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COMPARISON OF THE PERFORMANCES OF OECD COUNTRIES IN THE PERSPECTIVE OF SOCIO-ECONOMIC GLOBAL INDICES: CRITIC-BASED CoCoSo METHOD

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Abstract
Today, it has become a necessity for countries to adapt to the globalized and changing world in all areas. Developed countries, in particular, have realized the need for change and have updated their management philosophies based on performance measurement and effective/efficient use of resources. Therefore, countries that want to keep up with change, like developed countries, should monitor their performance in various areas and place in the world using various indicators. Global indices are one of the most important indicators that allow countries to compare their performance with other countries and identify their global weaknesses/strengths in many areas. In this study, using the CRITIC-based CoCoSo method, the performances of OECD countries between 2015 and 2019 were compared within the context of socio-economic global indices. First, weights for indices were determined in the study using the CRITIC method. According to the CRITIC method's findings, the GINI index has the most weight for all years. Subsequently, the performances of OECD countries were compared in the context of the global indices with the CoCoSo method using the weights determined according to the CRITIC method. The analysis showed that the best-performing country between 2015 and 2019 was Denmark and the worst-performing country was Mexico.
Keywords: CRITIC, CoCoSo, Multi criteria decision making, OECD countries, Socio-economic global indices
JEL Codes: C44, O21, O57

SOSYO-EKONOMİK KÜRESEL ENDEKSLER PERSPEKTİFİNDE OECD ÜLKELERİNİN PERFORMANSLARININ KARŞILAŞTIRILMASI: CRITIC TABANLI CoCoSo METODU

Öz
Günümüzde her alanda küreselleşen ve değişen dünyaya uyum sağlamak ülkeler için de bir zorunluluk haline gelmiştir. Özellikle gelişmiş ülkeler, değişimin gerekliliğinin farkına varmışlar ve yönetim anlayışlarını performans ölçümü ve kaynakların etkin/verimli kullanımını temel alarak yenilemişlerdir. Dolayısıyla gelişmiş ülkelerin de yaptığı gibi değişime ayak uydurmak isteyen ülkeler çeşitli alanlardaki performanslarını ve dünya üstündeki yerlerini çeşitli göstergeler yardımıyla izlemelidir. Ülkelerin diğer ülkelerle performanslarını karşılaştırmaya ve birçok alanda global olarak zayıf/güçlü yönlerini görmeye yarayan önemli göstergelerden biri küresel endekslerdir. Bu çalışmada CRITIC tabanlı CoCoSo metodu kullanılarak 2015-2019 yılları arasında OECD ülkelerinin performansları sosyo-ekonomik küresel endeksler çerçevesinde karşılaştırılmıştır. Çalışmada öncelikle CRITIC yöntemi kullanılarak söz konusu endekslere ilişkin ağırlıklar elde edilmiştir. CRITIC metodu sonuçlarına göre tüm yıllar için en büyük ağırlığa sahip olan endeksin GINI endeksi olduğu bulunmuştur. Daha sonra, CRITIC metoduyla elde edilen ağırlıklar kullanılarak OECD ülkelerinin ele alınan küresel endeksler çerçevesinde performansları CoCoSo yöntemi ile karşılaştırılmıştır. Yapılan analizler sonucunda 2015-2019 yılları arasında performansı en iyi olan ülkenin Danimarka ve en düşük olan ülkenin ise Meksika olduğu belirlenmiştir.
Anahtar Kelimeler: CRITIC, CoCoSo, Çok kriterli karar verme, OECD ülkeleri, Sosyo-ekonomik küresel endeksler
JEL Kodları: C44, O21, O57

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Introduction

The famous scientist Charles Darwin said, "*The survivors are not the strongest of their kind, nor are they the most intelligent. They are the ones best able to adapt to change*". Parallel to this sentence that Darwin said about living beings, almost 100 years later, the Japanese organization theorist and management consultant Masaaki Imai developed the "*Kaizen*" philosophy, which is one of the cornerstones of Total Quality Management in companies (Imai, 2007). Derived from the words "*Kai*" meaning "*Change*" and "*Zen*" meaning "*Better*", the Japanese word "*Kaizen*" means "*Continuous Improvement*" (Álvarez-García, Durán-Sánchez & del Rio-Rama, 2018). As can be seen, both scientists emphasized the same thing, albeit for different areas and at different times, namely "*change*". Now, "*continuous improvement*" is necessary not only for living things or businesses trying to survive, but also for countries that need to keep up with the changing world.

Today, many problems arise in countries that cannot keep up with globalization and the changing world in all areas that stay out of developments and thus cannot renew themselves. Developed countries in particular have recognized the need for change and have designed their management approaches accordingly. Instead of the process/form-based classical management approach, they have chosen the New Public Management (NPM) approach, which meets and adapts to the demands of the times (Telsaç, 2019). Performance measurement and effective and efficient use of resources are the basic principles of the New Public Management approach, which is similar in many respects to Total Quality Management (TQM), where success is achieved with the Kaizen philosophy (Özmen, 2013; Telsaç, 2019). Therefore, in order to adapt to the new times and change, countries should strive to "*continuously improve*" their performance in each area, as emphasized in the NPM and "*Kaizen*" philosophy, by monitoring indicators in these areas.

Global indices are one of the most important indicators that allow countries to compare their performance with that of other countries in the world and to identify their global weaknesses and strengths in many areas. Global indices are calculated by converting data from countries or international organizations into a numerical value using common definitions, classifications, and methods (Türkiye Bilişim Derneği, 2013). Many global indices that track economic performance, such as production, investment, and consumption, as well as social and human performance, such as education, health, and culture, are calculated and published at regular intervals. One of the most important features of these indices is that they provide continuity and comparability over time (Türkiye Bilişim Derneği, 2013; Fırat, Yurtsever, İleri, & Kıvılcım, 2017). Therefore, countries can use global indices to compare their own performance in various areas with that of other countries. As a result, they can question their place on the global scale and focus on solving problems, creating a roadmap of actions and solutions for "*continuous improvement*".

There are many approaches to the problem of evaluating the performances of countries in different areas. In recent years, multi criteria decision making (MCDM) methods have been increasingly used, which belong to these approaches and seem to provide effective and consistent results for the problem at hand (Çakın & Ayçin, 2019). In this study, the performances of OECD countries were compared within the context of socio-economic global indices using the CRITIC-based CoCoSo method, which is a MCDM method. Six global indices, namely the GINI Index, the Human Development Index (HDI), the Ease of Doing Business Index (EDB), the Global Competitiveness Index (GCI), the Global Entrepreneurship Index (GEI), and the Environmental Performance Index (EPI), were discussed. First, the global indices discussed were weighted using the CRiteria Importance Through Inter-criteria Correlation (CRITIC) method, and then the performances of OECD countries based on these indices were compared with the Combined Compromise Solution (CoCoSo) method using these weights.

The study consists of five sections. In the first section, an introduction has been made on the importance of global indices and the comparison of countries' performances taking into account

these indices. The second section is the part that conveys the studies in the literature on the use of MCDM methods in the performance evaluation of countries in the context of global indices. In the third section, the data and methodology used in the study are explained in detail. The fourth section is the application section, and the performances of OECD countries are compared within the context of socio-economic global indices using the CRITIC-based CoCoSo method. In the last section of the study, the results of the application are given and the results are interpreted.

1. Literature Review

In the literature, many techniques such as structural equation modeling (Cracolici, Cuffaro, & Nijkamp, 2010), fuzzy logic (Phillis, Grigoroudis, & Kouikoglou, 2011), regression (Kaklauskas et al., 2020), analysis of variance (Djoundourian, 2012), multidimensional scaling (Uca & Yüncü, 2020), and document analysis (Bek, 2019) are used to evaluate the performances of countries in various domains. In addition, MCDM methods are among the approaches that provide effective and consistent results in performance evaluation and have been widely used in the literature, especially in recent years. In Table 1, studies in which different MCDM methods, indices/indicators, and country/country groups are discussed to evaluate the performances of countries in different fields are presented.

As shown in Table 1, many MCDM techniques have been used in the literature to evaluate country performance. One of these methods is the CoCoSo method. Since the CoCoSo method was added to the literature in 2019, it has been observed that it is used less compared to other MCDM techniques in the field.

Table 1: *MCDM Methods Used in Evaluating the Performances of Countries in Different Areas*

References	Methods	Indices/Indicators	Countries
Ecer et al., 2019	CoCoSo	Sustainability performance	OPEC
Altıntaş, 2021a	CoCoSo	Global knowledge index	G7
Stanujkic et al., 2020	Shannon entropy method, CoCoSo	Sustainable development goals	EU
Torkayesh et al., 2021	BWM, LBWA, CoCoSo	Healthcare performances	Eastern Europe
Şener, 2022	CRITIC, ENTROPY, ELECTRE III	Legatum prosperity index	Selected Countries
Urfalıoğlu & Genç, 2013	ELECTRE, PROMETHEE, TOPSIS	Macro-economic criteria	EU, Turkey
Şener & Bircan, 2021	ELECTRE III, TOPSIS	Ease of doing business index	Selected Countries
Antanasijevic et al., 2017	PROMETHEE, DMCA	Sustainable development	European
Battal & Akan, 2019	CRITIC, PROMETHEE-GAIA	Macroeconomic and logistic performance (GDP per capita, annual growth rate, unemployment rate, annual inflation rate, balance of payments, credit rating, global innovation index, global competitiveness index, R&D spending to GDP ratio, human development index, logistics performance index, emerging markets logistics index, global logistics directory, regular line freight connectivity index)	BRICS, Turkey
D'Adamo, Gastaldi & Rosa, 2021	AHP	Environmental and energetic indices	European
Paksoy, 2015	VIKOR	Human development index, global competitiveness index, corruption perception index, welfare index	EU members, EU candidate, Turkey
Karakış & Göktolga, 2016	AHP, VIKOR	Economic and social performance (Growth rate, gross domestic product per capita, unemployment rates, inflation rate, foreign direct investment, life expectancy at birth, logistics performance index, under-five mortality rate, mobile phone use, internet use)	Turkish Republics in Central Asia
Akandere, 2021	ENTROPY, TOPSIS	Logistics performance index, environmental performance index	BRI
Bakır & Çakır, 2021	CRITIC, EVAMIX	Global competitiveness index, global innovation index, european innovation scorecard	EU,OECD
Şahin & Yılmaz, 2022	CRITIC, GRA	Economic and epidemic performances (Deaths, number of tests, number of cases, vaccinated population, GDP per capita, health spending/GDP, unemployment rate, consumer price index, poor population rate, number of hospital beds, number of doctors, stringency index)	Selected Countries

Çakın & Ayçin, 2019	ENTROPY, GRA, MOORA	Environmental performance index	EU members, EU candidate
References	**Methods**	**Indices/Indicators**	**Countries**
Altin, 2020	CRITIC, ENTROPY, ARAS, MOOSRA	Macroeconomic performance (GDP growth rate, GDP per capita, FDI inflow, unemployment, inflation, public debt)	American Continent
Şahin & Öztel, 2017	COPRAS	Habitability levels (Gross domestic product, life expectancy, human development index, population, unemployment rate)	BRICS
Altıntaş, 2021b	CRITIC, WASPAS, COPRAS	Logistics performance index	EU
Altıntaş, 2021c	ENTROPY, ROV, ARAS, COPRAS	Environmental performance index	G20
Satıcı, 2021	CRITIC, WASPAS	Innovation performance (Human resources, research systems, digitalization, financing and supports, company investments, use of information technologies, innovation, connections, intellectual assets, employment impact, sales impact, environmental sustainability)	Selected Countries
Çınaroğlu, 2021	CRITIC, CODAS, ROV	Life quality (Purchasing power index, climate index, cost of living index, safety index, health care index, real estate prices/income ratio, pollution index, time spent in traffic index)	EU
Belke, 2020	CRITIC, MAIRCA	Macroeconomic performance (Real per capita gross domestic product, economic growth, investment rate, trade, current account balance, budget balance, public debt, unemployment rate, inflation rate)	G7
Aktaş, Ömürbek & Karaatlı, 2021	ENTROPY, CRITIC, EM	Internet usage (mobile and cable internet subscription rates)	OECD
Arsu & Ayçin, 2021	CRITIC, MARCOS	Economic, social and environmental aspects (GDP, unemployment rate, inflation rate, growth rate, social progress index, Gini, human development index, life satisfaction index, share of renewable energy in gross final energy consumption, CO_2 emission per capita, environmental performance index, ecological footprint)	OECD
Orakçı & Özdemir, 2017	CRITIC, ENTROPY, GRA, MOORA	Human development index, Europe quality of life survey	EU, Turkey
Orhan & Aytekin, 2020	CRITIC, MAUT, SAW	R&D performance (Patent applications by non-residents, patent applications by non-residents, trademark applications made by non-residents directly, trademark applications filed directly by non-residents, trademark applications filed by non-residents, trademark applications filed by residents, total trade mark trademark applications, number of researchers in R&D, research and development expenditures GDP ratio, high technology exports, advanced technology exports, ICT goods exports, number of articles in scientific and technical journals)	Turkey, Last Members of EU
Orhan & Mutlu, 2021	CRITIC, MABAC	Fighting performance against Covid-19 (Number of medical doctors, number of nurses, number of hospital beds, health expenditures, percentage of people aged 65 and over in the total population, population density, total number of Covid-19 cases, number of deaths due to Covid-19, number of active Covid-19 cases, number of recovered patients, total number of tests for Covid-19, population, mortality rate due to total Covid-19)	Selected Countries

Ecer et al. (2019) assessed 12 countries OPEC with the CoCoSo method using official real data on 41 sustainability indicators. According to the results, the United Arab Emirates is the most sustainable member country of OPEC with a score of 71.9%. It is followed by Qatar (69.3%), Kuwait (66.6%) and Iran (56.2%). Stanujkic et al. (2020) discussed 17 sustainable development goals and compared EU countries using the Shannon entropy method and the CoCoSo method. According to the results, Sweden is the country that best implements the goals of SD, while Romania is in last place. Altıntaş (2021a) assessed the information performance of the G7 countries based on the values of the components of the Global Knowledge Index (GKI) using the CoCoSo method. According to the results, the countries with above the average knowledge performance are the United States and the United Kingdom; the countries below the average are Japan, Canada, Germany, Italy and France. Torkayesh et al. (2021) evaluated the health care performance of Eastern European countries using 7 indicators. This study applied an integrated approach using BWM-LBWA-CoCoSo methods. As a result of the evaluation, it was emphasized that Lithuania and Slovenia have better health systems.

2. Data and Methodology

2.1. Data

The aim of this study is to compare the performances of OECD countries in terms of socio-economic global indices. For this purpose, data from 34 OECD member countries for the period 2015-2019 were used on the above indices. New Zealand was not included in the study due to missing data. The aforementioned data used in the study were obtained from OECD databases. In Table 2, the indices, abbreviations, data sources and decision qualities discussed in the study are given.

Table 2: *Indices, Abbreviations, Data Sources and Decision Qualities*

Indices	Abbreviations	Data sources	Decision qualities
GINI Index	GINI	OECD	Cost
Human Development Index	HDI	UNDP	Benefit
Ease of Doing Business Index	EDB	World Bank	Benefit
Global Competitiveness Index	GCI	WEForum	Benefit
Global Entrepreneurship Index	GEI	GEDI	Benefit
Environmental Performance Index	EPI	SEDAC	Benefit

The information on six indices indicating the socioeconomic status of the countries listed in table 2 is as follows:

GINI index (GINI): It is a measure of income inequality. The GINI index takes values between 0-100. 0 means complete equality in income distribution and 100 means complete inequality (Kozuharov, Petkovski, & Ristovska, 2015). Since it is desirable for the GINI coefficient to have low values, this index was considered cost criterion in the study.

Human Development Index (HDI): It is an index that measures human development by taking into account indicators related to education and health, as well as income. This index is calculated for each year and takes values in the range of 0-1. If the index value approaches 0, it is said that human development is low; if it approaches 1, it is said to be high human development (Trabold-Nübler, 1991). For this reason, since the index will be asked to take high values, HDI has been considered as a benefit criterion in this study.

Ease of Doing Business Index (EDB): It is an index that determines the quality of the investment environment in countries based on basic criteria and indicators that apply to the entire life cycle of companies in countries. This index is calculated annually and takes values between 0and 100.

Values close to 0 indicate that the ease of doing business in a country is low, and values close to 100 indicate that it is high (Srivastava, 2020). Since the index is supposed to take on high values, it was considered as a benefit criterion.

Global Competitiveness Index (GCI): It is an instrument that measures the competitiveness of countries from a microeconomic and macroeconomic perspective. While the scores of this index, which is calculated annually, ranged from 1–7 until 2010, it was updated to 0-100 in 2011 when the calculation method was changed (Zengin & Sağır, 2019). Values of the index close to 0 indicate a low level of competitiveness for the country, while values close to 100 indicate a high level of competitiveness. Since the index must assume high values, it is considered as benefit criterion.

Global Entrepreneurship Index (GEI): It is an index that determines the entrepreneurial performance of countries in the context of components and variables of entrepreneurship. This index, which is calculated annually, takes values between 0and 100. Values of the index close to 0 indicate that the country's entrepreneurial performance is low, and values close to 100 indicate that it is high (Szerb et al., 2018). Since the index will be required to take high values, this index has been considered as a benefit in the study.

Environmental Performance Index (EPI): EPI is an index that measures the environmental performance of countries based on environmental components. This index takes values between 0-100 (Akandere, 2021). Countries with an index value close to 0 have low environmental performance, while countries with a value close to 100 have high environmental performance. Since an index value close to 100 indicates better environmental performance, this index was as a benefit criterion in the study.

2.2. CRITIC Method

The CRITIC method developed by Diakoulaki, Mavrotas, & Papayannakis (1995) is used to determine the objective weights of the criteria of relative importance in the MCDM. In this method, the weighting of the criteria is not subjectively determined based on the judgement of a decision maker. In determining the weights, an objective approach is used that takes into account the standard deviations of the criteria and the correlation between the criteria (Mukhametzyanov, 2021). The process of the CRITIC consists mainly of the following four steps:

Step 1: Determination of the decision matrix

In the first step, the (mxn) dimensional decision matrix X, consisting of m alternatives and n criteria, is created as shown below.

$$X = [X_{ij}] = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix} \quad (1)$$

Here, x_{ij} (i=1,2, ... , m; j=1,2, ... , n) represents the value of alternative i for criterion j.

Step 2: Normalization

Since it does not make sense in decision problems to evaluate criteria with different units of measurement together, these values are converted to a common unit by normalization (Satıcı, 2021). In this step of the method CRITIC, the decision matrix X is normalized using equations (2) and (3) to convert the criteria values into a common unit. If it is a benefit criterion, equation (2) is used in normalization, and if it is a cost criterion, equation (3) is used.

$$r_{ij} = \frac{x_{ij} - \min(x_j)}{\max(x_j) - \min(x_j)} \qquad \text{i= 1,2, … ,m and j= 1,2, … , n} \quad (2)$$

$$r_{ij} = \frac{max\,(x_j) - x_{ij}}{\max(x_j) - \min(x_j)} \qquad \text{i= 1,2, … ,m and j= 1,2, … , n} \qquad (3)$$

Here, r_{ij}= normalized value of the value of the ith alternative for the jth criterion, x_{ij}= the value of the ith alternative for the jth criterion, $\min(x_j)$= the minimum value of the jth criterion for the alternatives, and $\max(x_j)$= maximum values of the jth criterion for the alternatives. At the end of this step, normalized decision matrix $R_{(mxn)}$ is obtained.

Step 3: Calculation of C_j values

In this step, the C_j values, which indicate the information content of each criterion in the decision problem, are calculated using equation (4) below.

$$C_j = \sigma_j \sum_{k=1}^{n} (1 - \rho_{jk}) \qquad \text{j= 1,2, … , n} \qquad (4)$$

As shown in equation (4), the standard deviation of the criteria and the correlation coefficient between the pairs of criteria are used to calculate the C_j values. Therefore, here σ_j denotes the standard deviation of the j criterion and ρ_{jk} the correlation coefficient between the j criterion and the k criterion. The normalized decision matrix R is used to calculate the standard deviation and correlation coefficients.

Step 4: Determination of the criteria weights

In the 4th and last step of the CRITIC method, the values of the criterion weights w_j are calculated according to equation (5):

$$w_j = \frac{C_j}{\sum_{k=1}^{n} C_k} \qquad \text{j= 1,2, … ,n} \qquad (5)$$

The criterion with the highest value among the w_j values resulting from the weighting according to equation (5) has the highest importance, that is, the most important criterion.

2.3. CoCoSo Method

The CoCoSo method is a new MCDM method developed by Yazdani (2019) in recent years. This method is an extension of the SAW (simple additive weight) and EWP (exponentially weighted product) methods and attempts to determine the relative importance of alternatives through a combination of different aggregation strategies (Dündar, 2021). The process of the CoCoSo method consists of five steps, which are given below:

Step 1: Determination of the decision matrix

In the first step of the CoCoSo method, the (mxn) dimensional decision matrix X is created. The general representation of X decision matrix is given below:

$$X = [X_{ij}] = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix} \qquad (6)$$

As can be seen from equation (6), the decision matrix X consists of m alternatives and n criteria. x_{ij}, (i=1,2, ... , m; j=1,2, ... , n) indicate the value of the ith alternative for the jth criterion.

Step 2: Normalization

In this step, the decision matrix X is normalized using equations (7) and (8) below to convert the criteria into a common unit.

$$r_{ij} = \frac{x_{ij} - \min(x_j)}{\max(x_j) - \min(x_j)} \qquad \text{i= 1,2, … ,m and j= 1,2, … , n} \qquad (7)$$

$$r_{ij} = \frac{max\,(x_j) - x_{ij}}{\max(x_j) - \min(x_j)} \qquad \text{i= 1,2, … ,m and j= 1,2, … , n} \qquad (8)$$

Equation (7) is used in the normalization of benefit criteria, and equation (8) is used in cost criteria. Equations (7) and (8) show that r_{ij}= the normalized value of the ith alternative for the jth criterion, x_{ij}= the value of the ith alternative for the jth criterion, $\min(x_j)$= the minimum value of the jth criterion for the alternatives, and $\max(x_j)$ = the maximum value of the jth criterion for the alternatives. As a result of the normalization process, normalized decision matrix $R_{(mxn)}$ is obtained.

Step 3: Calculation of the weighted comparability sequences

In the third step, the additive weights (S_i) and exponentially weighted sums (P_i) of the alternatives are calculated using equations (9) and (10), respectively.

$$S_i = \sum_{j=1}^{n} (w_j r_{ij}) \qquad \text{i= 1,2, … , m} \qquad (9)$$

$$P_i = \sum_{j=1}^{n} (r_{ij})^{w_j} \qquad \text{i= 1,2, … , m} \qquad (10)$$

Here, w_j indicates the weighting of the jth criterion and r_{ij} indicates the normalized value of the ith alternative for the jth criterion.

Step 4: Determine the relative importance of the alternatives

In this step, three different evaluation scores are calculated using the values S_i and P_i determined in step 3. The formulas for these three evaluation scores, using different aggregation strategies, are given below.

$$k_{ia} = \frac{P_i + S_i}{\sum_{i=1}^{m} (P_i + S_i)} \qquad (11)$$

$$k_{ib} = \frac{S_i}{\min S_i} + \frac{P_i}{\min P_i} \qquad (12)$$

$$k_{ic} = \frac{\lambda(S_i) + (1-\lambda)(P_i)}{(\lambda \max S_i + (1-\lambda) \max P_i)} \qquad 0 \leq \lambda \leq 1 \qquad (13)$$

Here S_i and P_i are the additive weights and exponentially weighted sums, respectively, of the alternatives calculated in the previous step. min S_i is the smallest value among the S_i values; min P_i is the smallest value among the P_i values; max S_i is the largest value among the S_i values; and max P_i is the largest value among the P_i values. λ is a value between 0 and 1 that the decision maker can determine. The effects of the S_i and P_i values can be modified by choosing different values in the range 0-1 for the λ value. However, this value is usually set at 0.5 (Yazdani et al., 2019).

Step 5: Ranking of alternatives

In the final step of the method, using the three different evaluation scores obtained in step 4, the final evaluation scores (k_i values) of the alternatives are calculated using the formula given below.

$$k_i = (k_{ia} k_{ib} k_{ic})^{\frac{1}{3}} + \frac{1}{3}(k_{ia} + k_{ib} + k_{ic}) \qquad (14)$$

After determining the k_i final evaluation scores using equation (14), these values are ordered from largest to smallest. Thus, the alternatives are ranked from best (largest k_i value) to worst (smallest k_i value).

3. Empirical Results

In this study, six socio-economic global indices (GINI, HDI, EDB, GCI, GEI, and EPI) were weighted using the CRITIC method. Then, using these weights, the performances of OECD

countries were compared using the CoCoSo method within the framework of the mentioned indices. In this section, all steps for both methods are presented together for 2015 only. Table 3 shows the decision matrix created for 2015 for 35 countries and 6 indices.

Table 3: *Decision Matrix for 2015*

Countries	GINI	HDI	EDB	GCI	GEI	EPI
Australia	32,7	0,938	80,38389	73,6	77,6	82,4
Austria	27,7	0,915	78,81665	73,1	64,9	78,32
Belgium	26,1	0,922	72,42806	74,3	65,5	66,61
Canada	31,6	0,921	79,75597	75,9	81,5	73,14
Chile	45,6	0,842	71,17517	65,3	63,2	69,93
Czech Republic	25,1	0,891	76,10923	67	48,9	81,47
Denmark	25,8	0,933	84,50938	76,1	71,4	76,92
Estonia	32,3	0,877	80,53864	67,7	60,2	74,66
Finland	25,5	0,93	80,10477	77,9	65,7	75,72
France	32,7	0,895	76,14755	73,3	67,3	71,05
Germany	29,3	0,938	79,5005	79	67,4	80,47
Greece	36	0,877	66,92296	57,4	42	73,28
Hungary	27,7	0,842	71,06578	60,7	42,7	70,28
Iceland	24,8	0,934	78,97419	69	70,4	76,5
Ireland	30,1	0,935	79,79674	73	65,3	74,67
Israel	35,5	0,91	72,99577	73,1	59,9	65,78
Italy	33,7	0,882	71,68638	63,7	41,3	74,36
Japan	32	0,908	77,52941	78,1	49,5	72,35
Korea, Rep.	32,5	0,907	83,08952	71,3	54,1	63,79
Latvia	34,9	0,849	79,13397	63,6	54,5	64,05
Lithuania	35,7	0,862	78,99313	65	54,6	61,26
Luxembourg	28,9	0,906	69,15342	74,3	57,2	83,29
Mexico	44	0,766	71,64492	61,3	30,7	55,03
Netherlands	26,6	0,934	75,5221	78,6	66,5	77,75
Norway	25,7	0,947	81,83183	77,3	65,6	78,04
Poland	29,6	0,863	76,93009	64,1	47,4	69,53
Portugal	32,9	0,854	76,36078	64,6	50,8	75,8
Slovak Republic	24,1	0,85	74,84151	60,3	45,4	74,45
Slovenia	25,2	0,894	74,71274	61,1	53,1	76,43
Spain	33,7	0,895	75,92621	65,6	49,6	79,79
Sweden	26,1	0,938	81,63208	77,6	71,8	78,09
Switzerland	29,7	0,947	76,42844	82,3	68,6	87,67
Turkey	39,7	0,801	69,14468	62,4	54,6	54,91
United Kingdom	33,5	0,923	83,33719	77,6	72,7	77,35
United States	41,2	0,921	83,59247	80,1	85	67,52

For the other years (2016, 2017, 2018, and 2019) included in the study, only the outcome values are reported.

3.1. Determination of Index Weights with the CRITIC Method

In order to determine the weights by using the CRITIC method, firstly, the decision matrix given in Table 3 was normalized in order to convert the criteria values to the common unit. The decision characteristics of the indices listed in Table 2 were considered in the construction of the normalized

decision matrix. Since the GINI index is cost criterion, equation (3) was used to normalize the GINI values, as shown in Table 2. Except for the GINI index, the other five indices (HDI, EDB, GCI, GEI, and EPI) are benefit indices. Therefore, equation (2) was used in the normalization of these five indices. The normalized decision matrix for 2015 is shown in Table 4.

Table 4: *Normalized Decision Matrix for 2015*

Countries	GINI	HDI	EDB	GCI	GEI	EPI
Australia	0,6000	0,9503	0,7654	0,6506	0,8637	0,8391
Austria	0,8326	0,8232	0,6763	0,6305	0,6298	0,7146
Belgium	0,9070	0,8619	0,3130	0,6787	0,6409	0,3571
Canada	0,6512	0,8564	0,7297	0,7430	0,9355	0,5565
Chile	0,0000	0,4199	0,2418	0,3173	0,5985	0,4585
Czech Republic	0,9535	0,6906	0,5224	0,3855	0,3352	0,8107
Denmark	0,9209	0,9227	1,0000	0,7510	0,7495	0,6719
Estonia	0,6186	0,6133	0,7742	0,4137	0,5433	0,6029
Finland	0,9349	0,9061	0,7495	0,8233	0,6446	0,6352
France	0,6000	0,7127	0,5245	0,6386	0,6740	0,4927
Germany	0,7581	0,9503	0,7152	0,8675	0,6759	0,7802
Greece	0,4465	0,6133	0,0000	0,0000	0,2081	0,5607
Hungary	0,8326	0,4199	0,2356	0,1325	0,2210	0,4692
Iceland	0,9674	0,9282	0,6853	0,4659	0,7311	0,6590
Ireland	0,7209	0,9337	0,7320	0,6265	0,6372	0,6032
Israel	0,4698	0,7956	0,3453	0,6305	0,5378	0,3318
Italy	0,5535	0,6409	0,2709	0,2530	0,1952	0,5937
Japan	0,6326	0,7845	0,6031	0,8313	0,3462	0,5324
Korea, Rep.	0,6093	0,7790	0,9193	0,5582	0,4309	0,2711
Latvia	0,4977	0,4586	0,6943	0,2490	0,4383	0,2790
Lithuania	0,4605	0,5304	0,6863	0,3052	0,4401	0,1938
Luxembourg	0,7767	0,7735	0,1268	0,6787	0,4880	0,8663
Mexico	0,0744	0,0000	0,2685	0,1566	0,0000	0,0037
Netherlands	0,8837	0,9282	0,4890	0,8514	0,6593	0,6972
Norway	0,9256	1,0000	0,8477	0,7992	0,6427	0,7060
Poland	0,7442	0,5359	0,5690	0,2691	0,3076	0,4463
Portugal	0,5907	0,4862	0,5367	0,2892	0,3702	0,6377
Slovak Republic	1,0000	0,4641	0,4503	0,1165	0,2707	0,5965
Slovenia	0,9488	0,7072	0,4429	0,1486	0,4125	0,6569
Spain	0,5535	0,7127	0,5119	0,3293	0,3481	0,7595
Sweden	0,9070	0,9503	0,8364	0,8112	0,7569	0,7076
Switzerland	0,7395	1,0000	0,5405	1,0000	0,6980	1,0000
Turkey	0,2744	0,1934	0,1263	0,2008	0,4401	0,0000
United Kingdom	0,5628	0,8674	0,9333	0,8112	0,7735	0,6850
United States	0,2047	0,8564	0,9479	0,9116	1,0000	0,3849

After the normalized decision matrix is created, the C_j values, which indicate the information content of each criterion, are calculated using equation (4). However, in order to apply equation (4), the standard deviations of the criteria and the correlation coefficients between the pairs of criteria must first be determined. The normalized decision matrix is used to calculate the standard deviation

and correlation coefficients. The standard deviation values and correlation matrix obtained considering the normalized decision matrix for 2015 are shown in Table 5.

Table 5: *Standard Deviation Values and Correlation Matrix for 2015*

	GINI	**HDI**	**EDB**	**GCI**	**GEI**	**EPI**
GINI	1,0000	-0,5598	-0,2586	-0,2540	-0,1503	-0,5896
HDI	-0,5598	1,0000	0,5593	0,8012	0,7251	0,6828
EDB	-0,2586	0,5593	1,0000	0,5751	0,6159	0,2239
GCI	-0,2540	0,8012	0,5751	1,0000	0,7717	0,4255
GEI	-0,1503	0,7251	0,6159	0,7717	1,0000	0,3413
EPI	-0,5896	0,6828	0,2239	0,4255	0,3413	1,0000
Standard deviation	*0,2506*	*0,2326*	*0,2536*	*0,2749*	*0,2227*	*0,2235*

Using the standard deviation values and the correlation matrix in Table 5, the C_j values for each criterion were calculated according to equation (4). Table 6 shows the C_j values for 2015.

Table 6: *C_j Values for 2015*

	GINI	**HDI**	**EDB**	**GCI**	**GEI**	**EPI**	**Total**
C_j	1,7069	0,6493	0,8328	0,7368	0,6006	0,8751	5,4014

After calculating the C_j values, the weights of the indices were determined using equation (5). The weights for 2015 are shown in Table 7.

Table 7: *Weights of Indices for 2015*

	GINI	**HDI**	**EDB**	**GCI**	**GEI**	**EPI**	**Total**
w_j	0,3160	0,1202	0,1542	0,1364	0,1112	0,1620	1,0000

As shown in Table 7, the index with the highest weight for 2015 is the GINI index. In other words, the index that has a relatively strong impact on the performances of OECD countries on socio-economic indices is the GINI index. The GINI index is followed by EPI (0.1620), EDB (0.1542), GCI (0.1364), HDI (0.1202), and GEI (0.1112). The steps of the CRITIC method, performed above for the year 2015, were applied to all years of the period 2016-2019, and the weights for the indices for the periods covered in the study were calculated. The results are presented in Table 8.

Table 8: *Weights for Indices for 2015-2019 Using the CRITIC Method*

Indices	**2015**	**Rank**	**2016**	**Rank**	**2017**	**Rank**	**2018**	**Rank**	**2019**	**Rank**
GINI	**0,3160**	**1**	**0,3004**	**1**	**0,3118**	**1**	**0,3118**	**1**	**0,3368**	**1**
HDI	0,1202	5	0,1264	5	0,1222	5	**0,1238**	**6**	**0,1192**	**6**
EDB	0,1542	3	0,1494	3	0,1589	2	0,1573	2	0,1537	2
GCI	0,1364	4	0,1433	4	0,1328	4	0,1311	4	0,1302	4
GEI	**0,1112**	**6**	**0,1050**	**6**	**0,1206**	**6**	0,1260	5	0,1201	5
EPI	0,1620	2	0,1755	2	0,1538	3	0,1499	3	0,1401	3

According to Table 8, it is seen that the criterion with the highest weight for the years 2015-2019 is the GINI index for all years. In other words, the GINI index affects the performances of OECD countries on socio-economic indices relatively more than other indices for all years covered in the study. When the weights in Table 8 are examined, it is seen that the index with the lowest weight is GEI for 2015, 2016 and 2017, and HDI for 2018 and 2019.

3.2. Comparison of OECD Countries in the Context of the Socio-Economic Global Indices Using the CoCoSo Method

In this section, the performances of OECD countries are compared with the CoCoSo method in the context of socio-economic global indices by using the weights obtained with the CRITIC method. As with the CRITIC method, the application steps of the CoCoSo method are only presented in detail for the year 2015, the results for the other years are reported at the end of the chapter.

The first step of the CoCoSo method is to determinate the decision matrix. The decision matrix for 2015 is shown in Table 3. As in the CRITIC method, the decision matrix is normalized in the second step of this method. The recommended normalization procedure for the CoCoSo and CRITIC methods is the same. Therefore, the normalized decision matrix to be used in the CoCoSo method for 2015 is the same as the normalized decision matrix used in the CRITIC method in Section 2.2 and given in Table 4. After obtaining the normalized matrix, the additive weights (S_i) and the exponentially weighted sums (P_i) of the alternatives were calculated using equations (9) and (10), respectively. The w_j values in equation (9) and (10), which indicate the criterion weights, are the weighting values for the indices resulting from the application of the CRITIC method. The weights for 2015 can be found in Table 7 in the previous section. Taking these weights into account, the calculated S_i and P_i values for 2015 are shown in Table 9 and Table 10, respectively.

Table 9: *Additive Weights (S_i) for 2015*

Countries	GINI	HDI	EDB	GCI	GEI	EPI	S_i
Australia	0,1896	0,1142	0,1180	0,0887	0,0960	0,1359	0,7426
Austria	0,2631	0,0989	0,1043	0,0860	0,0700	0,1158	0,7381
Belgium	0,2866	0,1036	0,0483	0,0926	0,0713	0,0579	0,6602
Canada	0,2058	0,1029	0,1125	0,1013	0,1040	0,0901	0,7167
Chile	0,0000	0,0505	0,0373	0,0433	0,0666	0,0743	0,2719
Czech Republic	0,3013	0,0830	0,0805	0,0526	0,0373	0,1313	0,6861
Denmark	0,2910	0,1109	0,1542	0,1024	0,0833	0,1088	0,8507
Estonia	0,1955	0,0737	0,1194	0,0564	0,0604	0,0977	0,6031
Finland	0,2954	0,1089	0,1156	0,1123	0,0717	0,1029	0,8068
France	0,1896	0,0857	0,0809	0,0871	0,0750	0,0798	0,5980
Germany	0,2396	0,1142	0,1103	0,1183	0,0752	0,1264	0,7840
Greece	0,1411	0,0737	0,0000	0,0000	0,0231	0,0908	0,3288
Hungary	0,2631	0,0505	0,0363	0,0181	0,0246	0,0760	0,4685
Iceland	0,3057	0,1116	0,1057	0,0635	0,0813	0,1068	0,7746
Ireland	0,2278	0,1122	0,1129	0,0855	0,0709	0,0977	0,7070
Israel	0,1484	0,0956	0,0532	0,0860	0,0598	0,0538	0,4969
Italy	0,1749	0,0770	0,0418	0,0345	0,0217	0,0962	0,4461
Japan	0,1999	0,0943	0,0930	0,1134	0,0385	0,0862	0,6253
Korea, Rep.	0,1925	0,0936	0,1418	0,0761	0,0479	0,0439	0,5959
Latvia	0,1573	0,0551	0,1071	0,0340	0,0487	0,0452	0,4474
Lithuania	0,1455	0,0638	0,1058	0,0416	0,0489	0,0314	0,4371
Luxembourg	0,2455	0,0930	0,0196	0,0926	0,0543	0,1403	0,6452
Mexico	0,0235	0,0000	0,0414	0,0214	0,0000	0,0006	0,0869
Netherlands	0,2793	0,1116	0,0754	0,1161	0,0733	0,1129	0,7686
Norway	0,2925	0,1202	0,1307	0,1090	0,0715	0,1144	0,8383
Poland	0,2352	0,0644	0,0877	0,0367	0,0342	0,0723	0,5305
Portugal	0,1867	0,0584	0,0828	0,0394	0,0412	0,1033	0,5118
Slovak Republic	0,3160	0,0558	0,0694	0,0159	0,0301	0,0966	0,5838
Slovenia	0,2998	0,0850	0,0683	0,0203	0,0459	0,1064	0,6257
Spain	0,1749	0,0857	0,0789	0,0449	0,0387	0,1230	0,5462
Sweden	0,2866	0,1142	0,1290	0,1107	0,0842	0,1146	0,8392
Switzerland	0,2337	0,1202	0,0833	0,1364	0,0776	0,1620	0,8133
Turkey	0,0867	0,0232	0,0195	0,0274	0,0489	0,0000	0,2058
United Kingdom	0,1778	0,1043	0,1439	0,1107	0,0860	0,1110	0,7337
United States	0,0647	0,1029	0,1462	0,1243	0,1112	0,0624	0,6117

Table 10: *Exponentially Weighted Totals (P_i) for 2015*

Countries	GINI	HDI	EDB	GCI	GEI	EPI	P_i
Australia	0,8509	0,9939	0,9596	0,9431	0,9838	0,9720	5,7033
Austria	0,9437	0,9769	0,9415	0,9390	0,9499	0,9470	5,6980
Belgium	0,9696	0,9823	0,8360	0,9485	0,9517	0,8464	5,5345
Canada	0,8732	0,9815	0,9526	0,9603	0,9926	0,9094	5,6696
Chile	0,0000	0,9010	0,8034	0,8551	0,9445	0,8813	4,3852
Czech Republic	0,9851	0,9565	0,9047	0,8781	0,8855	0,9666	5,5765
Denmark	0,9743	0,9904	1,0000	0,9617	0,9684	0,9376	5,8324
Estonia	0,8592	0,9429	0,9613	0,8866	0,9344	0,9213	5,5057
Finland	0,9789	0,9882	0,9565	0,9738	0,9523	0,9291	5,7790
France	0,8509	0,9601	0,9053	0,9407	0,9571	0,8917	5,5057
Germany	0,9162	0,9939	0,9496	0,9808	0,9574	0,9606	5,7585
Greece	0,7751	0,9429	0,0000	0,0000	0,8398	0,9105	3,4684
Hungary	0,9437	0,9010	0,8002	0,7591	0,8455	0,8846	5,1340
Iceland	0,9896	0,9911	0,9434	0,9011	0,9658	0,9347	5,7256
Ireland	0,9018	0,9918	0,9530	0,9382	0,9511	0,9214	5,6573
Israel	0,7876	0,9729	0,8488	0,9390	0,9333	0,8363	5,3180
Italy	0,8295	0,9479	0,8176	0,8291	0,8339	0,9190	5,1770
Japan	0,8653	0,9713	0,9250	0,9751	0,8887	0,9029	5,5283
Korea, Rep.	0,8551	0,9704	0,9871	0,9236	0,9106	0,8094	5,4562
Latvia	0,8021	0,9105	0,9453	0,8273	0,9124	0,8132	5,2108
Lithuania	0,7827	0,9266	0,9436	0,8506	0,9128	0,7666	5,1828
Luxembourg	0,9233	0,9696	0,7273	0,9485	0,9233	0,9770	5,4690
Mexico	0,4400	0,0000	0,8165	0,7766	0,0000	0,4030	2,4361
Netherlands	0,9617	0,9911	0,8955	0,9783	0,9547	0,9432	5,7246
Norway	0,9759	1,0000	0,9749	0,9699	0,9520	0,9452	5,8178
Poland	0,9109	0,9278	0,9167	0,8361	0,8771	0,8775	5,3460
Portugal	0,8467	0,9170	0,9085	0,8443	0,8954	0,9297	5,3416
Slovak Republic	1,0000	0,9119	0,8842	0,7458	0,8648	0,9197	5,3264
Slovenia	0,9835	0,9592	0,8820	0,7710	0,9062	0,9342	5,4362
Spain	0,8295	0,9601	0,9019	0,8594	0,8893	0,9564	5,3966
Sweden	0,9696	0,9939	0,9728	0,9719	0,9695	0,9455	5,8232
Switzerland	0,9091	1,0000	0,9095	1,0000	0,9608	1,0000	5,7793
Turkey	0,6646	0,8208	0,7269	0,8033	0,9128	0,0000	3,9283
United Kingdom	0,8339	0,9830	0,9894	0,9719	0,9718	0,9405	5,6906
United States	0,6057	0,9815	0,9918	0,9875	1,0000	0,8567	5,4232

Three different evaluation scores (k_{ia}, k_{ib}, and k_{ic}) were calculated using the values for S_i and P_i given in Table 9 and Table 10. Equations (11), (12), and (13) were used to calculate the k_{ia}, k_{ib}, and k_{ic} evaluation scores, respectively. In calculating k_{ic}, the value of λ is assumed to be 0.5. Finally, using these three different evaluation scores, k_i values (the final evaluation scores) of the alternatives were calculated using equation (14). After the final evaluation scores were determined, these values were ordered from largest to smallest. The k_{ia}, k_{ib}, and k_{ic} evaluation scores and, k_i final evaluation scores, and country rankings for 2015 are shown in Table 11.

Table 11: *k_{ia}, k_{ib} and k_{ic} Rating Scores, k_i Final Rating Scores and Country Rankings for 2015*

Countries	k_{ia}	k_{ib}	k_{ic}	k_i	Rank
Australia	0,0312	10,8887	0,9645	4,6506	9
Austria	0,0311	10,8353	0,9630	4,6304	10
Belgium	0,0299	9,8709	0,9269	4,2587	15
Canada	0,0309	10,5775	0,9556	4,5329	12
Chile	0,0225	4,9294	0,6968	2,3090	**33**
Czech Republic	0,0303	10,1861	0,9371	4,3789	14
Denmark	0,0323	12,1868	1,0000	5,1393	**1**
Estonia	0,0295	9,2018	0,9140	4,0104	20
Finland	0,0318	11,6589	0,9854	4,9405	5
France	0,0295	9,1436	0,9133	3,9890	21
Germany	0,0316	11,3876	0,9789	4,8392	6
Greece	0,0184	5,2084	0,5682	2,3103	32
Hungary	0,0271	7,5007	0,8383	3,3430	28
Iceland	0,0314	11,2659	0,9726	4,7909	7
Ireland	0,0308	10,4597	0,9523	4,4884	13
Israel	0,0281	7,9024	0,8701	3,5117	27
Italy	0,0272	7,2600	0,8414	3,2592	30
Japan	0,0297	9,4672	0,9208	4,1102	17
Korea, Rep.	0,0293	9,0990	0,9056	3,9670	22
Latvia	0,0274	7,2883	0,8466	3,2734	29
Lithuania	0,0272	7,1585	0,8409	3,2224	31
Luxembourg	0,0296	9,6713	0,9149	4,1780	16
Mexico	0,0122	2,0000	0,3775	1,0062	**35**
Netherlands	0,0314	11,1971	0,9716	4,7656	8
Norway	0,0322	12,0372	0,9959	5,0830	**3**
Poland	0,0284	8,3011	0,8793	3,6615	25
Portugal	0,0283	8,0833	0,8758	3,5809	26
Slovak Republic	0,0286	8,9067	0,8843	3,8814	23
Slovenia	0,0293	9,4337	0,9070	4,0872	18
Spain	0,0287	8,5020	0,8892	3,7411	24
Sweden	0,0322	12,0507	0,9969	5,0886	**2**
Switzerland	0,0319	11,7334	0,9864	4,9678	4
Turkey	0,0200	3,9811	0,6186	1,9064	**34**
United Kingdom	0,0311	10,7808	0,9613	4,6097	11
United States	0,0292	9,2669	0,9030	4,0247	19

When the performance rankings of the OECD countries in 2015 according to the socio-economic indices given in Table 11 are examined, it is seen that Denmark has the best performance within the framework of the indices discussed in the study. Sweden and Norway follow Denmark, respectively. Within the scope of the indices discussed, the three worst-performing countries for 2015 are Mexico, Turkey and Chile, respectively.

The steps of the CRITIC-based CoCoSo method performed above for 2015 were applied to all years of the 2016-2019 period. Performance rankings for these periods were determined in the perspective of socio-economic indices of OECD countries and the results are given in Table 12.

Table 12: *Performance Rankings of OECD Countries for 2015-2019*

Countries	2015	2016	2017	2018	2019
Australia	9	12	13	14	15
Austria	10	8	11	11	9
Belgium	15	16	14	13	13
Canada	12	13	12	12	10
Chile	**33**	**33**	**33**	**33**	**33**
Czech Republic	14	18	19	20	18
Denmark	**1**	**1**	**1**	**1**	**1**
Estonia	20	19	20	24	23
Finland	5	4	**3**	4	**3**
France	21	15	15	15	16
Germany	6	7	7	7	11
Greece	32	32	32	32	32
Hungary	28	30	31	31	27
Iceland	7	5	5	6	5
Ireland	13	9	9	10	12
Israel	27	29	25	25	26
Italy	30	31	30	29	29
Japan	17	21	18	17	17
Korea, Rep.	22	25	23	21	19
Latvia	29	27	29	30	31
Lithuania	31	28	28	28	30
Luxembourg	16	20	21	23	21
Mexico	**35**	**35**	**35**	**35**	**35**
Netherlands	8	10	8	8	6
Norway	**3**	**3**	4	5	4
Poland	25	24	26	26	25
Portugal	26	26	27	27	28
Slovak Republic	23	22	22	19	22
Slovenia	18	14	17	18	14
Spain	24	23	24	22	24
Sweden	**2**	**2**	**2**	**2**	**2**
Switzerland	4	6	6	**3**	7
Turkey	**34**	**34**	**34**	**34**	**34**
United Kingdom	11	11	10	9	8
United States	19	17	16	16	20

When the results obtained using the CRITIC-based CoCoSo method are examined, it is seen that Denmark is in the first place for all years between 2015-2019 within the framework of the socio-economic global indices discussed in the study. Similarly, Sweden is ranked 2nd in all years included in the study. Another finding that emerges from Table 12 is that Norway, which ranked 3rd in 2015 and 2016, experienced a decline in 2017. Norway ranked 4th in 2017 and 5th in 2018, with a further decline. In 2019, the last year covered by the study, Norway again ranked 4th. In parallel with this result, Finland in 2017, Switzerland in 2018 and Finland in 2019 were in third place, considering the indices used in the study. When Table 12 is examined, it is seen that the countries in the last place are Mexico, Turkey and Chile, and the ranking of these countries has not changed according to the years covered in the study.

4. Conclusions

Today, in order to adapt to the globalized and changing world in all areas, countries should review their position in various fields and compare their performance with that of other countries. Thus, they should identify their weak and strong areas globally and develop new strategies based on this information. Global indices are one of the most important indicators of the global performance of countries in almost all areas.

There are many global indices that show both the economic performance and the social and human performance of countries and are calculated and published by internationally recognized institutions. Because of the continuity and comparability of the indices over time, countries can use global indices to compare their own performance with other countries in many areas. The mentioned comparison can be performed using many approaches and methods, one of which is the use of multi criteria decision making methods (MCDM).

In this study, the performances of OECD countries within the framework of socio-economic global indices were compared using the CRITIC-based CoCoSo method, an MCDM method. Six global indices (GINI, HDI, EDB, GCI, GEI and EPI) were included in the study, and these indices were first weighted using the CRITIC method.

The CRITIC method determines the amount of information contained in each criterion in the decision problem, and enables the determination of the objective weights of these criteria. When the results obtained with the CRITIC method shows that the GINI index has the greatest weight for all years. This result can be interpreted that the GINI index contains more information than other indices. The GINI index is considered as a cost criterion in the study. This is because it is desirable that the GINI index has low values. Therefore, based on this result, it can be said that the low GINI indices of OECD countries increase the performance of countries in terms of socio-economic indices. When the weights obtained by the CRITIC method are examined, it is seen that the lowest weighted indices are GEI for 2015, 2016 and 2017, and HDI for 2018 and 2019.

After the weights were determined with the CRITIC method, the performances of OECD countries within the framework of socio-economic global indices were compared with the CoCoSo method by using these weights. According to the results obtained using the CRITIC-based CoCoSo method, in terms of the global socio-economic indices discussed in the study, Denmark and Sweden are the two countries whose rankings have not changed over the period 2015-2019 and always performed best. Norway, Finland and Switzerland, on the other hand, alternately shared 3rd place in the aforementioned years. According to these results, when examining the data of the top three countries in the ranking, it is noticeable that the GINI indices of these countries are low. This is a result that is consistent with the result "Countries with low GINI index perform better on socio-economic indices" obtained using the CRITIC method. The three OECD countries with the lowest performance on the socio-economic indices covered in the study are Mexico, Turkey, and Chile. It is seen that the ranking of these countries has not changed as of the mentioned years. These three countries belong to fragile economies with an economic structure that is very sensitive to economic shocks, as well as to developing countries. Consequently, it is seen that the performance ranking determined under the indices discussed in the study is consistent with the socio-economic structures of the countries concerned.

In this study, the CRITIC method, which enables the objective determination of the criteria weights determined subjectively in many MCDM methods, was used and this method was integrated into the CoCoSo method, which is a newly introduced MCDM method. Therefore, this study is an example of the application of the CRITIC-based CoCoSo method, especially in performance evaluation problems. On the other hand, six global indices (GINI, HDI, EDB, GCI, GEI, and EPI) were addressed in the study, and the performance evaluation of OECD countries was made in the perspective of these indices. Today, many internationally accepted indices are calculated and

published for almost all countries. Therefore, in line with the structure of CRITIC and CoCoSo methods, the performances of different countries/country groups can be evaluated using different indices. In this way, countries' performance in different areas can be assessed both internally and jointly with other countries on a year-by-year basis, providing guidance to decision makers and researchers.

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