators was introduced in March 2015. Some of the SDGs expand upon earlier MDGs, while others incorporate new concepts (Hák et al., 2016). The global SDGs offer a framework grounded in evidence for planning and implementing sustainable development initiatives at national, regional, and global levels, spanning a 15-year timeline until 2030 (Allen et al., 2018). The 17 goals aim to offer a structured framework for policymaking in member states over a 15-year span. These SDGs were officially adopted during the UN summit in New York in September and came into effect starting January 2016, with a target completion date of 2030. The 17 SDGs can be categorized into six thematic areas: "Dignity", "People", "Planet", "Partnership", "Justice" and "Prosperity". Figure 1 presents the thematic areas and sustainable development goals (Leal Filho et al., 2018).

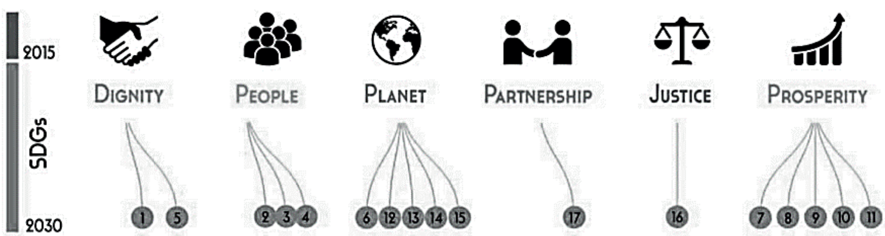

Figure 1. Thematic areas and SDGs (Leal Filho et al., 2018).

With the publication of the SDGs, this issue has been the focus of researchers' attention and many studies have been conducted in this field. For example, Diaz-Sarachaga et al. (2018) assessed whether the SDG index provides an adequate framework for measuring the progress of the 2030 goals. Le Blanc (2015) investigated to what extent the structure of the proposed goals and related targets actually reflects the goal of better integration across sectors. Moyer & Hedden (2020) built a baseline global development scenario by presenting an integrated assessment model to assess progress towards target values across nine indicators in six thematic areas. Bali Swain & Yang-Wallentin (2020) investigated which of the pillars of the SDGs (economic, social and environmental) are most effective in achieving sustainable development. Donaires et al. (2019) developed an approach to help determine whether efforts towards the SDGs can be expected to be effective. Allen et al. (2016) reviewed and evaluated 80 different quantitative models that have the potential to support national development planning for the SDGs.

In the literature, there are also researches on SDGs that utilize the use of MCDM techniques. For example, Aljaghoub et al. (2022) present some feasible cleaning techniques used to recover the full efficiency of photovoltaic panels and relate each cleaning technique to the SDGs and their related targets using TOPSIS technique. Rad et al. (2024) presented a global framework for maximizing sustainable development indices in agricultural photovoltaic-based renewable systems by integrating DEMATEL and ANP methods. Sousa et al. (2021) conducted a systematic literature review on CCM methods that support decisions focused on achieving the SDGs and implementing the 2030 Agenda for Sustainable Development in regional, national or local contexts. Sreenivasan et al. (2023) examined the research on SDGs using AHP technique with social network analysis. Burhan (2024) focuses on SDG 9 and evaluates EU countries and Turkey in terms of industry, innovation and infrastructure using VIKOR-MAIRCA integrated approach. Stanujkic et al. (2020) aimed to determine the position of EU countries regarding the SDGs in the period 2015-2018 using the Entropy-CoCoSo integrated model.

In the present study, WENSLO technique is preferred to determine the criteria weights and CoCoSo method is preferred to rank the countries. The WENSLO method is a newly developed technique and has been used by researchers to solve different types of MCDM problems. For example, Kara et al. (2025) presented a solution to the problem of sustainable brand logo selection by using artificial intelligence supported PF-WENSLO-ARLON hybrid method. Pamucar et al. (2023) used the integrated WENSLO-ALWAS approach to evaluate green growth performance. Similarly, Kara et al. (2024) used the neutrosophic WENSLO-ARLON model to evaluate sustainable brand equity performance. Trung et al. (2024) used Entropy-CoCoSo integrated approach to solve the problem of material selection in the design phase. They used the WENSLO technique to evaluate the accuracy of their proposed evaluation approach.

The CoCoSo method has been used by researchers to provide solutions to a variety of MCDM problems. For example, Deveci et al. (2021) used the CoCoSo technique to prioritize the advantages of autonomous vehicles in real-time traffic management. Lai et al. (2022) performed blockchain platform evaluation using the fuzzy CoCoSo method. Das & Chakraborty (2022) aimed to optimize green dry milling processes with SWARA-CoCoSo integrated approach. Jafari & Khanachah (2024) evaluated comprehensive information adoption solutions under uncertainty in supply chain through CoCoSo method. Yu et al. (2024) performed risk assessment of liquefied natural gas storage tank leakage using CoCoSo method and failure mode and effects analysis. Ecer & Pamucar (2020) integrated fuzzy BWM and fuzzy CoCoSo techniques to solve the sustainable supplier selection problem. Zhang & Wei (2023) solved the problem of site selection of electric vehicle charging stations by using global fuzzy CPT-CoCoSo and D-CRITIC method. Okursoy & Coşansu (2024) aimed to solve the zero emission electric vehicle selection problem using MEREC-based CoCoSo method.

3. Methodology

In this study, the integrated WENSLO-CoCoSo approach is used to assess the performance of OECD countries in achieving the Sustainable Development Goals. Criteria weights are determined using the WENSLO technique, while countries are ranked according to the CoCoSo method. In the following sections, these two methods are detailed.

The model of the study is presented in Figure 2. First, a decision matrix is constructed. This decision matrix is then subjected to the WENSLO procedure, thereby objectively determining the criterion weights. In the following step, the COCOSO methodology is applied, utilizing the criterion weights previously established through WENSLO. Through COCOSO, countries' scores based on their sustainability activities are obtained and analyzed. Subsequently, a sensitivity analysis is conducted by generating random weight sets. Finally, other techniques with computational steps similar to those of COCOSO are employed in order to examine the correlation among the resulting scores.

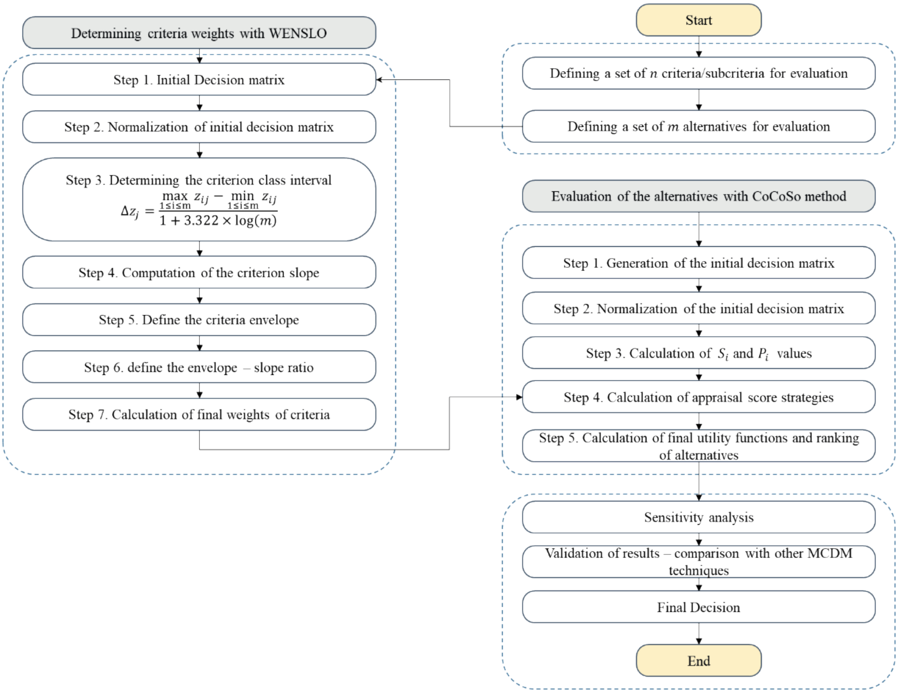

Figure 2. Research model

3.1. WENSLO Method

WENSLO is an objective multi-criteria decision making technique developed by Pamucar et al. (2023). This method is a crucial component of any decision-making process aimed at achieving the most objective final ranking of alternatives. Additionally, a key advantage of the WENSLO method is that it remains unaffected by criteria bias (whether they are benefit or cost criteria), as the normalization process for input data is independent of criteria preferences (Pamucar et al., 2023). The implementation steps of the method are as follows (Pamucar et al., 2023):

Step 1. Construct the decision matrix.

$$\left[x_{ij}\right]_{m\times n} = \begin{bmatrix} A/C & C_1 & C_2 & \dots & C_n \\ A_1 & x_{11} & x_{12} & \dots & x_{1n} \\ A_2 & x_{21} & x_{22} & \dots & x_{2n} \\ \dots & \dots & \dots & \dots & \dots \\ A_m & x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix} \quad (1)$$

where:

x_{ij} is the value of the i-th alternative according to the j-th criterion.

$A_1, A_2, \ldots, A_m$ refers to an alternative vector space representing a set of alternatives.

$C_1, C_2, \ldots, Cn$ refers to a criteria vector space representing a set of criteria.

n is the number of criteria.

Step 2. Normalize the decision matrix.

$$z_{ij} = \frac{x_{ij}}{\sum_{i=1}^{m} x_{ij}}, \forall j \in [1, 2, \ldots, n] \tag{2}$$

The normalized decision matrix is:

$$Z(A,C) = [z_{ij}]_{m \times n} = \begin{bmatrix} A/C & C_1 & C_2 & \cdots & C_n \\ A_1 & z_{11} & z_{12} & \cdots & z_{1n} \\ A_2 & z_{21} & z_{22} & \cdots & z_{2n} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ A_m & z_{m1} & z_{m2} & \cdots & z_{mn} \end{bmatrix} \tag{3}$$

where, z_{ij} refers to each element in the normalized decision matrix, where $0 < zij < 1$.

Step 3. Determine the final ranking of alternatives based on the identified criteria.

$$\Delta z_j = \frac{\max\limits_{1 \le i \le m} z_{ij} - \min\limits_{1 \le i \le m} z_{ij}}{1 + 3.322 \times \log(m)}, \ \forall j \in [1, 2, \ldots, n] \tag{4}$$

Step 4. Calculate the criterion slope.

$$\tan \varphi_j = \frac{\sum_{i=1}^{m} z_{ij}}{(m-1) \times \Delta z_j}, \ \forall j \in [1, 2, \ldots, n] \tag{5}$$

Step 5. Determine the criteria envelope.

$$E_j = \sum_{i=1}^{m-1} \sqrt{(z_{i+1,j} - z_{ij})^2 + \Delta z_j^2}, \ \forall j \in [1, 2, \ldots, n] \tag{6}$$

Step 6. Calculate the envelope-slope ratio.

$$q_j = \frac{E_j}{\tan \varphi_j}, \ \forall j \in [1, 2,, \ldots n] \tag{7}$$

Step 7. Determine the final criteria weights.

$$w_j = \frac{q_j}{\sum_{i=1}^{n} q_j}, \ \forall j \in [1, 2, \ldots, n] \tag{8}$$

3.2. CoCoSo (COmbined COmpromise SOlution) Method

The CoCoSo method was proposed by Yazdani et al. (2019). This approach combines the Simple Additive Weighting (SAW) method with the exponentially Weighted Product Model (WPM). It ranks alternatives by integrating compromise strategies derived from both the WSM and the WPM. The final ranking of alternatives is determined through a compromise criterion function (Deveci et al., 2021). The application steps of the method are as follows (Yazdani et al., 2019):

Step 1. Create the initial decision matrix.

$$x_{ij} = \begin{bmatrix} x_{11} & x_{12} & \ldots & x_{1n} \\ x_{21} & x_{22} & \ldots & x_{2n} \\ \ldots & \ldots & \ldots & \ldots \\ x_{m1} & x_{m2} & \ldots & x_{mn} \end{bmatrix}; i = 1, 2, \ldots, m; j = 1, 2, \ldots, n. \tag{9}$$

Step 2. Standardize the decision matrix.

$$r_{ij} = \frac{x_{ij} - \text{min} x_{ij}}{\text{max} x_{ij} - \text{min} x_{ij}}; \text{ for benefit criterion,} \tag{10}$$

$$r_{ij} = \frac{\max_i x_{ij} - x_{ij}}{\max_i x_{ij} - \min_i x_{ij}}, \text{ for cost criterion.} \tag{11}$$

Step 3. Calculate the total weighted comparison (S_i) and exponential weighted comparison (P_i) of the alternatives respectively.

$$S_i = \sum_{j=1}^{n} \left(w_j r_{ij} \right) \tag{12}$$

$$P_i = \sum_{j=1}^{n} \left(r_{ij} \right)^{w_j} \tag{13}$$

Step 4. Calculate the relative weights of alternatives using aggregation strategies.

$$k_{ia} = \frac{P_i + S_i}{\sum_{i=1}^{m} \left(P_i + S_i \right)}, \tag{14}$$

$$k_{ib} = \frac{S_i}{\min_i S_i} + \frac{P_i}{\min_i P_i}, \tag{15}$$

$$k_{ic} = \frac{\lambda \left(S_i \right) + \left(1 - \lambda \right) \left(P_i \right)}{\left(\lambda \max_i S_i + \left(1 - \lambda \right) \max_i P_i \right)}; 0 \leqslant \lambda \leqslant 1. \tag{16}$$

Equation (14) calculates the arithmetic mean of the combined scores from the WSM and WPM methods. Equation (15) sums the relative scores of WSM and WPM in comparison to the best-performing score. Equation (16) provides a balanced compromise between the WSM and WPM scores, where λ (typically set to 0.5) is a parameter determined by decision makers.

Step 5. The final ranking of alternatives is determined by their k_i values. The alternative with the highest k_i is the most important.

$$k_i = \left(k_{ia} k_{ib} k_{ic} \right)^{\frac{1}{3}} + \frac{1}{3} \left(k_{ia} + k_{ib} + k_{ic} \right) \tag{17}$$

4. Analysis and Results

In this study, OECD countries are analyzed in terms of their performance in achieving the Sustainable Development Goals. The data of the countries belong to 2023 and the countries were evaluated according to 15 Sustainable Development Goals. The data were obtained from the World Bank's Statistical Performance Indicators (World Bank, 2024). PDO 14 is excluded since it is not included in the World Bank dataset and PDO 12 is excluded since it is 1 for all countries. Table 1 shows the set of criteria used in the study (Fleming et al., 2017; World Bank, 2024).

Table 1. Criteria set

Code	Criteria	Explanation
C1	Goal 1: No poverty	End poverty in all its forms everywhere
C2	Goal 2: Zero hunger	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
C3	Goal 3: Good Health and Well-being	Ensure healthy lives and promote well-being for all at all ages
C4	Goal 4: Quality Education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
C5	Goal 5: Gender Equality	Achieve gender equality and empower all women and girls
C6	Goal 6: Clean Water and Sanitation	Ensure availability and sustainable management of water and sanitation for all
C7	Goal 7: Affordable and Clean Energy	Ensure access to affordable, reliable, sustainable and modern energy for all
C8	Goal 8: Decent Work and Economic Growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
C9	Goal 9: Industry, Innovation and Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
C10	Goal 10: Reduced Inequalities	Reduce inequality within and among countries
C11	Goal 11: Sustainable Cities and Communities	Make cities and human settlements inclusive, safe, resilient and sustainable
C12	Goal 13: Climate Action	Take urgent action to combat climate change and its impacts
C13	Goal 15: Life on Land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss
C14	Goal 16: Peace, Justice and Strong Institutions	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
C15	Goal 17: Partnerships for Goals	Strengthen the means of implementation and revitalize the global partnership for sustainable development

All criteria used in the study are utility-oriented. The scores of OECD countries for 2023 for each of the SDGs, in other words, the initial decision matrix is presented in Table 2.

Table 2. Initial decision matrix

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
Turkey	1.0	0.6	0.92	0.75	0.83	0.714	1.00	1.00	1.0	1.00	1.00	1.0	0.833	0.857	1.000
USA	0.8	0.8	0.88	0.75	0.83	0.857	0.83	1.00	0.9	1.00	1.00	1.0	0.833	0.857	0.800
Canada	0.8	0.9	0.88	0.75	0.83	0.857	0.83	1.00	0.9	1.00	0.75	0.5	0.833	0.857	0.867
France	1.0	0.7	0.84	0.75	1.00	0.857	0.83	1.00	1.0	1.00	1.00	1.0	0.750	1.000	0.867
Netherlands	1.0	0.8	0.8	0.75	1.00	0.857	0.83	1.00	1.0	1.00	1.00	1.0	0.667	1.000	0.867
Belgium	0.8	0.7	0.8	1.00	1.00	0.857	0.83	1.00	1.0	1.00	0.75	0.5	0.750	1.000	0.867
Luxemburg	0.8	0.8	0.8	0.75	0.83	0.857	0.83	0.88	0.9	0.75	0.75	0.5	0.667	1.000	0.867
Germany	0.8	0.7	0.84	0.75	1.00	0.857	0.83	1.00	1.0	1.00	0.75	0.5	0.833	1.000	0.867
Italy	1.0	0.8	0.84	0.75	1.00	1.000	0.83	1.00	1.0	1.00	1.00	1.0	0.833	1.000	0.867
Portugal	1.0	0.7	0.84	0.75	1.00	0.857	0.83	1.00	1.0	1.00	1.00	1.0	0.833	1.000	0.867
United Kingdom	1.0	0.8	0.84	1.00	0.83	0.857	0.83	1.00	0.9	1.00	1.00	1.0	0.750	0.714	0.867
Denmark	1.0	0.7	0.84	1.00	1.00	0.857	0.83	1.00	1.0	0.75	1.00	1.0	0.667	1.000	0.867
Ireland	0.8	0.8	0.84	0.75	1.00	0.857	0.83	1.00	0.9	0.75	0.75	0.5	0.750	1.000	0.867
Greece	0.8	0.8	0.84	0.75	1.00	1.000	0.83	1.00	0.9	0.875	0.50	0.5	0.833	0.857	0.867
Switzerland	1.0	0.8	0.8	0.75	1.00	0.857	0.83	1.00	0.9	0.875	1.00	1.0	0.750	0.857	0.800
Sweden	1.0	0.8	0.76	0.75	1.00	0.857	0.83	1.00	1.0	0.875	1.00	1.0	0.750	1.000	0.867
Austria	1.0	0.8	0.84	0.75	1.00	1.000	0.83	1.00	1.0	1.00	1.00	1.0	0.750	1.000	0.867
Iceland	0.4	0.7	0.84	0.75	1.00	0.714	0.83	1.00	0.9	0.75	0.75	0.5	0.833	0.857	0.867
Norway	0.8	0.9	0.84	1.00	1.00	1.000	0.83	1.00	0.9	0.875	0.75	0.5	0.750	0.857	0.867
Spain	1.0	0.8	0.88	0.75	1.00	0.857	0.83	1.00	1.0	1.00	1.00	1.0	0.833	1.000	0.867
Japan	0.6	0.8	0.88	0.75	0.83	0.714	0.83	1.00	0.9	0.875	1.00	1.0	0.750	0.857	0.867
Finland	1.0	0.7	0.84	0.75	1.00	0.857	0.83	1.00	1.0	0.875	1.00	1.0	0.833	1.000	0.867
Australia	0.6	0.7	0.88	0.75	1.00	0.714	0.83	1.00	0.8	0.875	1.00	1.0	0.833	0.857	0.867
New Zealand	0.6	0.8	0.88	0.75	0.83	0.857	0.83	1.00	0.9	0.750	1.00	1.0	0.750	0.857	0.867

According to the values in Table 2, Turkey has strengths and weaknesses in the United Nations Sustainable Development Goals criteria. In particular, it draws a positive picture by reaching the highest score in criteria such as "Zero Poverty (C1)", "Affordable and Clean Energy (C7)", "Decent Work and Economic Growth (C8)". However, its relatively low scores in criteria such as "Zero Hunger (C2)" and "Clean Water and Sanitation (C6)" indicate that more effort is needed in these areas. Turkey lags behind developed countries in areas such as gender equality and climate action, which highlights the need for policy development in these areas. Developed countries generally perform close to sustainability targets. In particular, European countries (France, Germany, the Netherlands), Scandinavian countries (Sweden, Norway, Finland) and the USA scored high in most criteria. However, these countries also show declines in environmental sustainability criteria such as “Climate Action (C12)” and “Life on Land (C13)”.

4.1. Weight determination with WENSLO

The first step in determining criterion weights using WENSLO is to normalize the decision matrix. By means of Equation (2), the decision matrix was normalized, and the results are presented in Table 3.

Table 3. Normalized decision matrix

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
Australia	0.029	0.038	0.043	0.039	0.044	0.035	0.041	0.042	0.035	0.040	0.046	0.050	0.045	0.038	0.042
Austria	0.049	0.043	0.042	0.039	0.044	0.049	0.041	0.042	0.044	0.046	0.046	0.050	0.040	0.045	0.042
Belgium	0.039	0.038	0.040	0.053	0.044	0.042	0.041	0.042	0.044	0.046	0.034	0.025	0.040	0.045	0.042
Canada	0.039	0.049	0.043	0.039	0.036	0.042	0.041	0.042	0.040	0.046	0.034	0.025	0.045	0.038	0.042
Denmark	0.049	0.038	0.042	0.053	0.044	0.042	0.041	0.042	0.044	0.034	0.046	0.050	0.036	0.045	0.042
Finland	0.049	0.038	0.042	0.039	0.044	0.042	0.041	0.042	0.044	0.040	0.046	0.050	0.045	0.045	0.042
France	0.049	0.038	0.042	0.039	0.044	0.042	0.041	0.042	0.044	0.046	0.046	0.050	0.040	0.045	0.042
Germany	0.039	0.038	0.042	0.039	0.044	0.042	0.041	0.042	0.044	0.046	0.034	0.025	0.045	0.045	0.042
Greece	0.039	0.043	0.042	0.039	0.044	0.049	0.041	0.042	0.040	0.040	0.023	0.025	0.045	0.038	0.042
Iceland	0.019	0.038	0.042	0.039	0.044	0.035	0.041	0.042	0.040	0.034	0.034	0.025	0.045	0.038	0.042
Ireland	0.039	0.043	0.042	0.039	0.044	0.042	0.041	0.042	0.040	0.034	0.034	0.025	0.040	0.045	0.042
Italy	0.049	0.043	0.042	0.039	0.044	0.049	0.041	0.042	0.044	0.046	0.046	0.050	0.045	0.045	0.042
Japan	0.029	0.043	0.043	0.039	0.036	0.035	0.041	0.042	0.040	0.040	0.046	0.050	0.040	0.038	0.042
Luxembourg	0.039	0.043	0.040	0.039	0.036	0.042	0.041	0.037	0.040	0.034	0.034	0.025	0.036	0.045	0.042
Netherlands	0.049	0.043	0.040	0.039	0.044	0.042	0.041	0.042	0.044	0.046	0.046	0.050	0.036	0.045	0.042
New Zealand	0.029	0.043	0.043	0.039	0.036	0.042	0.041	0.042	0.040	0.034	0.046	0.050	0.040	0.038	0.042
Norway	0.039	0.049	0.042	0.053	0.044	0.049	0.041	0.042	0.040	0.040	0.034	0.025	0.040	0.038	0.042
Portugal	0.049	0.038	0.042	0.039	0.044	0.042	0.041	0.042	0.044	0.046	0.046	0.050	0.045	0.045	0.042
Spain	0.049	0.043	0.043	0.039	0.044	0.042	0.041	0.042	0.044	0.046	0.046	0.050	0.045	0.045	0.042
Sweden	0.049	0.043	0.038	0.039	0.044	0.042	0.041	0.042	0.044	0.040	0.046	0.050	0.040	0.045	0.042
Switzerland	0.049	0.043	0.040	0.039	0.044	0.042	0.041	0.042	0.040	0.040	0.046	0.050	0.040	0.038	0.038
Turkey	0.049	0.033	0.045	0.039	0.036	0.035	0.050	0.042	0.044	0.046	0.046	0.050	0.045	0.038	0.048
United Kingdom	0.049	0.043	0.042	0.053	0.036	0.042	0.041	0.042	0.040	0.046	0.046	0.050	0.040	0.032	0.042
United States	0.039	0.043	0.043	0.039	0.036	0.042	0.041	0.042	0.040	0.046	0.046	0.050	0.045	0.038	0.038

The subsequent steps consist of, respectively, calculating the interval values (Equation (4)), calculating the slope value (Equation (5)), calculating the envelope value (Equation (6)), calculating the envelope/slope ratio (Equation (7)), and finally determining the final criterion weights. The results of these calculations are presented in Table 4.

Table 4. Criteria slope values

		Δz_j	Slope $\tan \varphi_j$	Envelope E_j	Ratio q_j	Weights w_j
C1	No Poverty	0.0053	8.127	0.249	0.031	0.236
C2	Zero Hunger	0.0030	14.518	0.133	0.009	0.071
C3	Good Health and Well-being	0.0015	29.944	0.062	0.002	0.016
C4	Gender Equality	0.0024	17.990	0.143	0.008	0.062
C5	Quality Education	0.0013	32.361	0.074	0.002	0.018
C6	Clean Water and Sanitation	0.0026	17.023	0.137	0.008	0.062
C7	Affordable and Clean Energy	0.0015	28.574	0.049	0.002	0.013
C8	Decent Work and Economic Growth	0.0010	45.211	0.031	0.001	0.005
C9	Industry, Innovation and Infrastructure	0.0016	26.866	0.078	0.003	0.023
C10	Reduced Inequality	0.0021	20.712	0.130	0.006	0.049
C11	Sustainable Cities and Communities	0.0042	10.297	0.177	0.017	0.133
C12	Climate Action	0.0046	9.468	0.272	0.029	0.222
C13	Life on Land	0.0016	26.614	0.096	0.004	0.028
C14	Peace and Justice Strong Institutions	0.0024	18.443	0.108	0.006	0.045
C15	Partnerships to achieve the Goal	0.0018	24.626	0.057	0.002	0.018

The criterion weights are presented as a bar chart in Figure 3. An examination of the data in the figure reveals that the goal "No Poverty" has the highest weight (0.236), followed closely by "Climate Action" (0.222). Subsequently, "Sustainable Cities and Communities" holds a considerable share (0.133), while "Zero Hunger" (0.071) and "Clean Water and Sanitation" (0.062) both exhibit moderate levels of importance. In contrast, "Decent Work and Economic Growth" carries the lowest weight (0.005), suggesting that, within this particular analysis, it is considered less critical compared to the other listed criteria.

From these findings, several insights can be drawn. First, the relatively high weights for "No Poverty" and "Climate Action" underscore the paramount importance of socio-economic development and environmental protection. This suggests that poverty reduction and sustainable climate strategies should be prioritized in policy-making and research agendas. Second, "Sustainable Cities and Communities," with a notable weight, indicates the growing emphasis on urban resilience, infrastructure, and livability—factors vital for long-term sustainability. Meanwhile, the moderate weights of "Zero Hunger" and "Clean Water and Sanitation" affirm the continued urgency of ensuring basic necessities for all populations.

By contrast, the lower weights allocated to goals such as "Decent Work and Economic Growth" do not imply that these objectives are unimportant; rather, they highlight the need for an integrated approach where social, environmental, and economic dimensions are balanced according to contextual priorities. Overall, the results imply that strategies targeting poverty alleviation and climate resilience are central to this framework, serving as a basis for broader interventions that address interconnected sustainable development.

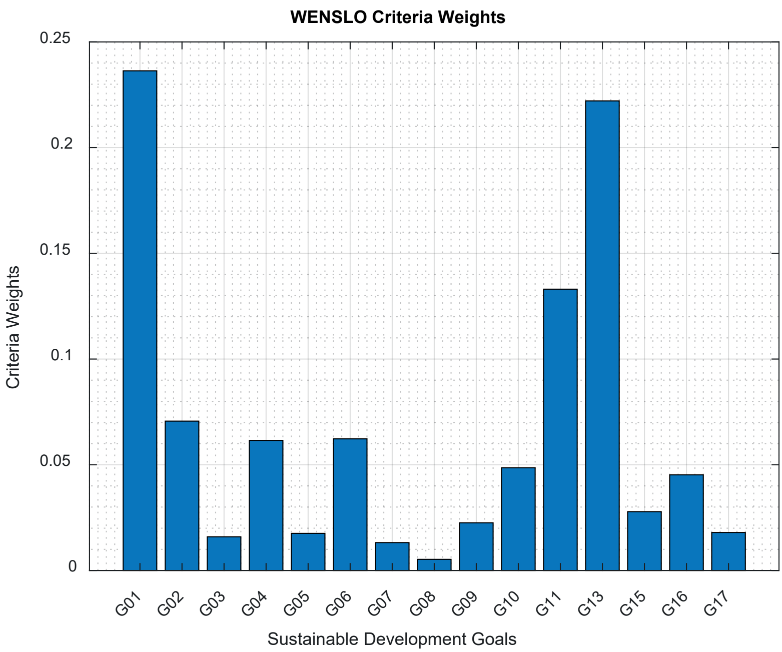

Figure 3. Criterion weights

4.2. Alternative evaluation with CoCoSo

The first step in determining the alternative scores using COCOSO is to normalize the decision matrix. This procedure is performed using Equation (10 and 11), and the results are presented in Table 5.

Table 5. Normalized decision matrix

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
Australia	0.333	0.333	0.75	0.0	1.0	0.0	0.0	1.0	0.0	0.5	1.0	1.0	1.0	0.5	0.335
Austria	1.000	0.667	0.50	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.5	1.0	0.335
Belgium	0.667	0.333	0.25	1.0	1.0	0.5	0.0	1.0	1.0	1.0	0.5	0.0	0.5	1.0	0.335
Canada	0.667	1.000	0.75	0.0	0.0	0.5	0.0	1.0	0.5	1.0	0.5	0.0	1.0	0.5	0.335
Denmark	1.000	0.333	0.50	1.0	1.0	0.5	0.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	0.335
Finland	1.000	0.333	0.50	0.0	1.0	0.5	0.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	0.335
France	1.000	0.333	0.50	0.0	1.0	0.5	0.0	1.0	1.0	1.0	1.0	1.0	0.5	1.0	0.335
Germany	0.667	0.333	0.50	0.0	1.0	0.5	0.0	1.0	1.0	1.0	0.5	0.0	1.0	1.0	0.335
Greece	0.667	0.667	0.50	0.0	1.0	1.0	0.0	1.0	0.5	0.5	0.0	0.0	1.0	0.5	0.335
Iceland	0.000	0.333	0.50	0.0	1.0	0.0	0.0	1.0	0.5	0.0	0.5	0.0	1.0	0.5	0.335
Ireland	0.667	0.667	0.50	0.0	1.0	0.5	0.0	1.0	0.5	0.0	0.5	0.0	0.5	1.0	0.335
Italy	1.000	0.667	0.50	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.335
Japan	0.333	0.667	0.75	0.0	0.0	0.0	0.0	1.0	0.5	0.5	1.0	1.0	0.5	0.5	0.335
Luxembourg	0.667	0.667	0.25	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.5	0.0	0.0	1.0	0.335
Netherlands	1.000	0.667	0.25	0.0	1.0	0.5	0.0	1.0	1.0	1.0	1.0	1.0	0.0	1.0	0.335
New Zealand	0.333	0.667	0.75	0.0	0.0	0.5	0.0	1.0	0.5	0.0	1.0	1.0	0.5	0.5	0.335
Norway	0.667	1.000	0.50	1.0	1.0	1.0	0.0	1.0	0.5	0.5	0.5	0.0	0.5	0.5	0.335
Portugal	1.000	0.333	0.50	0.0	1.0	0.5	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.335
Spain	1.000	0.667	0.75	0.0	1.0	0.5	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.335
Sweden	1.000	0.667	0.00	0.0	1.0	0.5	0.0	1.0	1.0	0.5	1.0	1.0	0.5	1.0	0.335
Switzerland	1.000	0.667	0.25	0.0	1.0	0.5	0.0	1.0	0.5	0.5	1.0	1.0	0.5	0.5	0.000
Turkey	1.000	0.000	1.00	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	1.000
United Kingdom	1.000	0.667	0.50	1.0	0.0	0.5	0.0	1.0	0.5	1.0	1.0	1.0	0.5	0.0	0.335
United States	0.667	0.667	0.75	0.0	0.0	0.5	0.0	1.0	0.5	1.0	1.0	1.0	1.0	0.5	0.000

After the decision matrix has been rendered dimensionless, the S values (Equation (12)), P values (Equation (13)), and the score appraisal strategies values (Equation (14, 15 and 16)) should be determined in sequence. Following these calculations, alternative scores are computed using Equation (17). The results of all the computational steps are presented in Table 6. In addition, the final column of Table 6 provides the rank values obtained after the scores are determined.

Table 6. S Values

	S Values	P Values	Xi	Psi	Omega	Scores	Ranks
Australia	0.573	10.609	0.038	4.417	0.809	2.271	18
Austria	0.868	12.922	0.047	6.282	0.998	3.109	2
Belgium	0.503	12.643	0.045	4.312	0.951	2.339	15
Canada	0.459	10.708	0.038	3.828	0.808	2.049	20
Denmark	0.812	11.853	0.043	5.848	0.916	2.884	9
Finland	0.803	12.820	0.047	5.923	0.985	2.967	6
France	0.813	12.834	0.047	5.980	0.987	2.990	5
Germany	0.460	11.673	0.042	3.955	0.878	2.150	19
Greece	0.390	10.770	0.038	3.466	0.807	1.912	22
Iceland	0.189	8.760	0.031	2.139	0.647	1.288	24
Ireland	0.410	10.685	0.038	3.560	0.803	1.944	21
Italy	0.882	12.941	0.047	6.358	1.000	3.139	1
Japan	0.576	10.620	0.038	4.437	0.810	2.279	17
Luxembourg	0.369	7.693	0.028	2.956	0.583	1.551	23
Netherlands	0.819	11.888	0.044	5.887	0.919	2.901	8
New Zealand	0.583	10.611	0.038	4.472	0.810	2.291	16
Norway	0.527	12.692	0.045	4.446	0.956	2.394	14
Portugal	0.827	12.853	0.047	6.057	0.990	3.020	4
Spain	0.855	12.905	0.047	6.209	0.995	3.081	3
Sweden	0.805	11.858	0.043	5.807	0.916	2.869	10
Switzerland	0.769	11.809	0.043	5.610	0.910	2.792	11
Turkey	0.765	10.969	0.040	5.484	0.849	2.697	12
United Kingdom	0.824	11.864	0.044	5.913	0.918	2.910	7
United States	0.718	10.787	0.039	5.212	0.832	2.583	13

As a result of the computational steps, the scores obtained were visualized on a map (Figure 4). Scores range approximately from 1.288 to 3.139, suggesting a significant disparity in sustainability performance across countries. European countries generally dominate the top of the ranking, although their specific scores vary.

- **Top Performers**: Italy leads with the highest score (3.139), placing it at rank 1. Austria (3.109) and Spain (3.081) follow closely, at ranks 2 and 3, respectively. These results suggest that Italy, Austria, and Spain exhibit notably strong sustainability outcomes in comparison to other countries listed.
- **Strong European Representation**: Many of the top-ranked countries (Italy, Austria, Spain, Portugal, France, Finland, and the United Kingdom) are in Europe, indicating a regional trend toward higher sustainability scores. Portugal (3.02, rank 4) and France (2.99, rank 5) reinforce the observation that Western and Southern European nations frequently appear among the leaders.

- **Mid-Range Scores**: Countries such as Denmark (2.884, rank 9), Sweden (2.869, rank 10), and Switzerland (2.792, rank 11) occupy mid-to-high positions, still performing well in sustainability. Meanwhile, larger nations like the United States (2.583, rank 13) and Turkey (2.697, rank 12) fall in the mid-range, indicating room for improvement relative to the top performers.
- **Lower Scores**: At the lower end of the rankings are Iceland (1.288, rank 24) and Luxembourg (1.551, rank 23), reflecting comparatively weaker performance in the metrics used to calculate sustainability scores. Greece (1.912, rank 22) and Ireland (1.944, rank 21) also appear in the lower tier, signaling potential challenges in meeting sustainability targets.

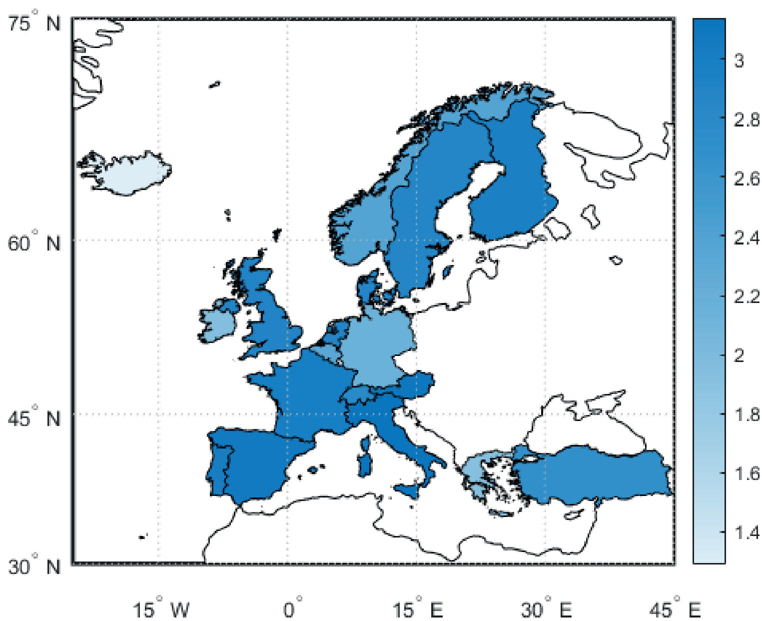

Figure 4. WENSLO-CoCoSo scores of the OECD Countries.

4.3. Sensitivity Analysis

In this study, countries' sustainability performances were compared using the weight set determined objectively by the WENSLO method. However, when different weight sets are employed, the ranking may or may not change. To gauge countries' sensitivity to these weights, the analysis was repeated using ten distinct weight sets. Consequently, observing that certain countries maintain high performance across multiple weight configurations suggests they are performing better overall.

For this study, 10 random numbers were drawn from a uniform distribution on the interval [0,1]. Their total sum was then computed. Next, each individual random number was divided by this sum, which yielded a corresponding weight in the interval [0,1]. As a result, the final set of 10 weights collectively sums to 1.

The weight sets are presented in Table 7. As can be observed from the table, the weights assigned to the criteria differ from one set to another. In other words, a criterion that carries a high weight in one set may have a lower weight in another.

One clear advantage of this variability is that it allows for greater flexibility and adaptability in the evaluation process. By tailoring weights to different sets, it becomes possible to capture the unique priorities, contexts, or constraints of each scenario more accurately. This approach prevents reliance on a single weighting scheme that may not be applicable in all circumstances, thereby enhancing the robustness and relevance of the overall analysis.

Table 7. Random weight sets

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
Random set 1	0.0016	0.1421	0.1272	0.0965	0.0139	0.0066	0.0349	0.0773	0.0501	0.0773	0.0767	0.0351	0.0745	0.1688	0.0176
Random set 2	0.0684	0.1134	0.0401	0.0479	0.0058	0.1072	0.0030	0.1170	0.0962	0.0266	0.0699	0.1026	0.0365	0.0996	0.0659
Random set 3	0.0148	0.1089	0.0390	0.1275	0.0388	0.0048	0.0911	0.0524	0.0468	0.1234	0.1012	0.0216	0.1182	0.0784	0.0332
Random set 4	0.0094	0.1798	0.1414	0.0071	0.0683	0.0502	0.0359	0.0729	0.0297	0.0785	0.0535	0.0523	0.1052	0.0298	0.0859
Random set 5	0.1320	0.0709	0.0036	0.1530	0.0944	0.0395	0.1052	0.1703	0.0016	0.0152	0.0151	0.0741	0.0210	0.0141	0.0900
Random set 6	0.0597	0.0607	0.0642	0.0439	0.0820	0.0317	0.0740	0.0799	0.1018	0.1062	0.1122	0.0308	0.0860	0.0267	0.0402
Random set 7	0.0940	0.0356	0.0905	0.0783	0.0705	0.0977	0.1035	0.0813	0.0656	0.0719	0.0673	0.0253	0.0862	0.0319	0.0004
Random set 8	0.0861	0.0823	0.0517	0.1216	0.0760	0.0011	0.0123	0.0128	0.1158	0.0026	0.1086	0.1118	0.0982	0.1073	0.0118
Random set 9	0.1293	0.1409	0.0306	0.0537	0.0116	0.0582	0.0093	0.1393	0.0902	0.0107	0.0918	0.0030	0.1424	0.0526	0.0364
Random set 10	0.0810	0.0108	0.0534	0.1083	0.1009	0.1004	0.1109	0.0362	0.0147	0.0028	0.0866	0.1005	0.0179	0.0976	0.0781

The ranking of countries under different weight sets is presented as a heat map in Figure 5. Certain countries (e.g., Iceland and Luxembourg) maintain the same or very similar ranks across all weight sets. This consistency may suggest that these countries' performance is relatively unaffected by changes in the weighting scheme, implying a robust standing in the overall assessment. Other countries (e.g., Spain and Italy) also tend to rank highly under most configurations, though with slight variations. Their generally strong positions may indicate fundamental advantages or stability in the underlying indicators, making them less sensitive to weight fluctuations.

Some countries experience more pronounced shifts in rank depending on the weighting set (e.g., Denmark, Norway, Turkey, and the United Kingdom). Such movements highlight a potential sensitivity to specific criteria within the assessment. When certain indicators are given higher weight, these countries' standings improve or decline accordingly.

The disparities in rankings across the weight sets underscore the importance of transparency in how weights are assigned. In policy analysis or comparative studies, the choice of weights can substantially influence outcomes. Researchers and decision-makers should conduct sensitivity analyses to determine how robust the results are to different weight configurations. This step is crucial for ensuring that conclusions drawn from such rankings are well-founded and not unduly influenced by arbitrary weighting schemes

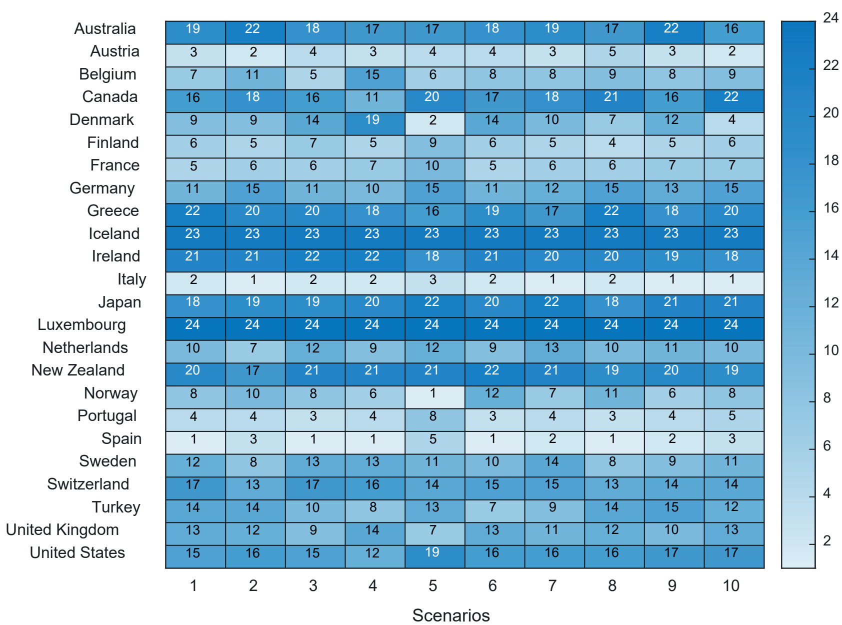

Figure 5. Sensitivity Analysis

4.4. Comparison with Other Methods

The Table 8 presents the results of score calculations performed using four different multi-criteria decision-making (MCDM) techniques, namely MOORA, WASPAS, TODIM, and TOPSIS. The rows list the countries under evaluation, and each column shows the corresponding score derived from one of these MCDM methods.

Each MCDM technique applies a different methodological approach to aggregating and prioritizing criteria. Consequently, while the overall trends may be similar (e.g., countries that score relatively high in one method often perform well in others), variations arise due to the unique weighting and normalization processes of each technique. Countries such as Italy (0.9694) and Austria (0.9666) achieve notably high scores, suggesting strong performance under the combined additive-multiplicative approach of WASPAS. Spain (1.0000) and Italy (0.9896) stand out with the highest TODIM values. TODIM, being a prospect theory–based method, can yield higher sensitivity to improvements in certain criteria compared to other methods. Austria (0.9099) and Italy (0.9107) both score above 0.90, indicating minimal distance from the ideal solution and a significant distance from the negative ideal solution under TOPSIS's geometric-based evaluation.

Some countries (e.g., Iceland in TOPSIS with 0.1539; Luxembourg in TODIM with 0.0000) exhibit relatively low scores in specific methods. These discrepancies can highlight areas where a particular country's indicators align poorly with the criteria emphasized by that specific technique.

When comparing countries, it is critical to consider the decision criteria and their relative weights in each method. A country's performance is multidimensional; hence, results should be interpreted in the context of which indicators (economic, social, environmental, etc.) are prioritized and how the techniques process these indicators.

Although there is some alignment in identifying top-performing countries (e.g., Italy, Spain, Austria), the ranking positions may vary among the four methods. This underscores the importance of employing multiple MCDM techniques for robust decision-making. By doing so, analysts can gain a more comprehensive perspective and reduce the risk of methodological bias.

Table 8. Scores of the other models

	MOORA	WASPAS	TOPSIS	TODIM
Australia	0.1930	0.8259	0.5808	0.5408
Austria	0.2241	0.9666	0.9099	0.9330
Belgium	0.1793	0.7642	0.4484	0.6655
Canada	0.1775	0.7575	0.4493	0.5754
Denmark	0.2208	0.9496	0.8950	0.7135
Finland	0.2194	0.9458	0.8815	0.8711
France	0.2201	0.9492	0.8837	0.8671
Germany	0.1761	0.7530	0.4432	0.7628
Greece	0.1695	0.7189	0.4142	0.5945
Iceland	0.1474	0.6239	0.1539	0.3964
Ireland	0.1742	0.7447	0.4438	0.5808
Italy	0.2247	0.9694	0.9107	0.9896
Japan	0.1941	0.8306	0.5843	0.4809
Luxembourg	0.1727	0.7382	0.4434	0.0000
Netherlands	0.2213	0.9539	0.8989	0.7749
New Zealand	0.1949	0.8336	0.5864	0.5012
Norway	0.1821	0.7741	0.4565	0.6218
Portugal	0.2207	0.9519	0.8843	0.9237
Spain	0.2228	0.9611	0.9019	1.0000
Sweden	0.2204	0.9500	0.8972	0.7470
Switzerland	0.2183	0.9407	0.8929	0.5545
Turkey	0.2161	0.9296	0.8454	0.6537
United Kingdom	0.2220	0.9547	0.9149	0.5936
United States	0.2089	0.9000	0.7555	0.5848

Table 9 reports the correlation relationships among the MCDM (Multi-Criteria Decision-Making) scores. For each correlation value, the p-value was calculated to be less than 0.01. The Proposed Model, MOORA, WASPAS, and TOPSIS are highly correlated with each other (all correlation coefficients are above 0.94). This suggests that these four methods produce very similar ranking or scoring outcomes. TODIM shows relatively lower correlation coefficients in comparison to the other methods (ranging from 0.6286 to 0.7984). This indicates that TODIM's scoring results diverge more significantly from the others. Since all p-values are below 0.01, the correlations observed are statistically significant, underscoring the reliability of these relationships.

Table 9. Correlation Analysis results with other models

	Proposed Model	MOORA	WASPAS	TOPSIS	TODIM
Proposed Model	1.000000	0.962308	0.960867	0.947650	0.798437
MOORA	0.962308	1.000000	0.999887	0.995210	0.648089
WASPAS	0.960867	0.999887	1.000000	0.995658	0.648022
TOPSIS	0.947650	0.995210	0.995658	1.000000	0.628622
TODIM	0.798437	0.648089	0.648022	0.628622	1.000000

5. Conclusion

The application of the WENSLO–COCOSO framework to assess OECD countries' sustainability performances yielded a comprehensive ranking based on fifteen distinct criteria. In the first stage, WENSLO was employed to assign objective weights to each of the sustainability criteria, minimizing potential researcher bias in the weighting process. Subsequently, the COCOSO technique was used to integrate these weighted criteria into an overall performance score for each country.

Several noteworthy findings emerge from these results. First, Italy tops the ranking, indicating relatively strong performance across the majority of the fifteen sustainability criteria. Interestingly, Austria, Spain, and Portugal also appear at the upper end of the scale, suggesting that these countries may have well-established policies or socio-environmental frameworks that holistically address economic, environmental, and social dimensions of sustainability. The high scores for these countries could stem from their investments in clean energy, effective social welfare systems, and progressive environmental regulations. In contrast, Iceland, Luxembourg, and Greece occupy the lower positions in the ranking. While Iceland is often regarded favorably in certain environmental indices (particularly for renewable energy usage), the aggregated evaluation here suggests that some of the broader sustainability dimensions—potentially related to social or economic indicators—brought down its overall score. Likewise, Luxembourg's score may reflect challenges in areas beyond pure economic metrics, such as environmental impact per capita or social equity, while Greece's position could be influenced by socio-economic and fiscal pressures that limit extensive sustainability initiatives.

A major limitation of the study is that the 15 SDG benchmarks used do not cover all 17 targets, and in particular the lack of explanation for the exclusion of SDG 12 and SDG 14. The lack of data on 42% of SDG indicators limits the depth of analysis, while methodological inconsistencies between OECD countries make comparisons difficult. Moreover, the novelty of the WENSLO and CoCoSo techniques prevents the comparison of results with other MCDM methods and the heterogeneous nature of OECD countries may ignore the unique circumstances of some countries. The study's ad-hoc assessment of SDG performance and its failure to quantitatively measure synergies and trade-offs among the SDGs limit the effectiveness of policy recommendations. To overcome these limitations, it is suggested to include SDGs 12 and 14, address data gaps with fuzzy logic or machine learning, and compare WENSLO-CoCoSo results with other methods. It would also be useful to examine successful policies of top-ranked countries, increase regional cooperation for low-performing countries, map SDG synergies through network analysis, and adapt the methodology to the local level. While green bonds and social impact investments are recommended for policymakers, academically, the applicability of WENSLO in other disciplines should be emphasized. These recommendations will strengthen the contributions of the study and guide future research.

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