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Evaluation of Social Protection Performance in EU Countries: Multiple-criteria Decision Analysis (MCDA)

Ocena skuteczności ochrony socjalnej w krajach UE: Wielokryterialna analiza decyzji (MCDA)

Milan Marković*, Jelena J. Stanković, Panagiota Digkoglou***, Ivana Marjanović******

**University of Niš, Innovation Centre, Univerzitetski trg 2, 18000 Niš, Serbia*
E-mail (Corresponding Author): markovicmilan89@gmail.com,
ORCID ID: 0000-0002-9617-6697
***University of Niš, Faculty of Economics, Trg kralja Aleksa IMCSAdra Ujedinitelja 11, 18000 Niš, Serbia*
E-mail: jelena.stankovic@eknfak.ni.ac.rs, ORCID ID: 0000-0002-9875-9861
****University of Macedonia, Egnatia 156, Thessaloniki, Central Macedonia 546 36, Greece*
E-mail: gdigkoglou@uom.edu.gr, ORCID ID: 0000-0001-7101-5136
*****University of Niš, Faculty of Economics, Trg kralja Aleksandra Ujedinitelja 11, 18000 Niš, Serbia,*
E-mail: ivana.veselinovic@eknfak.ni.ac.rs, ORCID ID: 0000-0002-9526-0467

Abstract
The paper aims to rank European Union (EU) countries according to the composite index, which uses selected social protection indicators from the relevant database at EU level – Eurostat. The total score of social performance for 2020 was determined using the CRITIC-TOPSIS framework. The study showed that Austria, Luxembourg and Germany, respectively, had the best level of social protection, while Latvia, Romania and Spain were at the bottom, as the countries with the worst values of indicators. The importance of research is reflected in the fact that the social component of sustainable development is still not sufficiently researched, especially when it comes to the application of multi-criteria analysis methods in the empirical analysis of social sustainability. In this regard, depending on the obtained performance values, socio-economic policymakers can redesign existing measures and programs, as well as the amounts of social transfers to certain EU member states. The authors expect that the results of the study will help build higher social standards and well-being in the EU.

Key words: social sustainability, social protection, socio-economic indicators, poverty, unemployment, CRITIC-TOPSIS method, EU countries
Słowa kluczowe: zrównoważoność społeczna, ochrona socjalna, wskaźniki społeczno-ekonomiczne, ubóstwo,bezrobocie, metoda CRITIC-TOPSIS, kraje UE

Introduction
In general, sustainability is the maintenance of social well-being over time with constant efforts to increase it. Theorists, who deal with the concept of sustainability, mainly emphasize the need to harmonize economic growth and environmental protection in the conditions of upcoming climate change. However, it is a narrow interpretation of sustainable development because it means recognizing only the ecological problem.
In previous decades, the focus has been either on biophysical environmental issues or on trying to balance the economy with overall development (Vallance et al., 2011). Most research aimed to find a compromise between the economy and the problem of pollution, while social sustainability was often unjustifiably neglected. This

situation is explained by the fact that the social component was much later integrated into the concept of sustainability, and therefore both theoretical and empirical works are missing (Eizenberg & Jabareen, 2017; Kamali et al., 2018).

Social sustainability is one of the three basic and interrelated dimensions of the concept of sustainable development. Social sustainability has become especially important with the development of a knowledge-based economy that transforms the old industrial society into a society in which scientists and experts in new intellectual technology have a dominant role (Veselinović & Veljković, 2021). Unlike economic and environmental sustainability, the social component is the least researched (Popović et al., 2018). In the scientific community, there is no consensus regarding the concept and composition of the social pillar of sustainability. Indicators of poverty, unemployment, as well as social and health exclusion predominate.

The EU is one of the largest integrations of countries, having in mind economic, political and other indicators. The subject of the research is the assessment of the performance of social protection of EU countries by the TOPSIS method. The main goal of the research is to rank and compare countries based on performance scores. An additional goal is to form such a model that will include the most important relevant indicators of this multidimensional phenomenon. In addition to the above-mentioned multi-criteria decision-making (MCDM) method, the CRITIC method was chosen to determine the weight of the criteria (indicator or attribute). This approach is characterized by objectivity, because it eliminates the subjective assessments of individuals when determining weight coefficients. The authors selected 11 indicators of social protection based on the official Eurostat database (2022) entitled *Social protection performance monitor – Indicators*. This database is heterogeneous and contains a range of indicators, including indicators of poverty, social exclusion, indicators of unemployment, as well as health care.

The paper consists of several logically connected parts. After an introductory discussion of the subject of research and the relationship between social sustainability and sustainable development, the authors described in detail the applied methodology, performed the necessary analysis and discussed important results. Finally, in the conclusion, a summary review of the study is shown. In addition, recommendations for economic and social policymakers were presented, as well as directions for future research.

Theoretical background

In the literature, there is a lack of research on social sustainability, as opposed to economic and environmental sustainability (Sierra et al., 2018). Scientific studies mainly rely on some broader issues such as: social capital, social cohesion and social exclusion (Dempsey et al., 2011). However, with the emergence of the global economic and financial crisis (2007–2008), as well as the general social crisis due to the COVID-19 pandemic, there was a revival of interest in social sustainability.

The social pillar is one of the three basic pillars of sustainable development (besides economic and ecological). Modern society is full of risks, among which poverty and social exclusion stand out the most at the global level (Krstić, 2018). Under the influence of globalization, there is no doubt that conditions are being created for unstoppable development (Radulović & Kostić, 2020). However, at the same time, there is a deepening of poverty and other social problems in peripheral countries, i.e. underdeveloped countries and transition countries. On the other hand, social exclusion is manifested through the inability of individuals and groups to participate in various socio-economic activities such as education, production, health, political processes. All this shows that the link between poverty and social exclusion is mutual and unbreakable, and in the assessment of poverty, only one indicator is often used, which combines poverty risk and risk of social exclusion.

The basis of social sustainability is the quality of life of people, which is associated with various social performances such as poverty rate (especially children, unemployed, women and pensioners), unemployment (young and older people who have not yet exercised their right to a pension) and social protection of people who are employed in labour-intensive activities and temporary jobs. All these problems are closely related to economic factors, but also to the education of individuals. Stable economic growth and development minimizes social costs. Many studies have shown a positive link between socio-economic development and indicators of the social status of the population (Halaskova & Bednář, 2020). On the other hand, social cohesion provides a sufficient condition for economic prosperity. In fact, countries with low levels of social protection show limited economic development (Chugunov & Nasibova, 2021). The feedback between poverty and education is especially important, because people without income, as well as those with low social assistance, will not be able to educate their children, which opens space for early school leaving and social exclusion, which creates a vicious circle of poverty. It is further connected with the problems of malnutrition, as well as diseases due to the often inaccessible possibility of treatment and living in unhygienic conditions. Borgonovi et al. (2018) point out that the notion of social sustainability means increased availability of health care services to vulnerable categories of the population.

In addition, there is research that emphasizes the important role of social protection policy in preserving and adequately managing the environment (Asteria et al., 2018). There is evidence in the literature of the negative effects of poverty on the adoption of green technologies (e.g. lack of funds for the purchase of solar panels or adaptation of buildings to increase energy efficiency) which makes it difficult to implement the environmental

dimension of sustainable development (Crabtree, 2005). These examples show a high degree of connection between the economic, social and environmental dimensions of the concept of sustainability. Therefore, studying social sustainability requires a multidisciplinary approach. Partial observation of this phenomenon is the subject of constant criticism (Hale et al., 2019).

Social protection is a part of public policy that is influenced by macroeconomic policymakers. It is considered as one of the criteria of macroeconomic efficiency of the national economy. Also, social protection is aimed at reducing poverty, restoring work capacity and productivity, as well as compensating for the livelihood of people who are unable to earn due to old age or unfavourable social circumstances (Chugunov & Nasibova, 2021). Within the social approach, the following elements dominate: social inequality, justice and fairness. In this way, this policy provides assistance to marginalized groups and alleviates inequalities in income distribution, as well as access to essential medical services. The realization of social goals primarily depends on fiscal policy. Social policy measures require sustainable and adequate funding, while limited resources require good management of social protection policy at the macro level (Hagemejer, 2018).

The basic components of social protection in European countries are social spending and social security. Social spending at EU level ranges from 13.4% of GDP (Ireland) to 31% of GDP (France) (OECD, 2022), while social security contributions are 0.06% of GDP (Denmark) up to 16.8% of GDP (Slovenia) (OECD, 2022a). At the same time, higher levels of social spending are most often the result of rising poverty in the country. It is a potential source of social instability, which is certainly in conflict with the concept of sustainable development. Krstić (2018) emphasizes that the EU has especially recognized the problem of poverty and social exclusion and that it is seriously considering the social protection of vulnerable groups in the population. To achieve social sustainability, social policy, education policy, employment policy and health care policy are sectoral policies of the utmost importance. Ultimately, building sustainable societies must ensure a decent life for all people.

At EU level, The *European Pillar of Social Rights* aimed to bring social sustainability on a par with economic and environmental sustainability (Alexandris Polomarkakis, 2020). It is an initiative of the European Commission that was created in 2017 and whose goal was to establish a socially sustainable Union by respecting social rights, among which the most prominent are benefits to the unemployed. It should be pointed out that poverty is the main problem faced by socio-economic policymakers. Job loss, high housing costs, and early school leaving are key factors that can increase the risk of poverty. Therefore, unemployment and education are often used in studies as indicators of social sustainability (Torres et al., 2016).

In the coming period, it is estimated that the social pillar will become increasingly important because it is a vital factor for the life of the human population (Torkayesh et al., 2021). This statement stems from the fact that solving the accumulated social problems is the backbone of economic and development policies of many countries. Isolated data on the living standard of the population are not enough to draw conclusions about the quality of life of people because do not include non-economic factors. In addition, they do not provide useful (qualitative) information on the social status of the population. Therefore, it is extremely important to research and quantify social performance at the level of national economies, or more broadly, at the level of a group of countries within economic integration (for example). This is the practical significance of this research.

Materials and methods

In the scientific and professional literature, there is no consensus on the definition of social sustainability (Missimer et al., 2017). In fact, there is a wide range of factors due to different angles of observation and understanding of this concept. Social sustainability is a long-term concept applicable to a wide range of situations, where the criteria of sustainability largely depend on the context with one common feature (Haller et al., 2020). Regardless of the heterogeneity of the concept of social sustainability and social protection, in this paper we have opted for indicators of the widely used international database Eurostat (2022) that are directly related to the performance of social protection. All data are in relative numbers, i.e. percentages and refer to 2020, as the last available year. Italy is the only one excluded from the analysis of the EU countries, since there are no data for a number of indicators for 2020. As there were no data for 2020 for the indicator *Housing cost overburden rate* and the indicator *Self-reported unmet need for medical care* in the case of France and Malta, respectively, the values of the same from the last available year were taken. All indicators are linked to two leading socio-economic issues: poverty and unemployment. Indicators of social sustainability primarily include socio-economic attributes because other performance is difficult or impossible to measure. Eleven indicators were selected from the part of the mentioned database entitled *Social protection performance monitor – Indicators*, which (in the opinion of the author) is sufficient for the assessment and ranking of EU countries (Table 1). Out of a total of 24 indicators in this database, 11 were singled out that best represent the research problem. The authors were guided by the fact that the indicators come from different dimensions of social protection: poverty rate, unemployment, medical care, cost of living and education indicators.

Table 1. Description of indicators

Indicator/Criteria	Definition	Source
People at risk of poverty or social exclusion (in %)	This indicator includes all persons who are: at risk of poverty after social transfers, severely material deprived persons, as well as persons living in households with very low labour intensity.	Eurostat (2022)
At-risk-of-poverty rate (in %)	The at-risk-of-poverty rate refers to the percentage of the population who, after social transfers, have equalised disposable income below the at-risk-of-poverty threshold. This threshold is 60% of the national equalised disposable income. It is an indicator that identifies low incomes compared to others in the national economy.	Eurostat (2022)
Severe material deprivation rate (in %)	The rate of material deprivation is an indicator that indicates the inability of people to afford (pay) certain things that are desirable or necessary for an adequate or quality life.	Eurostat (2022)
People living in households with very low work intensity (in %)	This indicator includes people, under the age of 59 years, living in households where adult family members work less than 20% of their work potential during the past year.	Eurostat (2022)
Early leavers from education and training, age group 18–24 (in %)	Early leavers from education and training, age group 18-24 in relation to the population of the same age group. These are people who have not received appropriate education (ISCED 0, 1, 2 or 3c short) or have not completed the training.	Eurostat (2022)
Housing cost overburden rate (in %)	Percentage of the population whose total disposable household income is burdened by total housing costs of more than 40% at the household level.	Eurostat (2022)
Youth unemployment ratio (15–24) (in %)	It is a measure of youth unemployment (15 to 24 years) in the total population of the same age group (which includes the employed, the unemployed and the inactive young people)	Eurostat (2022)
Young people neither in employment nor in education and training (in %)	The indicator refers to young people who are unemployed or have not received any education or training.	Eurostat (2022)
At-risk of poverty rate of unemployment persons (in %)	This percentage includes unemployed persons (aged 18 year or over) who earn equivalent disposable income below the at-risk-of-poverty threshold. This threshold is defined within the description of the second indicator.	Eurostat (2022)
Long-term unemployment rate (in %)	It includes the long-term unemployed (12 months or more) aged 15–74 as a percentage of the active population (employed and unemployed) of the same age.	Eurostat (2022)
Self-reported unmet need for medical care (in %)	It is calculated in relation to the person's own assessments (over the age of 16) on whether the person needed an examination or treatment in the previous year, but did not have or did not ask for it due to financial reasons, waiting list or *too far to travel*.	Eurostat (2022)

After determining the data that will be used in the research, it is necessary to define the applied CRITIC-TOPSIS method. Diakoulaki et al. (1995) were the first to propose the CRITIC (CRiteria Importance Through Intercriteria Correlation) method for determining weighting coefficients in MCDM. This method is based on an objective approach to weighting the values of the criteria (Adalı & Işık, 2017; Mao & Li, 2022). The essence of this method is to use the standard deviation of the normalized values of the criteria and determine the correlation coefficients between all pairs of criteria (Stanković et al., 2021; Žižović et al., 2020). The CRITIC method consists of the following steps (Diakoulaki et al., 1995):

Step 1. Normalization of criterion values within the decision matrix:

a) for revenue indicators: $r_{ij}^{+} = \frac{\left(x_{ij} - x_{ij}^{min}\right)}{\left(x_{ij}^{max} - x_{ij}^{min}\right)}$ (1)

b) for cost indicators: $r_{ij}^{-} = \frac{\left(x_{ij}^{max} - x_{ij}\right)}{\left(x_{ij}^{max} - x_{ij}^{min}\right)}$ (2)

wherein $x_{ij}^{max} = max(i)x_j$ and $x_{ij}^{min} = min(i)x_j$, i = 1, 2, …, m, j = 1, 2, …, n.

Step 2. Calculation of the standard deviation σj for each vector r_j in the normalized decision matrix.

Step 3. Determination of a symmetric matrix with elements R_{ij} representing linear correlation coefficients between each pair of normalized criteria values.

Step 4. Calculating the measure of conflict between indicator j and other indicators:

$\sum_{j=1}^{n}\left(1 - R_{ij}\right)$ (3)

Step 5. Determining the quantity of the information C_j as a product of the standard deviation and the size of the conflict:

$C_j = \sigma_j \sum_{j=1}^{n}\left(1 - R_{ij}\right)$ (4)

Step 6. Obtaining the weight of the criteria as follows:

$w_j = \frac{C_j}{\sum_{j=1}^{n} C_j}$ (5)

The methods of multi-criteria analysis, in the decision-making process, aim to choose the best among different alternatives. Their application has been intensified due to the growing existence of multidimensional problems in modern society. Multi-criteria methods are particularly suitable in the study of sustainability since sustainability is a multidimensional concept (Benítez & Liern, 2021; Dalampira & Nastis, 2020; Neto & Cunha, 2020; Yi et al., 2019). The TOPSIS method is a technique of multi-criteria analysis developed by Hwang and Yoon (1981). It is a widely used method of multi-criteria analysis in scientific research, especially in the field of social sciences. The method is based on the concept of an ideal point, where the best (optimal) alternative is closest to a positive ideal solution and farthest from a negative ideal solution in the geometric sense (Chen et al, 2020; Marjanović & Marković, 2022; Vasilić et al., 2020). To compare alternatives, the TOPSIS method takes into account both the weighting coefficients of the criteria and the standardized values. It is characterized by clarity and easy interpretation. Yoon and Hwang in their work (1995) define the basic steps in calculating the proximity index using the TOPSIS method:

Step 1. The first step is to calculate a normalized decision matrix:

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}}, \text{ i = 1, 2, …, } m, j = 1, 2, \ldots, n \quad (6)$$

Step 2. After that, in the second step, it is necessary to form a normalized decision matrix with v_{ij} coefficients:

$$v_{ij} = r_{ij} * w_j \quad (7)$$

Step 3. In this phase, a positive ideal solution v_j^+ and a negative ideal solution v_j^- are determined:

$$v_j^+ = max(v_{ij}), i = 1, 2, \ldots, m \quad (8)$$

$$v_j^- = min(v_{ij}), i = 1, 2, \ldots, m \quad (9)$$

Step 4. This stage represents the core of the method because it calculates the distance between the alternative and both solutions reached in the third step:

$$S_i^+ = \sqrt{\sum_{j=1}^{n}(v_{ij} - v_j^+)^2}, i = 1, 2, \ldots, m \quad (10)$$

$$S_i^- = \sqrt{\sum_{j=1}^{n}(v_{ij} - v_j^-)^2}, i = 1, 2, \ldots, m \quad (11)$$

Step 5. The last step in the calculation is to determine the proximity index:

$$C_i = \frac{S_i^-}{S_i^+ + S_i^-}, i = 1, 2, \ldots, m \quad (12)$$

After these steps, the ranking of alternatives depending on the value of the proximity (composite) index remained.

Results and discussion

At the beginning of the analysis of the results of the applied research, Table 2 is shown. The table provides an overview of the minimum and maximum values of the selected variables, as well as the mean values and standard deviation of the indicators, taking into account the 26 countries included in the analysis. This is the initial step in any empirical research in order to obtain a systematic overview of the variables and values of the same.

Table 2. Descriptive statistics, authors' calculation

	N	Minimum	Maximum	Mean	Std. Deviation
People at risk of poverty or social exclusion	26	11,9	32,1	20,70	5,12
At-risk-of-poverty rate	26	9,5	23,8	16,18	3,91
Severe material deprivation rate	26	1,7	19,4	5,94	4,64
People living in households with very low work intensity	26	4,3	12,8	7,65	2,56
Early leavers from education and training, age group 18-24	26	2,2	16,0	8,47	3,39
Housing cost overburden rate	26	1,9	32,6	7,91	6,57
Youth unemployment ratio (15-24)	26	2,2	12,5	6,37	2,49
Young people neither in employment nor in education and training	26	5,7	18,7	12,29	3,45
At-risk of poverty rate of unemployment persons	26	35,4	62,9	48,51	7,12
Long-term unemployment rate	26	0,6	10,9	2,1	2,02
Self-reported unmet need for medical care	26	0,1	13,0	2,75	3,47

Table 3 shows the obtained weighting coefficients of the criteria. They were calculated using the CRITIC method. According to these data, the *Self-reported unmet need for medical care* will be of the greatest relative importance (0.1218), while the *Long-term unemployment rate*, with a weight value of 0.0634, will have the least importance in obtaining the value of the composite index.

Table 3. Criteria weights, authors' calculation

Criteria/Indicator	Weights
People at risk of poverty or social exclusion	0,0662
At-risk-of-poverty rate	0,0815
Severe material deprivation rate	0,0742
People living in households with very low work intensity	0,1155
Early leavers from education and training, age group 18-24	0,1025
Housing cost overburden rate	0,0722
Youth unemployment ratio (15-24)	0,1079
Young people neither in employment nor in education and training	0,0872
At-risk of poverty rate of unemployment persons	0,1075
Long-term unemployment rate	0,0634
Self-reported unmet need for medical care	0,1218

As the final result of the application of the TOPSIS method, Table 4 was created. It contains the ranking of countries depending on the value of the obtained composite index. Austria, Luxembourg and Germany, respectively, are the leading countries in terms of social performance at the EU level. It is important to point out that these countries are among the leading EU countries, bearing in mind the amount of social expenditures per inhabitant. At the other end, Latvia, Romania and Spain show the worst values of social protection indicators. The values of these indicators describe the success of EU countries in implementing economic and social policy measures.

Table 4. Composite index of the social protection performance, authors' calculation

Country	Composite index	Rank	Country	Composite index	Rank
Austria	0,5196	1	Ireland	0,2713	14
Luxembourg	0,5170	2	Denmark	0,2544	15
Germany	0,5035	3	Estonia	0,2519	16
Czechia	0,4706	4	Lithuania	0,2515	17
Netherlands	0,4209	5	Finland	0,2489	18
Malta	0,4005	6	Portugal	0,2480	19
Croatia	0,3902	7	Bulgaria	0,2240	20
Poland	0,3827	8	Greece	0,2162	21
Slovenia	0,3532	9	Belgium	0,2158	22
Cyprus	0,3344	10	France	0,2001	23
Slovakia	0,2906	11	Latvia	0,1984	24
Hungary	0,2890	12	Romania	0,1729	25
Sweden	0,2800	13	Spain	0,1631	26

A more detailed analysis of the obtained values of the index indicates that in addition to the mentioned countries, all the countries of the Visegrad Group (Czech Republic, Poland, Slovakia and Hungary) are highly ranked and they are in the first half of the table. There are also two island countries – Malta and Cyprus, as well as the Netherlands, Croatia and Slovenia, which are also showing good conditions for achieving social sustainability. It is obvious that in the first half of the table, the largest number of countries joined the EU in 2004. It is noticeable that the first three countries, along with the Netherlands, have high levels of GDP per capita, unlike the others that are at the top in terms of the value of social performance, but not in terms of economic development. For example, Croatia recorded favorable values of the indicator *Early leavers from education and training* and *Housing cost overburden rate*, which had a decisive impact on its final position in the table. In contrast, Belgium and France are among the countries with high GDP per capita that unexpectedly found themselves at the bottom of the list. Belgium is a country with a high level of *Long-term unemployment*, as well as a percentage of *People living in households with very low work intensity*.

On the other hand, at the bottom of the list are Latvia, Romania and Spain. According to Eurostat, these are the EU countries with the highest at-risk-of-poverty rates. In addition, Spain and Romania have an extremely high percentage of young people who drop out of school and training early (*Early leavers from education and training*). The best ranked countries among the analysed EU countries, Austria, Luxembourg and Germany, have the lowest values of the indicators *Young people neither in employment nor in education and training*, as well as *Self-reported unmet need for medical care*. Adequate performance of social sustainability and social protection provides a high level of life satisfaction that is present in these countries.

Conclusion

The aim of the paper was to use the integrated CRITIC-TOPSIS method to rank EU countries in order to establish the position of countries in achieving social sustainability, taking into account social protection indicators. Social

protection is a broad concept, so it is possible to include a large number of indicators in the analysis. However, the authors opted for social protection criteria based on the Eurostat database. The authors took care to present heterogeneous indicators: those that describe the degree of poverty (primarily young and unemployed as the most vulnerable groups), social exclusion, unemployment, education, housing costs, as well as indicator of access to health services.

The research showed that the best conditions for achieving social sustainability have three highly developed EU countries: Austria, Luxembourg and Germany. In addition to them, the countries of the Visegrad Group also have good conditions, having in mind the composite index of social protection. Particular attention needs to be paid to the worst-placed countries – Latvia, Romania and Spain, either through social transfers or other employment, training and social inclusion programs.

The right to work and a decent life are prerequisites for society to be able to achieve a high level of social performance and, ultimately, sustainability. Adequate and timely recognition of social problems is the key to social protection policy. Social protection measures must be aimed at solving the problem of material endangerment, but also social exclusion and reducing the risk of permanent unemployment. Without the coordination of social, economic and employment policies, as envisaged by the Lisbon Strategy, it is not possible to achieve the set goals at the level of the EU (Zeitlin & Vanhercke, 2014). The European Social Fund, which was established with the task of promoting social inclusion through sustainable and quality employment, also has a significant role (Von Jacobi et al, 2017), as well as the European Union Program for Employment and Social Innovation (Oudeniotis & Tsobanoglou, 2020). More specifically, the goal is to provide skills that will contribute to reducing marginalization, unemployment and poverty through training and the acquisition of new qualifications. Addressing these issues must result in increased life satisfaction and, ultimately, social sustainability and socio-economic welfare (Billan et al., 2020).

The study identifies relevant factors of social sustainability and ranks EU countries according to the level of social protection by applying an adequate methodological (multi-criteria) approach. Due to the obvious complexity, there is no single understanding of the social framework of sustainable development. The authors are aware of the fact that there are a large number of indicators that can be linked to social sustainability and that future studies may look at this problem differently, using a different database or set of indicators (criteria) in a multi-criteria or other model.

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