



Examining the dynamics of Sustainable Development Goal 17 in Türkiye: A data-driven multi-criteria decision-making approach

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ABSTRACT

Sustainable Development Goal 17 is critical to advancing operational capacities and rejuvenating international partnerships to achieve sustainable development. Despite its strategic importance, longitudinal, methodologically integrated assessments of SDG 17 performance at the national level remain limited, particularly in Türkiye. In this research, Türkiye's performance between 2010 and 2021 was thoroughly investigated using 26 indicators, with multi-criteria assessment methods applied to weight the criteria. The IDOCRIW method was employed. This method determines objective weights based on the information content and differences among the criteria, thereby enhancing methodological consistency in the evaluation process. Subsequently, the CoCoSo method was employed to rank the years in terms of performance. The CoCoSo method integrates compromise to obtain more balanced and reliable rankings. According to the results, 2013 was identified as the year with the highest performance across all methods, whereas 2019–2021 exhibited the lowest performance. These results indicate a recent decline in Türkiye's sustainable development performance in partnership-related areas and underline the need for renewed policy attention in this area. To test the consistency of the proposed methodology, comparative analyses were conducted with ARAS, TOPSIS, VIKOR, and MOOSRA methods, and the findings were cross-validated. The convergence of rankings across different methods confirms the reliability of the proposed evaluation framework. This study contributes to the literature by offering a longitudinal, multi-method, and policy-relevant assessment framework for SDG 17 and provides practical insights for policymakers to monitor partnership effectiveness and design more resilient sustainable development strategies.

Türkiye’de Sürdürülebilir Kalkınma Hedefi 17’nin dinamiklerinin incelenmesi: Veri odaklı çok kriterli karar verme yaklaşımı

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ÖZ

Sürdürülebilir Kalkınma Amacı 17, sürdürülebilir kalkınmanın sağlanmasında uygulama kapasitesinin güçlendirilmesi ve küresel ortaklıkların yeniden canlandırılması açısından kritik bir rol oynamaktadır. Stratejik önemine rağmen, özellikle Türkiye özelinde, SKA 17 performansının ulusal düzeyde uzun dönemli ve metodolojik olarak bütünlük biçimde değerlendirildiği çalışmalar sınırlıdır. Bu çalışmada, Türkiye’nin 2010–2021 yılları arasındaki performansı 26 gösterge kullanılarak kapsamlı bir şekilde değerlendirilmiştir. Kriterlerin ağırlıklandırılmasında IDOCRIW yöntemi kullanılmıştır. Bu yöntem, kriterlerin hem bilgi içeriğini hem de değişkenlik düzeyini dikkate alarak nesnel ağırlıklar belirlemekte ve böylece değerlendirme sürecine metodolojik tutarlılık ve nesnellik kazandırmaktadır. Ardından, yılları performans açısından sıralamak için CoCoSo yöntemi uygulanmıştır. Birden fazla uzlaşma temelli toplulaştırma stratejisini bir araya getiren CoCoSo, daha dengeli ve güvenilir sıralamalar sunmaktadır. Bulgular, 2013 yılının en yüksek SKA 17 performansına sahip olduğunu, 2019–2021 döneminin ise en düşük performansı gösterdiğini ortaya koymuştur. Bu sonuçlar Türkiye’nin ortaklık temelli sürdürülebilir kalkınma performansında son yıllarda bir gerilemeye işaret etmekte ve bu alanda politika düzeyinde yeniden odaklanılması gerektiğini göstermektedir. Önerilen çerçevenin tutarlılığını ve sağlamlığını test etmek amacıyla ARAS, TOPSIS, VIKOR ve MOOSRA yöntemleriyle karşılaştırmalı analizler yapılmış ve sonuçlar çapraz doğrulama ile desteklenmiştir. Farklı yöntemler arasında elde edilen sıralamaların yakınsaması, önerilen değerlendirme çerçevesinin güvenilirliğini doğrulamaktadır. Bu çalışma, SKA 17’ye ilişkin uzun dönemli, çok yöntemli ve politika açısından anlamlı bir değerlendirme çerçevesi sunarak literatüre katkı sağlamakta; politika yapıcılara ortaklıkların etkinliğini izleme ve daha dayanıklı sürdürülebilir kalkınma stratejileri geliştirme konusunda pratik çıkarımlar sunmaktadır.

1. Introduction

The United Nations (UN) adopted a landmark agreement with the overarching objectives of eradicating poverty, enhancing the living standards and well-being of all individuals, fostering peace and inclusive societies, and reversing the trajectory of environmental degradation (Rombouts and Zekić, 2020). The agreement is structured around a set of 17 Sustainable Development Goals (SDGs) forming the basis, along with measurable targets established to facilitate continuous evaluation of achievements (Hák, Janoušková and Moldan, 2016). This global agenda, encompassing a total of 169 targets, underscores the holistic and multidimensional nature of development.

In this broader framework, the attainment of the SDGs necessitates not only national-level initiatives but also the effective strengthening of regional and global partnerships (Halkos and Gkampoura, 2021). In this context, SDG 17 constitutes a pivotal framework underpinning the feasibility of all other goals. The objective of SDG 17 is to reinforce partnerships across governments, international institutions, business actors, academic communities, and civil society (Cruz, 2023). This goal particularly encourages the establishment of effective mechanisms in areas such as financing, technology transfer, trade facilitation, harmonization of data and monitoring systems, and capacity

building (Maltais, Weitz and Persson, 2018). In this respect, SDG 17 is not merely an instrument for the implementation of the other SDGs, but also a strategic objective that constitutes the foundation of global solidarity and multi-stakeholder governance. Therefore, the success of SDG 17 directly influences the feasibility of all other goals (TİKA, 2021). Against this background, the multidimensional challenges faced at the global scale necessitate the development of collective solutions (Özcan, 2022). In other words, these challenges, which cannot be overcome through the efforts of a single country or institution, can only be addressed through effective partnerships, knowledge sharing, financial solidarity, and technology transfer (UN, 2020). More specifically the COVID-19 pandemic has clearly demonstrated that global crises cannot be resolved solely with national-level capacities and resources. The strength of health systems or certain countries' access to vaccines alone proved insufficient to bring the pandemic under control (Howarth, 2020). Accordingly, in this period, initiatives such as the Solidarity Response Fund highlighted the indispensable role of multi-stakeholder cooperation (Gölbaşı and Metintaş, 2020). The sub-targets of SDG 17 aim to institutionalize and operationalize global cooperation across various thematic areas. In terms of financing, the primary objectives include mobilizing additional financial resources for developing countries, alleviating debt burdens, and increasing investment support. As of 2021, Türkiye reached a rate of 0.96%, surpassing this target, and ranked among the top Economic Cooperation and Development (OECD) countries in this regard, thereby drawing attention with its contributions to global partnerships (TİKA, 2021). This performance reflects Türkiye's growing role in development cooperation and its strengthened capacity for international solidarity.

Accordingly, systematically measuring the performance of SDG 17 and ensuring cross-country comparability hold strategic importance for policymakers and researchers (Perez-Gladish, Ferreira and Zopounidis, 2020). Given the multidimensional nature of SDG 17, analyses based on a single indicator remain insufficient to capture the success of its objectives. Considering multiple criteria simultaneously, applying appropriate weighting, and generating rankings lead to more reliable and comprehensive results. The examination of SDG 17 in this research relied on multi-criteria decision-making (MCDM). Specifically, the Integrated Determination of Objective Criteria Weights (IDOCRIW) method was used to derive the relative importance of 26 indicators between 2010 and 2021, providing a statistically grounded estimation of indicator priorities and ensuring the construction of a consistent comparative weighting framework. The CoCoSo (Combined Compromise Solution) method was employed to evaluate and rank the performance of the alternatives. This approach integrates various compromise decision making methods, thereby enabling a more balanced and robust ranking of alternatives. The integration of these two methods provides a strong analytical framework, both methodologically and practically, for measuring the performance of SDG 17. In addition, the validity and stability of the findings were examined by conducting comparative analyses against alternative MCDM methods. To this end, Additive Ratio Assessment (ARAS), Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), VIseKriterijumsa KOpriMisno Resenje (VIKOR) and Multi-Objective Optimization based on Simple Ratio Analysis (MOOSRA) methods were also applied, and their results were compared with those of CoCoSo. These comparative methods revealed similarities and differences in ranking performance across methods, thereby mitigating potential biases stemming from methodological dependence. The primary objective of this study is to evaluate Türkiye's performance with respect to SDG 17 and to identify the most influential criteria shaping partnership success. The remainder of this paper is organized as follows: Section 2 provides a review of existing scholarship and outlines the initial considerations; Section 3 describes the methodological framework; Section 4 delivers the empirical analysis; and Section 5 offers a discussion on managerial implications and key insights.

2. Literature review

An examination of previous studies indicates notable diversity in the methodological strategies and analytical models employed for the implementation and evaluation of the SDGs. Allen (2018) concentrated on evaluating SDG interactions, the application of systems thinking, and the use of integrated analytical models. Although advancements have been achieved in the planning phases, the study underscored substantial gaps in the assessment of inter-goal interactions and synergies. Similarly, Fonseca et al. (2020) examined the interlinkages and synergies among the SDGs, finding strong connections between SDG 1 and SDG 3, while observing negative relationships between SDG 12 and energy consumption patterns. MCDM methods stand out as prominent analytical tools in evaluating the

SDGs. Büyüközkan, Karabulut and Mukul (2018) addressed renewable energy source selection in Türkiye within the context of SDG 7, applied hesitant fuzzy linguistic Analytic Hierarchy Process (AHP) and COmplex PROportional Assessment (COPRAS) and demonstrated that solar energy systems exhibited the highest performance among alternatives. Almeida (2019) investigated the applicability of SDG 11 in Brazilian municipalities using the Multi-Actor Multi-Criteria Analysis (MAMCA), emphasizing the importance of governance, transparency, and public participation, while also drawing attention to the necessity of integrating climate change and disaster risk reduction plans. Oliveira et al. (2019) provided a methodological perspective for prioritizing SDGs in Brazil under the 2030 Agenda through the fuzzy AHP-TOPSIS. Their study underscored the goals such as enhancing global representation in economic-financial institutions, raising awareness of sustainable development, and combating corruption ranked among the most impactful in developing countries due to their multi-centered roles.

Macro-level comparative studies also feature prominently in literature. Moyer and Hedden (2020) employed the International Futures model to examine SDG performance across 186 countries using nine indicators, finding that while 43% of countries had achieved target values in 2015, this share was projected to increase to 53% by 2030. Nevertheless, persistent challenges were observed in meeting targets related to access to safe sanitation, secondary education completion rates, and undernourished children. Resce and Schiltz (2021) evaluated 28 European Union member states using Hierarchical Stochastic Multicriteria Acceptability Analysis, identifying Denmark as the best performer, whereas Romania and Bulgaria ranked lowest. Breu, Bergöö, Ebnetter, Pham-Truffert, Bieri, Messerli and Bader (2021) investigated SDG interlinkages in Switzerland's national implementation of the 2030 Agenda and proposed an eight-step methodological framework to guide national strategies. Carlsen and Bruggemann (2021) analyzed data from 102 countries for 2010, 2015, and 2019 across regional and economic classifications, assessing the impacts of each SDG. Halkos and Gkampoura (2021), drawing on UN projections, found progress under SDG 8, while SDG 9 and SDG 12 showed only partial success. Studies focusing on the private sector similarly highlight its critical role. Rashed and Shah (2021) argued that corporate social responsibility, the circular economy, and environmental initiatives are key drivers of SDG success, stressing the need to align private-sector strategies with the SDGs, develop measurable indicators, and promote public-private partnerships. Recent meta-analyses have also addressed the broader political implications of the SDGs. Biermann, Hickmann, Sénit et al. (2022) examined their effects on global governance, national politics, institutional integration, inclusiveness, and ecological integrity, concluding that while the SDGs have shaped policy debates, they have yet to deliver the transformative impact necessary to achieve the 2030 targets. Sorooshian (2024) investigated the distribution of academic research efforts on the SDGs and employed an MCDM method to rank them by research potential. The comprehensive review indicates that a considerable number of studies have concentrated on environment, energy, education, and health-related SDGs. By contrast, academic research specifically addressing SDG 17 remains extremely limited. Although SDG 17 stresses the importance of global cooperation, multi-stakeholder collaboration, and coherent policies for the effective realization of the SDGs, the literature shows that research on this dimension is dominated by policy documents and international reports, with a notable lack of quantitative, evidence-based academic contributions.

Taken together, these studies show that the SDG literature has developed along three main lines: interlinkage-focused conceptual analyses, goal-specific applications, and cross-country comparative assessments. However, these strands remain fragmented in two important respects. First, most quantitative applications concentrate on SDGs such as energy, environment, health, and urban sustainability, while SDG 17 has received relatively limited empirical attention. Second, even when MCDM methods are employed, they are generally used either for sectoral prioritization or broad SDG comparisons rather than for a dedicated, longitudinal, data-driven assessment of partnership performance. In this respect, the present study is positioned at the intersection of these strands by focusing specifically on SDG 17 and by combining objective weighting, compromise ranking, and comparative validation within a national time-series framework. This research contributes to filling the gap by offering one of the first comprehensive data-driven attempts to measure, evaluate, and integrate SDG 17 into decision-support systems. In doing so, it not only enhances the academic visibility of SDG

17 but also proposes an innovative and analytical framework that can inform the creation and execution of policies that are environmentally sustainable.

3. Research model

The study employed a data-driven MCDM framework to evaluate SDG 17 and integrate them within the broader decision-making model. As illustrated in Figure 1, the proposed procedure includes data collection, screening of criteria, determination of criterion weights using the IDOCRIW method, performance ranking of the years using the CoCoSo method, and comparative analysis of the results.

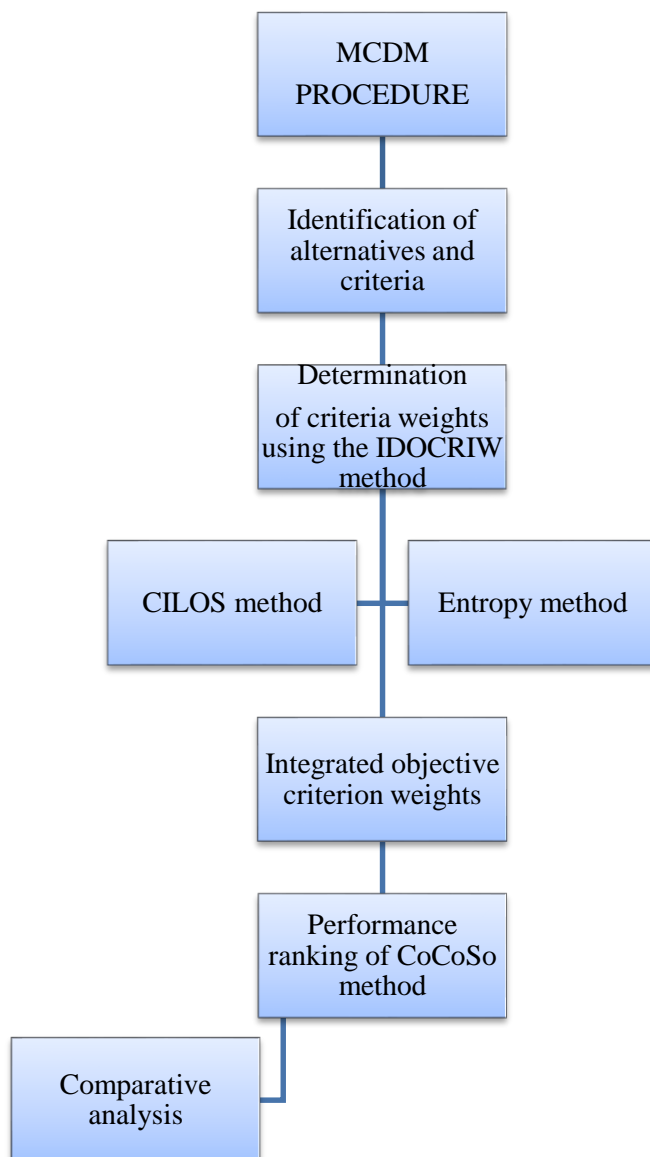


Figure 1. The flowchart of the methodological framework.

As an initial step, the IDOCRIW method was applied with the aim of estimating the degree of relative significance attributed to the individual criteria. The selection of the criteria was also supported by a theoretical perspective consistent with the scope of SDG 17. In particular, the indicator set can be associated with institutional economics, global public goods theory, and development cooperation frameworks. From the perspective of institutional economics, indicators related to domestic resource mobilization, fiscal structure, financial capacity, and macroeconomic stability reflect the institutional foundations required for sustainable development implementation. From the perspective of global public goods theory, variables related to international aid, trade integration, remittances, and digital

connectivity capture the cross-border and cooperative dimensions of sustainable development. In addition, development cooperation frameworks justify the inclusion of indicators associated with official development assistance, foreign direct investment, technical and financial support, and public-private partnership investments, as these variables reflect the operational dimension of international partnerships. Although TurkStat reports a broader set of SDG 17 indicators, this study uses 26 criteria for which complete, continuous, and comparable data were available over the common analysis period. Indicators with missing observations or insufficient temporal coverage were excluded; therefore, the final number of criteria was determined by data availability and comparability rather than by a priori choice. The complete inventory of those criteria whose relative importance values were generated in the analysis is displayed in Table 1.

Table 1

Criteria set

Code	Criteria	Unit
N1	Share of overall public revenue, disaggregated by source, as a percentage of Gross Domestic Product (GDP)	(%)
N2	Share of tax revenue generated by the central government compared with its total spending	(%)
N3	Overall net provision of official development assistance resources	(%)
N4	Official aid allocated to the group of least developed nations	(%)
N5	Foreign direct investment	(% of GDP)
N6	Ratio of personal remittances received to GDP	(%)
N7	Fixed broadband subscriptions per 100 inhabitants	(Per 100 persons)
N8	Proportion of individuals using the internet in the last three months	(%)
N9	Financial and technical assistance commitments to developing countries	(% of GDP)
N10	Türkiye share in global exports	(%)
N11	Foreign direct investment	(%)
N12	Total reserves in months of imports	(Ratio)
N13	Personal remittances	(%)
N14	Broad money growth (annual %)	(%)
N15	Bank capital to assets ratio	(%)
N16	Tax revenue (% of GDP)	(%)
N17	GDP growth	(%)
N18	Household final consumption expenditure	(%)
N19	Total government expenditure on final consumption goods and services	(%)
N20	Investment amount undertaken in public-private partnerships for infrastructure	(% of GDP)
N21	Total external debt (% of GDP)	(%)
N22	Official exchange rate	(LCU per US\$)
N23	Broad money to total reserves ratio	(Ratio)
N24	Ratio of impaired loans to the aggregate value of gross loans	(%)
N25	Inflation, consumer prices (annual %)	(%)
N26	Unemployment rate	(%)

Source: TurkStat, Sustainable Development Indicators, 2010-2023

To rank the alternatives and determine the most appropriate option, this study adopted a data-driven MCDM framework instead of relying on a single ranking technique. Although numerous MCDM methods have been proposed in the literature, no single method is considered universally superior for all decision-making scenarios (Zavadskas and Turskis, 2011). This issue becomes even more critical under uncertainty, where integrating or comparatively employing different MCDM approaches can improve the robustness and interpretability of results (Mardani et al., 2015). Within this broader framework, ARAS is valuable because it reveals the proportional similarity of each alternative to the ideal alternative, thereby enabling a clear assessment of relative performance (Ecer, 2016). TOPSIS, one of the most widely used MCDM methods, evaluates alternatives by simultaneously considering their distances from the positive ideal solution and the negative ideal solution, and ranks them according to

their relative closeness to the ideal point (Madanchian and Taherdoost, 2023; Janko and Bernroider, 2005). VIKOR, on the other hand, is a compromise-based approach that constructs a ranking index according to closeness to the ideal solution and allows criteria measured in different units to be normalized and assessed jointly (Opricovic and Tzeng, 2004). Likewise, MOOSRA offers important practical advantages, including short computation time, limited mathematical complexity, high reliability, and ease of implementation; it is also based on a clear decision-matrix structure involving alternatives, criteria, criterion weights, and the performance values of alternatives with respect to each criterion (Das et al., 2012; Jagadish and Ray, 2014). In this study, CoCoSo was preferred for the final ranking stage because it provides a compromise-oriented evaluation structure that enables a more balanced aggregation of criterion performances, thereby yielding consistent and comparable rankings of the alternatives. Thus, the selection of CoCoSo was not intended to replace well-established methods such as TOPSIS, but rather to strengthen the methodological framework by employing a more comprehensive and robust decision-making perspective (Ozdemir, 2024). This section introduces the MCDM methods applied in the study. However, only the procedural steps of the IDOCRIW and CoCoSo methods are presented in detail, since providing step-by-step formulations for all methods would make the methodology section excessively formula-driven and may reduce the intuitive understanding of the overall decision-making framework. The methodological framework adopted in this study was not selected solely for computational convenience, but also for its relevance to the evaluation problem addressed in the SDG literature. In recent sustainability assessment studies, MCDM methods have been widely used because they enable the joint evaluation of multiple and heterogeneous indicators within a structured decision-making framework. In this context, the combined use of an objective weighting approach and a compromise-based ranking method is particularly appropriate for SDG 17, since this goal involves multidimensional indicators related to finance, trade, technology, and international cooperation. Accordingly, the methodology of this study is positioned as a data-driven and decision-support-oriented approach that extends existing SDG assessment practices toward a more focused evaluation of partnership performance.

3.1. IDOCRIW method

The IDOCRIW, formulated by Zavadskas and Podvezko (2016), provides a holistic method for determining criterion weights by considering both objective and structural properties. Specifically, it combines the strengths of the Entropy method (Shannon, 1948) and the Criterion Impact Loss (CILOS) method (Zavadskas and Podvezko, 2016), thereby enabling a more comprehensive analysis of the data structure. This integration reduces subjectivity, ensures a balanced representation of criteria, and enhances the robustness and reliability of the weighting process.

3.1.1. Entropy method

The Entropy method is applied through the following steps:

Formulation of the decision matrix, which is represented in Equation (1):

$$X = [x_{ij}]_{m \times n} = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix} \quad (i = 1, 2, \dots, m; j = 1, 2, \dots, n) \quad (1)$$

Since the criteria included in the decision matrix may have different measurement units, the first step of the analysis requires the normalization of the decision matrix. The normalization process ensures that all criteria are transformed into a comparable scale.

The normalization procedure is performed according to Equation (2):

$$r_{ij} = \frac{x_{ij}}{\sum_{i=1}^n x_{ij}} \quad (2)$$

This step allows alternatives to be evaluated on a comparable scale across different criteria. This procedure ensures comparability of each alternative according to the corresponding criterion.

Calculation of Entropy values E_j . The Entropy degree is computed using Equation (3):

$$E_j = -\frac{1}{\ln n} \sum_{i=1}^n r_{ij} \ln(r_{ij}) \quad 0 \leq E_j \leq 1 \quad (3)$$

Calculation of the degree of diversification of the criteria. The values d_j are calculated using Equation (4):

$$d_j = 1 - E_j \quad (4)$$

Calculation of the final weight of each criterion, which is represented in Equation (5):

$$W_j = \frac{d_j}{\sum_{j=1}^m d_j}, \quad \sum_j w_j = 1 \quad (5)$$

3.1.2. CILOS method

CILOS is applied through the following steps:

Transformation of minimization-oriented criteria into maximization types. Criteria that need to be minimized are converted into maximization form using Equation (6). The purpose of this transformation is to restructure each criterion in a way that reflects its optimal value. Here, r_{ij} represents the transformed value of a minimization criterion and is used in constructing the new decision matrix, which is defined in Equation (7). For maximization criteria, no transformation is required, and they are directly included in the evaluation process in their original form.

$$\bar{r}_{ij} = \frac{\min_i r_{ij}}{r_{ij}} \quad (6)$$

$$X = \|x_{ij}\| \quad (7)$$

The maximum values of the criteria are determined using Equation (8). This procedure aims to identify the maximum value of each criterion in the matrix, which subsequently serves as a reference point for the following calculations.

$$x_j = \max_i x_{ij} = x_{kij} \quad (8)$$

Construction of the square matrix. Matrix B is constructed from matrix X by selecting the values x_{kij} linked to the maximum performance of the i th criterion.

Construction of the P matrix. The P matrix represents the relative loss of impact for each criterion. The calculation is performed according to Equation (9):

$$P = \|p_{ij}\|, p_{ij} = \frac{x_j - b_{ij}}{x_j} = \frac{b_{ii} - b_{ij}}{b_{ii}}, p_{ij} = 0; i, j = 1, 2, \dots, m \quad (9)$$

Formulation of the F matrix, where the criterion weights are specified, as presented in Equation (10):

$$F = \begin{bmatrix} -\sum_{i=1}^m P_{i1} & P_{12} & \dots & P_{1m} \\ P_{21} & -\sum_{i=1}^m P_{i2} & \dots & P_{2m} \\ \vdots & \vdots & \vdots & \vdots \\ P_{m1} & P_{m2} & \dots & -\sum_{i=1}^m P_{im} \end{bmatrix}_{m \times m} \tag{10}$$

Determination of the CILOS weights. To determine the CILOS weights, the system of linear equations is solved using Equation (11):

$$F \times q_j = 0 \tag{11}$$

Calculation of the IDOCRIW weights. Calculation of the IDOCRIW weights, represented in Equation (12):

$$W_j = \frac{q_j W_j}{\sum_{j=1}^m q_j W_j} \tag{12}$$

3.2. CoCoSo method

The CoCoSo method, formulated by Yazdani, Zarate, Kazimieras Zavadskas and Turskis (2019), was applied, producing reliable and integrated rankings.

The CoCoSo method is applied through the following steps:

Formulation of the decision matrix, which is represented in Equation (13):

$$X = [x_{ij}] = \begin{matrix} A_1 \\ A_2 \\ \dots \\ A_m \end{matrix} \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix}_{m \times n} \tag{13}$$

Normalization of the decision matrix which is represented using Equation (14):

$$\bar{X}_{ij} = \begin{matrix} A_1 \\ A_2 \\ \dots \\ A_m \end{matrix} \begin{bmatrix} \bar{x}_{11} & \bar{x}_{12} & \dots & \bar{x}_{1n} \\ \bar{x}_{21} & \bar{x}_{22} & \dots & \bar{x}_{2n} \\ \dots & \dots & \dots & \dots \\ \bar{x}_{m1} & \bar{x}_{m2} & \dots & \bar{x}_{mn} \end{bmatrix}_{m \times n} \tag{14}$$

The normalization procedure varies according to the type of criteria. For benefit criteria, normalization is performed using Equation (15), whereas for cost criteria it is conducted using Equation (16). In this way, all criteria are transformed into a comparable scale, thereby ensuring consistency in the evaluation process.

$$x_{ij} = \frac{x_{ij} - x_{ij}^-}{x_{ij}^+ - x_{ij}^-} \tag{15}$$

$$x_{ij}^- = \frac{\min(x_{ij})}{1 \leq i \leq n}, x_{ij}^+ = \frac{\max(x_{ij})}{1 \leq i \leq n}$$

$$x_{ij} = \frac{x_{ij}^+ - x_{ij}}{x_{ij}^+ - x_{ij}^-} \quad (16)$$

(18): Calculation of S_i and P_i values, which are obtained for each alternative using Equations (17) and

$$S_i = \sum_{j=1}^n (w_j \bar{x}_{ij}) \quad (17)$$

$$P_i = \sum_{j=1}^n (\bar{x}_{ij})^{w_j} \quad (18)$$

In this phase of the study, the comparative importance of the alternatives is quantified through the utilization of the expressions provided in Equations (19–21).

$$\varphi_{ia} = \frac{P_i + S_i}{\sum_{i=1}^m P_i + S_i} \quad (19)$$

$$\varphi_{ib} = \frac{S_i}{\min_i S_i} + \frac{P_i}{\min_i P_i} \quad (20)$$

$$\varphi_{ic} = \frac{\lambda(S_i) + (1 - \lambda)(P_i)}{\left(\frac{\lambda \max S_i}{i} + (1 - \lambda) \frac{\max P_i}{i}\right)}; \lambda = 0.5 \quad (21)$$

Calculation of the performance scores (φ_i), which are represented in Equation (22):

$$\varphi_i = (\varphi_{ia} \cdot \varphi_{ib} \cdot \varphi_{ic})^{\frac{1}{3}} + \frac{1}{3}(\varphi_{ia} \cdot \varphi_{ib} \cdot \varphi_{ic}) \quad (22)$$

In the evaluation process, the alternatives have been prioritized in descending order, commencing with the most advantageous choice and culminating with the option that obtained the lowest relative standing.

4. Findings

In Table 2, the study introduces the baseline decision matrix employed in the evaluation of SDG 17.

Table 2
Initial decision matrix

	N1	N2	N3	N4	N5	N6	N7
2010	33.0	75.2	0.13	0.02	1.16	0.23	9.60
2011	32.2	81.7	0.15	0.03	1.90	0.22	10.1
2012	32.2	78.5	0.29	0.04	1.54	0.21	10.4
2013	32.4	80.5	0.35	0.03	1.40	0.20	10.9
2014	31.7	80.5	0.39	0.02	1.41	0.19	11.4
2015	31.9	84.4	0.46	0.06	2.21	0.16	12.1
2016	32.3	78.3	0.76	0.02	1.58	0.14	13.1
2017	30.7	76.0	0.97	0.02	1.28	0.12	14.7
2018	31.6	73.4	1.11	0.02	1.57	0.14	16.3
2019	31.9	68.3	1.16	0.02	1.23	0.11	17.1
2020	31.4	69.3	1.15	0.01	1.04	0.11	19.9
2021	31.1	76.9	0.96	0.01	1.58	0.09	21.4
	N8	N9	N10	N11	N12	N13	N14
2010	37.5	0.12	0.74	1.17	5.03	1.36	18.5
2011	40.4	0.15	0.76	1.93	4.06	1.39	15.1
2012	42.7	0.28	0.82	1.57	5.56	1.27	10.5
2013	43.1	0.34	0.96	1.42	5.49	1.14	21.0
2014	48.4	0.38	0.98	1.42	5.48	1.16	11.7
2015	51.6	0.45	0.99	2.22	5.55	1.09	16.2
2016	58.3	0.74	0.95	1.59	5.58	0.87	17.8
2017	64.6	0.94	0.97	1.30	4.86	0.87	16.1
2018	71.0	1.09	0.94	1.56	4.30	1.00	18.2
2019	73.9	1.11	0.98	1.26	5.31	0.70	28.0
2020	77.6	1.10	0.91	1.07	4.61	0.86	33.9
2021	81.4	0.91	1.02	1.65	4.43	0.66	52.2
	N15	N16	N17	N18	N19	N20	N21
2010	14.2	19.3	8.40	11.0	1.70	1.72	39.6
2011	12.6	19.1	11.2	12.2	1.10	0.53	38.2
2012	13.8	18.8	4.80	3.20	6.80	0.001	40.7
2013	11.7	19.0	8.50	7.60	8.00	8.11	42.2
2014	12.0	18.4	4.90	3.10	3.10	0.36	44.3
2015	11.5	18.5	6.10	5.20	3.90	0.09	46.4
2016	11.3	18.6	3.30	3.70	9.50	0.82	46.7
2017	11.2	18.1	7.50	5.90	5.00	0.73	52.4
2018	11.0	17.6	3.00	0.50	6.50	0.06	53.4
2019	10.9	17.1	0.80	1.50	3.80	0.01	54.6
2020	9.73	18.1	1.90	3.20	2.50	0.09	59.9
2021	7.64	18.2	11.4	15.3	2.60	1.54	54.4
	N22	N23	N24	N25	N26		
2010	1.50	4.63	3.92	6.40	11.9		
2011	1.67	4.21	2.83	10.4	9.80		
2012	1.79	3.69	2.95	6.16	9.20		
2013	1.90	3.39	2.79	7.40	9.70		
2014	2.19	3.83	2.89	8.17	9.90		
2015	2.72	4.00	3.14	8.81	10.3		
2016	3.02	4.53	3.30	8.53	10.9		
2017	3.65	4.29	3.01	11.9	10.9		
2018	4.81	4.51	3.99	20.3	10.9		
2019	5.67	4.24	5.50	11.8	13.7		
2020	7.01	5.24	4.19	14.6	13.2		
2021	8.89	5.28	3.28	36.0	12.0		

Source: TurkStat, Sustainable Development Indicators, 2010-2023

Since the performance values associated with the criteria are expressed in different units and scales, a normalization procedure was applied to enable a sound comparison among the alternatives. In this way, the indicators were evaluated on a common scale, thereby enhancing the consistency of the relative performance ranking.

The normalization process was implemented, with its formulation provided in Equation (2). Subsequently, the entropy values of the criteria and the entropy-based weights were calculated through Equations (3-5), respectively.

The values of Entropy, CILOS, and IDOCRIW are summarized in Table 3.

Table 3
Entropy, CILOS, and IDOCRIW criterion weights

Criterion	Entropy (E_j)	CILOS(q_j)	IDOCRIW (W_j)
N1	0.0393	0.2175	0.2190
N2	0.0393	0.0709	0.0714
N3	0.0378	0.0156	0.0151
N4	0.0384	0.0097	0.0096
N5	0.0391	0.0183	0.0183
N6	0.0390	0.0219	0.0219
N7	0.0391	0.0188	0.0188
N8	0.0391	0.0210	0.0210
N9	0.0380	0.0156	0.0151
N10	0.0393	0.0625	0.0629
N11	0.0392	0.0191	0.0192
N12	0.0393	0.0650	0.0654
N13	0.0391	0.0224	0.0225
N14	0.0385	0.0132	0.0130
N15	0.0392	0.0308	0.0310
N16	0.0393	0.1734	0.1746
N17	0.0380	0.0207	0.0201
N18	0.0373	0.0160	0.0153
N19	0.0381	0.0107	0.0105
N20	0.0306	0.0059	0.0047
N21	0.0393	0.0365	0.0367
N22	0.0380	0.0154	0.0152
N23	0.0393	0.0216	0.0218
N24	0.0392	0.0285	0.0286
N25	0.0381	0.0154	0.0150
N26	0.0393	0.0337	0.0339

Ranking of the criteria based on the IDOCRIW method is as follows: N1>N16>N2>N12>N10>N21>N26>N15>N24>N13>N6>N23>N8>N17>N11>N7>N5>N18>N9>N3>N22>N25>N14>N19>N4>N20.

According to the findings, total government revenue to GDP (N1) and tax revenue (N16) represent the most decisive criteria, whereas the investment in PPP-based infrastructure projects (N20), in US dollar terms, proved to be the least significant criterion. This result can be interpreted within the perspective of institutional economics and development cooperation frameworks. In the context of SDG 17, fiscal capacity does not merely represent a macroeconomic outcome; it also reflects the institutional ability of the state to mobilize domestic resources, sustain policy commitments, and participate effectively in international cooperation mechanisms. From this perspective, the prominence of N1 and N16 suggests that partnership effectiveness is closely linked to the strength of domestic public finance. By contrast, the relatively low weight of PPP-based infrastructure investment may indicate that such investments are more episodic and project-specific and therefore less capable of capturing the broader and more continuous partnership architecture emphasized by SDG 17. The CoCoSo-based evaluation is presented in Table 4. CoCoSo results are reported in Table 4.

Table 4
CoCoSo results

Alternative	φ_{ia}	φ_{ib}	φ_{ic}	φ_i	Rank
2010	0.075	3.100	0.810	1.391	7
2011	0.085	3.124	0.913	1.454	6
2012	0.085	3.208	0.917	1.487	4
2013	0.093	3.533	1.000	1.651	1
2014	0.091	3.100	0.986	1.484	5
2015	0.092	3.320	0.993	1.570	2
2016	0.092	3.242	0.991	1.540	3
2017	0.087	2.506	0.943	1.247	8
2018	0.086	2.472	0.928	1.228	9
2019	0.073	2.162	0.789	1.050	11
2020	0.075	2.146	0.807	1.052	10
2021	0.066	2.230	0.709	1.036	12

The results of Table 4 indicate that, in Türkiye, 2013 exhibited the best performance in terms of SDG 17, followed by 2015 and 2016. In contrast, 2019 and 2021 were identified as the years with the poorest performance.

4.1. Combined ranking results

To evaluate the consistency and robustness of the ranking outcomes, a range of both well-established and more recently developed MCDM methodologies, including ARAS, TOPSIS, VIKOR and MOOSRA, were implemented within the analysis process. This comprehensive application of diverse techniques made it possible to observe potential similarities as well as discrepancies across different methodological perspectives, thereby strengthening the reliability of the overall evaluation. The complete results of this comparative assessment are presented in Table 5.

Table 5
Comparative assessment

Rank	CoCoSo	ARAS	TOPSIS	VIKOR	MOOSRA
1	2013	2013	2013	2013	2013
2	2015	2015	2015	2010	2012
3	2016	2011	2011	2012	2011
4	2012	2012	2010	2016	2014
5	2014	2021	2012	2011	2015
6	2011	2010	2016	2015	2010
7	2010	2016	2017	2014	2016
8	2017	2014	2014	2018	2017
9	2018	2017	2021	2021	2018
10	2020	2018	2018	2020	2019
11	2019	2019	2019	2019	2021
12	2021	2020	2020	2017	2020

Table 5 provides a general summary of the findings from the comparative evaluation.

The outcomes indicate that 2013 consistently ranked first across all methods, while the low-performing years of 2019–2021 were commonly emphasized by all methods. Figure 2 presents a comparative analysis of SDG 17 performance rankings for the period 2010–2021, obtained through different MCDM methods.

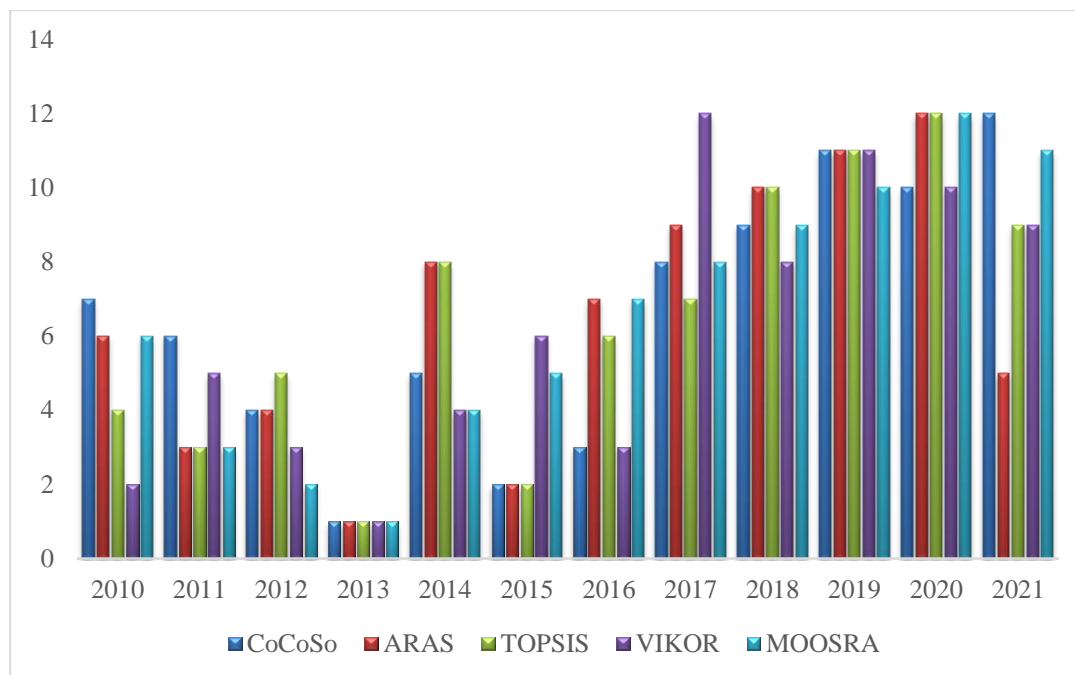


Figure 2. MCDM results

The results demonstrate a general alignment across methods, with 2013 consistently emerging as the best-performing year. In contrast, 2019-2021 stand out for their low performance, a finding consistently emphasized by all methods. Furthermore, the relatively high performance observed in 2015 indicates that Türkiye exhibited stronger outcomes in terms of global partnerships during this period. Overall, the figure illustrates that the results derived from different methods are mutually supportive and highlight the fluctuating trajectory of SDG 17 performance over time.

5. Conclusion

This study primarily aims to evaluate the performance of SDG 17 over the period 2010–2021 by employing MCDM methods, with particular emphasis on the IDOCRIW and CoCoSo approaches. The results obtained from the IDOCRIW method reveal that fiscal indicators, such as the ratio of total government revenue to GDP (N1) and tax revenue (N16), are the most influential determinants of partnership success. In contrast, the indicator related to public–private partnerships in infrastructure investment (N20) received the lowest weight, suggesting that fiscal stability plays a more decisive role than infrastructure-oriented indicators in explaining SDG 17 performance. The ranking results indicate that 2013 was the best-performing year, whereas the 2019–2021 period recorded the lowest performance levels.

The identification of 2013 as the best-performing year across all methods is consistent with the domestic demand-led growth momentum observed in the Turkish economy during that period. According to the World Bank (2014), economic growth in 2013 was largely supported by private consumption, public investment, and inventory accumulation; during the first three quarters, the economy grew by 4.0% year-on-year, with domestic demand contributing 6.1 percentage points to growth, while net exports reduced growth by 2.2 percentage points. The 5.3% increase in private investment in the third quarter of 2013, following six consecutive quarters of decline, further indicates that the economic recovery extended to the investment side. The Autumn Forecast Report published by the Ministry for EU Affairs of the Republic of Türkiye (2013) similarly noted that economic activity rebounded in the first half of 2013 due to a looser monetary policy stance and rising public expenditures, with GDP growth in the first half of the year reaching 3.7% and the largest contribution coming from consumption expenditures. Public–private partnership investments reached USD 78 billion, GDP amounted to USD 957.8 billion, and the ratio of total government revenue to GDP stood at 32.4%. Taken together, these indicators point to a relatively strong fiscal and macroeconomic outlook for that year. Contributions to international organizations amounting to USD 151.0 million further suggest that 2013 was also marked by a relatively

strong level of international institutional engagement (Ministry for EU Affairs of the Republic of Türkiye, 2013; TurkStat, 2024; SBB, 2024; TİKA, 2021).

By contrast, the low performance recorded during the 2019–2021 period reflects vulnerabilities at both the national and global levels, particularly the disruptive effects of the COVID-19 crisis on economic performance, trade flows, employment, and fiscal stability. According to the Presidency of Strategy and Budget (2021), the Turkish economy contracted by 9.9% in the second quarter of 2020. This contraction stemmed from the negative effects of the pandemic on consumer behavior, restrictive measures that limited economic activity, and the decline in net exports due to weakened external demand. The easing of restrictions in June, following a decline in case numbers, helped contain the contraction in the first half of 2020 to 3.1%. Sectoral contributions show that the industrial sector contributed –1.1 percentage points and the services sector –2.6 percentage points to the contraction, whereas the agricultural sector made a positive contribution of 0.1 percentage points. Macroeconomic indicators also reflect this deterioration: GDP declined to USD 761 billion in 2019 and further to USD 720.3 billion in 2020, while the ratio of total government revenue to GDP fell to 31.9% in 2019 and 31.4% in 2020. Similarly, the ratio of tax revenue to GDP decreased from 18.9% in 2013 to 16.9% in 2019 and reached only 18.0% in 2020. In addition, financial contributions to international organizations declined to USD 90.94 million in 2020 and further to USD 83.16 million in 2021, suggesting that Türkiye’s international institutional engagement weakened during this period (TurkStat, 2024; TİKA, 2021). Therefore, the identification of 2013 as the best-performing year and 2019–2021 as the lowest-performing period is consistent with the structural contrast between domestic demand- and public support-driven economic expansion and pandemic-induced supply and demand contraction, declining trade flows, and erosion in fiscal capacity.

These findings suggest that the relatively high performance observed in 2013 and the weak performance recorded during 2019–2021 are consistent with fiscal indicators and external trade dynamics. From a theoretical perspective, these findings also point to an underlying mechanism: SDG 17 performance improves when domestic institutional capacity and external cooperation conditions reinforce each other and weakens when both dimensions deteriorate simultaneously. In other words, stronger fiscal space, higher public revenue generation, and a more favorable macroeconomic environment appear to support Türkiye’s ability to maintain international engagement, financial contributions, and partnership-based development performance. Conversely, periods marked by macroeconomic fragility, declining fiscal capacity, and disruptions in global flows tend to reduce the operational effectiveness of partnership mechanisms. This interpretation helps explain why the findings are not only statistically consistent, but also theoretically meaningful in relation to the implementation logic of SDG 17. Based on these findings, policy recommendations can be formulated at three levels. At the policy level, sustaining effective partnerships requires strengthening fiscal discipline, broadening the tax base, and increasing development assistance. At the institutional level, cooperation among the public sector, private sector, academia, and civil society should be reinforced through more institutionalized and inclusive mechanisms. At the international level, the lasting effectiveness of global partnerships depends on advancing technology transfer, promoting knowledge sharing, and improving financial mechanisms in a transparent, fair, and SDG-aligned manner. Beyond these policy implications, the originality of this study lies in bringing SDG 17, which has remained relatively underexplored in empirical sustainability assessment, into a longitudinal, data-driven, and decision-support-oriented evaluation framework for Türkiye. By combining objective weighting through IDOCRIW, compromise-based ranking through CoCoSo, and comparative validation with alternative MCDM methods, the study moves beyond descriptive SDG monitoring and provides a structured analytical approach for assessing partnership performance over time. In this respect, the study contributes not only by generating country-specific evidence for Türkiye, but also by offering a replicable framework that can be adapted to similar national contexts in future SDG 17 assessments.

This study has several limitations. As the examination was restricted to the years 2010–2021, expanding the temporal scope and incorporating cross-national or regional perspectives may provide a more holistic view of SDG 17 performance. In addition, scenario-based analyses that model the potential effects of macroeconomic shocks and global crises could yield further insights into the vulnerabilities and resilience of global partnerships. Future studies may extend the proposed framework to other OECD countries to conduct comparative analyses and reveal similarities or differences in SDG 17 performance

across national settings. In addition, alternative MCDM methods, including fuzzy logic-based methods, may be integrated into the evaluation process to better address uncertainty and to test the robustness of the findings under different methodological perspectives.

In conclusion, the findings underscore that while fiscal stability constitutes the backbone of SDG 17, its overall success is inherently tied to global stability, economic resilience, and collective action. The high performance observed in 2013 illustrates the benefits of stability and cooperation, whereas the low performance during 2019–2021 reflects the profound challenges posed by global crises. Thus, systematically measuring and evaluating SDG 17 performance is a strategic necessity for advancing sustainable development.

Author statement

Declaration of research and publication ethics

This study has been prepared in accordance with the ethical principles of scientific research and publication.

Approval of ethics board

Ethics committee approval is not required for this study.

Author contribution

The author is solely responsible for all parts of the study.

Conflict of interest

There is no conflict of interest between any organization or individual.

Declaration of support

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References

- Allen, C., Metternicht, G. and Wiedmann, T. (2018). Initial progress in implementing the Sustainable Development Goals (SDGs): A review of evidence from countries. *Sustainability science*, 13(5), 1453-1467. <https://doi.org/10.1007/s11625-018-0572-3>
- Almeida, A. C. (2019). Multi actor multi criteria analysis (MAMCA) as a tool to build indicators and localize sustainable development goal 11 in Brazilian municipalities. *Heliyon*, 5(8). <https://doi.org/10.1016/j.heliyon.2019.e02128>
- Biermann, F., Hickmann, T., Sénit, C. A., Beisheim, M., Bernstein, S., Chasek, P. and Wicke, B. (2022). Scientific evidence on the political impact of the Sustainable Development Goals. *Nature Sustainability*, 5(9), 795-800. <https://doi.org/10.1038/s41893-022-00909-5>
- Breu, T., Bergöö, M., Ebnetter, L., Pham-Truffert, M., Bieri, S., Messerli, P. and Bader, C. (2021). Where to begin? Defining national strategies for implementing the 2030 Agenda: the case of Switzerland. *Sustainability Science*, 16(1), 183-201. <https://doi.org/10.1007/s11625-020-00856-0>
- Büyüközkan, G., Karabulut, Y. and Mukul, E. (2018). A novel renewable energy selection model for United Nations' sustainable development goals. *Energy*, 165, 290-302. <https://doi.org/10.1016/j.energy.2018.08.215>
- Carlsen, L. and Bruggemann, R. (2022). The 17 United Nations' sustainable development goals: A status by 2020. *International Journal of Sustainable Development and World Ecology*, 29(3), 219-229. <https://doi.org/10.1080/13504509.2021.1948456>
- Cruz, S. A. (2023). SDG 17 and global partnership for sustainable development: unraveling the rhetoric of collaboration. *Frontiers in Environmental Science*, 11, 1155828. <https://doi.org/10.3389/fenvs.2023.1155828>
- Das, M. C., Sarkar, B., and Ray, S. (2012). Decision making under conflicting environment: a new MCDM method. *International Journal of Applied Decision Sciences*, 5(2), 142-162. <https://doi.org/10.1504/IJADS.2012.046505>
- Ecer, F. (2016). ARAS yöntemi kullanılarak kurumsal kaynak planlaması yazılımı seçimi. *Uluslararası Alanya İşletme Fakültesi Dergisi*, 8(1).

- Fonseca, L. M., Domingues, J. P. and Dima, A. M. (2020). Mapping the sustainable development goals relationships. *Sustainability*, 12(8), 3359. <https://doi.org/10.3390/su12083359>
- Gölbaşı, S. D. and Metintas, S. (2020). Dünya Sağlık Örgütü'nün covid-19 pandemisinde küresel sürveyans çalışmaları. *Eskişehir Türk Dünyası Uygulama ve Araştırma Merkezi Halk Sağlığı Dergisi*, 5(12), 184-213. <https://doi.org/10.35232/estudamhsd.778746>
- Hák, T., Janoušková, S. and Moldan, B. (2016). Sustainable Development Goals: A need for relevant indicators. *Ecological indicators*, 60, 565-573. <https://doi.org/10.1016/j.ecolind.2015.08.003>
- Halkos, G. and Gkampoura, E. C. (2021). Where do we stand on the 17 Sustainable Development Goals? An overview on progress. *Economic Analysis and Policy*, 70, 94-122. <https://doi.org/10.1016/j.eap.2021.02.001>
- Howarth, C., Bryant, P., Corner, A., Fankhauser, S., Gouldson, A., Whitmarsh, L. and Willis, R. (2020). Building a social mandate for climate action: Lessons from COVID-19. *Environmental and Resource Economics*, 76(4), 1107-1115. <https://doi.org/10.1007/s10640-020-00446-9>
- Jagadish, J., and Ray, A. (2014). Green cutting fluid selection using MOOSRA method. *International Journal of Research in Engineering and Technology*, 3(3), 559-563.
- Janko, W., and Bernroider, E. (2005). Multi-Criteria Decision Making: An Application Study of ELECTRE & TOPSIS. *Dalam Fuzzy Multi-Attribute Decision Making (MADM)*. Yogyakarta: Graha Ilmu, 1-36.
- Küresel Amaçlar Platformu (2025). *Amaçlar için Ortaklıklar (SDG17)*. Access, 12 March 2025, <https://www.kureselamaclar.org/amaclar/amaclar-icin-ortakliklar/>
- Madanchian, M., and Taherdoost, H. (2023). A comprehensive guide to the TOPSIS method for multi-criteria decision making. *Madanchian M, Taherdoost H. A comprehensive guide to the TOPSIS method for multi-criteria decision making. Sustainable Social Development*, 1(1), 2220. <https://doi.org/10.54517/ssd.v1i1.2220>
- Maltais, A., Weitz, N. and Persson, Å. (2018). SDG 17: Partnerships for the Goals. *A Review of Research Needs*.
- Ministry for EU Affairs of the Republic of Türkiye. (2013). *Autumn Forecast Report*. https://www.ab.gov.tr/files/EMPB/sonbahar_tahminler_raporu_2013.pdf
- Moyer, J. D. and Hedden, S. (2020). Are we on the right path to achieve the sustainable development goals? *World Development*, 127, 104749. <https://doi.org/10.1016/j.worlddev.2019.104749>
- Oliveira, A., Calili, R., Almeida, M. F. and Sousa, M. (2019). A systemic and contextual framework to define a country's 2030 agenda from a foresight perspective. *Sustainability*, 11(22), 6360. <https://doi.org/10.3390/su11226360>
- Opricovic, S., and Tzeng, G. H. (2004). Compromise solution by MCDM methods: A comparative analysis of VIKOR and TOPSIS. *European journal of operational research*, 156(2), 445-455. [https://doi.org/10.1016/S0377-2217\(03\)00020-1](https://doi.org/10.1016/S0377-2217(03)00020-1)
- Özcan, B. A. Çevre sorunlarının küreselleşmenin yapısal sorunları açısından bir değerlendirmesi. *Beykoz Akademi Dergisi*, 10(2), 408-436. <https://doi.org/10.14514/beykozad.1171914>
- Ozdemir, S. (2024). Unveiling environmental resilience: A data-driven multi-criteria decision-making approach. *Environmental Impact Assessment Review*, 108, 107607. <https://doi.org/10.1016/j.eiar.2024.107607>
- Perez-Gladish, B., Ferreira, F. A. and Zopounidis, C. (2021). MCDM/A studies for economic development, social cohesion and environmental sustainability: introduction. *International Journal of Sustainable Development and World Ecology*, 28(1), 1-3. <https://doi.org/10.1080/13504509.2020.1821257>
- Presidency of Strategy and Budget (SBB). (2021). *2021 Annual Program of the Presidency*. https://www.sbb.gov.tr/wpcontent/uploads/2022/07/2021_Yili_Cumhurbaskanligi_Yillik_Programi.pdf
- Presidency Strategy and Budget Department (2022). *Public Investment Programs*. Access, 18 May 2025, <https://www.sbb.gov.tr/kamu-yatirim-programlari/>
- Rashed, A. H. and Shah, A. (2021). The role of private sector in the implementation of sustainable development goals. *Environment, Development and Sustainability*, 23(3), 2931-2948. <https://doi.org/10.1007/s10668-020-00718-w>
- Resce, G. and Schiltz, F. (2021). Sustainable development in Europe: A multicriteria decision analysis. *Review of Income and Wealth*, 67(2), 509-529. <https://doi.org/10.1111/roiw.12475>

- Rombouts, S. J. and Zekić, N. (2020). Decent and sustainable work for the future?. *UCLA Journal of International Law and Foreign Affairs*, 24(2), 317-358. <https://www.jstor.org/stable/48609838>
- Shannon, C. E. (1948). A mathematical theory of communication. *The Bell System Sechnical Journal*, 27(3), 379-423. <https://doi.org/10.1002/j.1538-7305.1948.tb01338.x>
- Sorooshian, S. (2024). The Sustainable Development Goals of the United Nations: A Comparative Midterm Research Review. *Journal of Cleaner Production*, 453, 142272. <https://doi.org/10.1016/j.jclepro.2024.142272>
- Turkish Statistical Institute (2024). *Sustainable Development Indicators, 2010–2023*. Access, 16 April 2025, <https://data.tuik.gov.tr>
- Türkiye Cooperation and Coordination Agency (2021). *Türkiye Development Assistance Report 2021*. Access, <https://tika.gov.tr/wp-content/uploads/2023/01/TurkiyeKalkinma2021Web.pdf>, Ankara.
- United Nations (2022). *Sustainable Development Goals*. Access, 29 October 2025, <https://www.un.org/sustainabledevelopment/globalpartnerships/>
- World Bank. (2014). *Turkey Regular Economic Brief, 2014-I*. <https://documents.worldbank.org/en/publication/documentsreports/documentdetail/805291468180543908>
- Yazdani, M., Zarate, P., Kazimieras Zavadskas, E. and Turskis, Z. (2019). A combined compromise solution (CoCoSo) method for multi-criteria decision-making problems. *Management Decision*, 57(9), 2501-2519. <https://doi.org/10.1108/MD-05-2017-0458>
- Zavadskas, E. K., and Turskis, Z. (2011). Multiple criteria decision making (MCDM) methods in economics: an overview. *Technological and economic development of economy*, 17(2), 397-427. <https://doi.org/10.3846/20294913.2011.593291>
- Zavadskas, E. K., and Podvezko, V. (2016). Integrated determination of objective criteria weights in MCDM. *International Journal of Information Technology and Decision Making*, 15(02), 267-283. <https://doi.org/10.1142/S0219622016500036>