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Comparison of European Union Countries Based on Selected Indicators of Poverty and Social Exclusion

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Abstract: *The paper deals with the comparison of European Union countries. The aim of the paper is to evaluate these countries based on their ranking positions in terms of poverty and social exclusion in the year before the outbreak of the COVID-19 pandemic (year 2019) and after (year 2023). The countries are compared using three indicators – the percentage of the population severely socially and materially deprived, the percentage of the population living in households with very low work intensity and the percentage of the population unable to face unexpected financial expenses. The ranking of countries is based on the use of one of simple methods of multivariate comparison, namely the distance from a fictitious object method.*

1. INTRODUCTION

Poverty is understood as the inability to meet basic life needs (especially in the areas of nutrition, safe drinking water, clothing, housing, education, etc.).

The aim of the paper is to evaluate European Union countries based on their ranking positions in terms of poverty and social exclusion indicators in the year before the COVID-19 pandemic (2019) and after (2023).

We have established the hypothesis that the level of poverty and social exclusion in EU countries was worse in 2023 (post-COVID-19) compared to 2019 (pre-COVID-19).

European Union countries are compared using three indicators: severe material and social deprivation rate, people living in households with very low work intensity, and inability to face unexpected financial expenses. The ranking of countries is based on the use of one of the simple methods of multivariate comparison – the distance from a fictitious object method.

Basic indicators of poverty and social exclusion monitored according to Eurostat methodology include the following indicators (Vlačuha & Kubala, 2024, pp. 6-7):

- the at-risk-of-poverty or social exclusion rate,
- the at-risk-of-income-poverty rate,
- the severe material and social deprivation rate,
- the very low work intensity rate.

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The at-risk-of-poverty or social exclusion rate (AROPE) is the main indicator for monitoring the EU 2030 goal in the area of poverty and social exclusion. It represents the share of people at risk of poverty or social exclusion. Social exclusion means unequal access to basic societal resources (employment, education, housing, healthcare, social protection) and the inability to engage in normal relationships and activities that the majority of people in society participate in (economic, social, cultural, or political relations), which ensure integration into society. For an individual, this means that basic goods and services are not normally available to them, their basic life needs are not covered, and they are simultaneously excluded from the events and relationships that the majority of people in their surroundings are engaged in. This indicator consists of the at-risk-of-income-poverty rate, the severe material and social deprivation rate, and the very low work intensity rate.

The at-risk-of-poverty rate expresses the share of individuals in the total population whose equivalent disposable income is below the poverty risk threshold. The poverty risk threshold is set at 60% of the national median equivalent disposable income. According to the Statistical Office of the Slovak Republic (2023), the equivalent disposable income of households is the disposable income of the household divided by the household's equivalent size. For the calculation of the equivalent size of a household, the EU-SILC survey uses the so-called modified OECD scale, where each first adult household member is assigned a coefficient of 1, each additional member aged 14 years or older is assigned a coefficient of 0,5, and each person younger than 14 years is assigned a coefficient of 0,3.

The severe material and social deprivation rate expresses the proportion of the population experiencing an enforced lack of at least 7 out of 13 deprivation items (6 related to the individual and 7 related to the household).

The items of material and social deprivation at the household level are:
- ability to face unexpected expenses,
- ability to afford a one-week holiday away from home,
- ability to pay for arrears related to mortgages, rent, utility bills, instalment payments for purchases, and other loans,
- ability to afford meat, chicken, fish, or a vegetarian equivalent every other day,
- ability to maintain adequate heating at home,
- own a personal car,
- replace worn-out furniture.

The items of material and social deprivation at the individual level are:
- have an internet connection,
- replace worn-out clothing with new items,
- have two pairs of shoes in the right size (including a pair suitable for all weather conditions),
- spend a small amount of money on oneself each week,
- have regular leisure activities,
- meet with friends/family for a meal and drinks at least once a month.

People living in households with very low work intensity express the percentage of people aged 0-64 living in households where the adults (aged 18-64) worked less than 20% of their total work potential during the past year. The reference population was adjusted to exclude retirees and students.

The measurement of poverty and social exclusion in the EU is primarily carried out in the context of the Europe 2030 strategy. According to United Nations Special Rapporteur Olivier De Schutter, poverty reduction must be one of the main priorities of the European Commission's action plan for

implementing the European Pillar of Social Rights. He stated that poverty in the EU increasingly affects women and single-parent households.

According to De Schutter, the action plan for the implementation of the European Pillar of Social Rights should include three ambitious goals:

- A poverty reduction strategy for 2030, which should set an ambitious target of reducing the share of people at risk of poverty by 50%.
- A child guarantee covering five main areas: access to education, early childhood care, nutrition, housing, and healthcare. This would also include supporting families by providing a decent income, employment, and access to benefits.
- A new legally binding tool for minimum income systems to ensure that such schemes in the EU are adequate and that member states follow a common methodology.

Christa Schweng stated that even before COVID-19, one in five people in the EU was at risk of poverty and social exclusion, which she considers a failure of our developed European societies. One of the best ways to lift people out of poverty and prevent it is to build social and individual resilience (Hajnoš, 2021).

According to Crettaz (2015), indicators of material deprivation are especially useful in situations where other indicators, such as income poverty, may not fully reflect the living conditions of the population during economic crises. Material deprivation is an important complement to traditional poverty indicators, as it reacts more sensitively to economic cycles and changes in social policies. Research shows that material deprivation indicators are much more sensitive to economic cycles and unemployment than income poverty indicators, and therefore, they should be systematically used in analyses of working poverty.

Dudek (2019) states that the rate of severe material deprivation in the EU is influenced by factors such as median disposable income, unemployment, GDP per capita, and social protection expenditures. Using the GEE methodology, it was shown that the high disparities in deprivation rates between countries can be explained by differences in these factors, with countries like Scandinavia and Luxembourg showing low levels of deprivation, while Bulgaria has the highest values. The findings suggest that increasing incomes alone is not enough to reduce deprivation, and it is necessary to also improve the effectiveness of social protection.

Similar to Łuczak and Kalinowski (2020), who focus on the level of material deprivation in EU countries in 2016, they use the TOPSIS method to assess severe material and social deprivation in EU countries. According to the findings of the mentioned study, there are five main types of countries with different levels of material deprivation, with the older EU member states showing a lower level of deprivation compared to the new members. This approach can serve as a tool for analyzing changes in the level of material deprivation in different years and for comparing countries across various time periods.

Currently, the issues of poverty, inequality, and social exclusion are inextricably linked to global challenges such as inflation, the energy crisis, the pandemic, and the war. Halkos and Aslanidis (2023) highlight the complexity and interconnection of these phenomena, which negatively affect the ability to achieve sustainable development goals. While inequalities are decreasing between countries, internal disparities within countries are growing. The authors emphasize the need for a comprehensive approach to measuring poverty, including multidimensional indicators, as well as the creation of a unified poverty index.

Fabrizi et al. (2023) compare the standard indicator of material deprivation and the new indicator of material and social deprivation in the EU. They found that although these indicators identify partially overlapping groups of people, the new indicator also includes personal and social deprivation, which was not included in the original material deprivation indicator. While material deprivation focuses on household-level material deprivation, the new indicator takes into account both individual and social aspects.

2. METHODOLOGY

To rank European Union countries based on selected poverty and social exclusion indicators, one of the simple multi-dimensional comparison methods will be used. The goal of those methods is to replace the indicators on which the countries are to be ranked with a single quantitatively expressed integral indicator.

Two types of variables are distinguished: stimulants (where a positive growth of values is desirable) and destimulants (where a positive decrease in values is desirable). In our case, all three indicators are destimulants.

The method used for the analysis will be the distance from a fictitious object. In addition to this method, we are also familiar with the ranking method, the scoring method, and the standardized variable method.

The essence of the distance from a fictitious object method is the creation of a fictitious (optimal) object O_0, where all destimulants take the minimum value. The values of all indicators are first expressed in a normalized (standardized) form. For destimulants, we will use the formula (Pažitná & Labudová, 2007):

$$z_{ij} = \frac{\bar{x}_j - x_{ij}}{s_j} \tag{1}$$

where:

z_{ij} are normalized values of individual indicators,
$\bar{x}_j$ are average values of individual indicators,
x_{ij} are original values of individual indicators,
s_j are standard deviations of individual indicators.

Normalized variables have a mean of 0 and a standard deviation of 1.

For each country, the average distance from this fictitious object is calculated. The most commonly used is the Euclidean distance, the values of which serve as the integral indicator (Vojtková & Stankovičová, 2020):

$$d_i = \sqrt{\frac{1}{k}\sum_{j=1}^{k}\left(z_{ij} - z_{0j}\right)^2} \tag{2}$$

where:
d_i is the integral indicator,
k is the number of indicators,
z_{0j} is the fictitious object.

The closer a country is to the fictitious object, the smaller its distance is from it. The lowest achievable value of the integral indicator (0) would be reached by a country that has the best values in all

indicators. The final ranking of the countries will be determined by assigning rank 1 to the country with the smallest distance from the fictitious object, and rank 27 to the country with the largest distance.

In the literature, this method is also known as TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution). It is a multi-criteria decision-making method developed by Yoon and Hwang, which is frequently used at various decision-making levels. The fundamental principle of TOPSIS is to identify the best alternative based on its distance from the ideal solution (positive ideal) while also being as far as possible from the negative ideal. Alternatives are evaluated based on their similarity to the ideal solution – the closer an alternative is to the ideal, the higher it is ranked (Thakkar, 2021).

The method's procedure includes:
1. Determining criteria and their weights – each criterion is assigned importance based on its influence on the decision-making process.
2. Normalizing the values of the criteria – results are recalculated to a comparable scale.
3. Calculating the distances from the ideal and anti-ideal solutions – using geometric distances, the alternative closest to the ideal and furthest from the anti-ideal is identified.

TOPSIS provides an effective way of evaluating alternatives and allows decision-makers to select the one that best meets the established criteria.

One of the main advantages of TOPSIS is quick identification of the best alternative from the available options. The calculations are simple and easily understandable even for managers in practice.

The TOPSIS method is used in various fields. For example, Masca (2017) applied the TOPSIS method to evaluate the economic performance of European Union countries using six macroeconomic indicators for 2015. Bhutia and Phipon (2012) used the TOPSIS method for supplier selection, which is a key activity for effective supply chain management and represents a multi-criteria decision-making problem. Rahim et al. (2018) applied the TOPSIS method to support management decision-making in selecting the best employees, enabling managers to objectively, quickly, and efficiently assess employees based on established criteria.

3. RESULTS AND DISCUSSION

Data for the analysis of selected indicators of poverty and social exclusion in European Union countries were obtained from the website of Eurostat.

The following charts illustrate the values of the analyzed indicators in individual countries. In all three charts, the countries are arranged based on the values from 2023. The lowest and highest values for 2023 are highlighted, as well as the value for the EU 27.

Figure 1 provides data on the percentage of the population severely socially and materially deprived in the EU countries in 2019 and 2023. It is evident that in 2023, 11,0% of population in the EU 27 was at risk of poverty and social exclusion. The lowest percentage of people affected by this phenomenon was in the Czech Republic (4,3%) and the highest percentage was in Romania (28,4%). In most countries, a decrease of this indicator was recorded. Compared to year 2019, the largest decrease of this indicator was recorded in Lithuania by 37,57% and the largest increase was recorded in Sweden by 103,03%. In the EU 27, the value of this indicator decreased by 4,35%.

Figure 2 provides the percentage of people living in households with very low work intensity in the EU countries in 2019 and 2023. It is evident that in 2023, 8% of the population in the EU

27 lived in households with very low work intensity. The lowest share of people living in such households was recorded in Malta (3,6%) and the highest share was recorded in Belgium (10,5%). Compared to the year 2019, the largest decrease of this indicator was recorded in Luxembourg by 43,48% and the largest increase was recorded in Germany by 30,26%. In the EU 27, the value of this indicator remained unchanged.

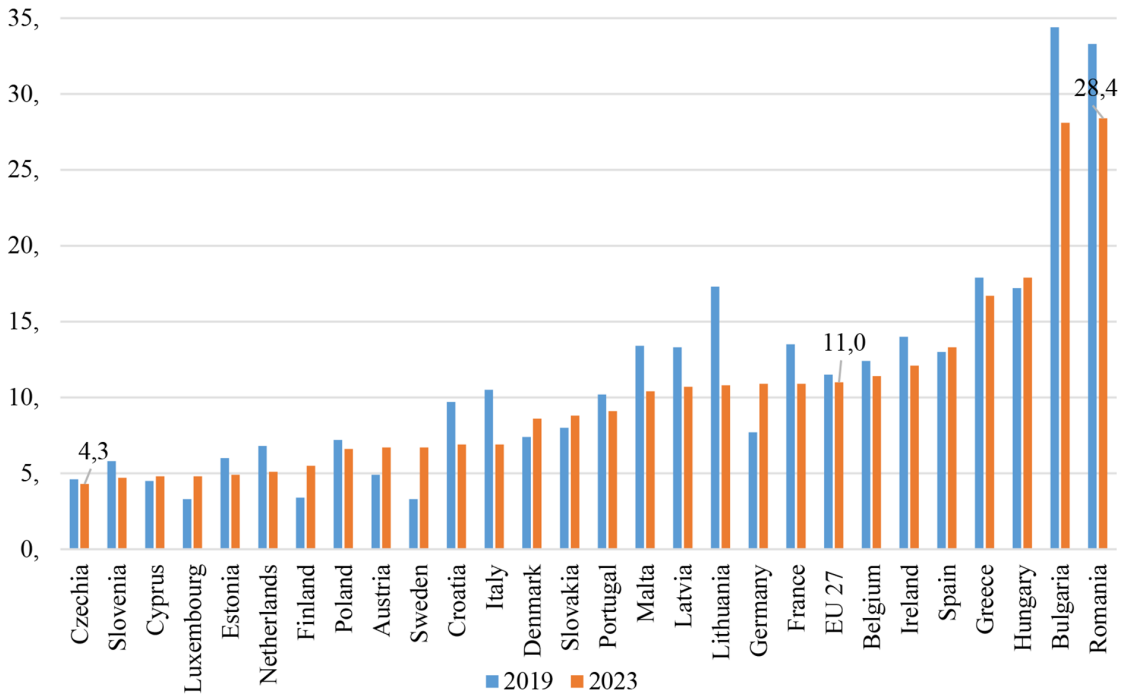

Figure 1. Severe material and social deprivation rates in European Union countries in 2019 and 2023

Source: Eurostat (2024); Own processing

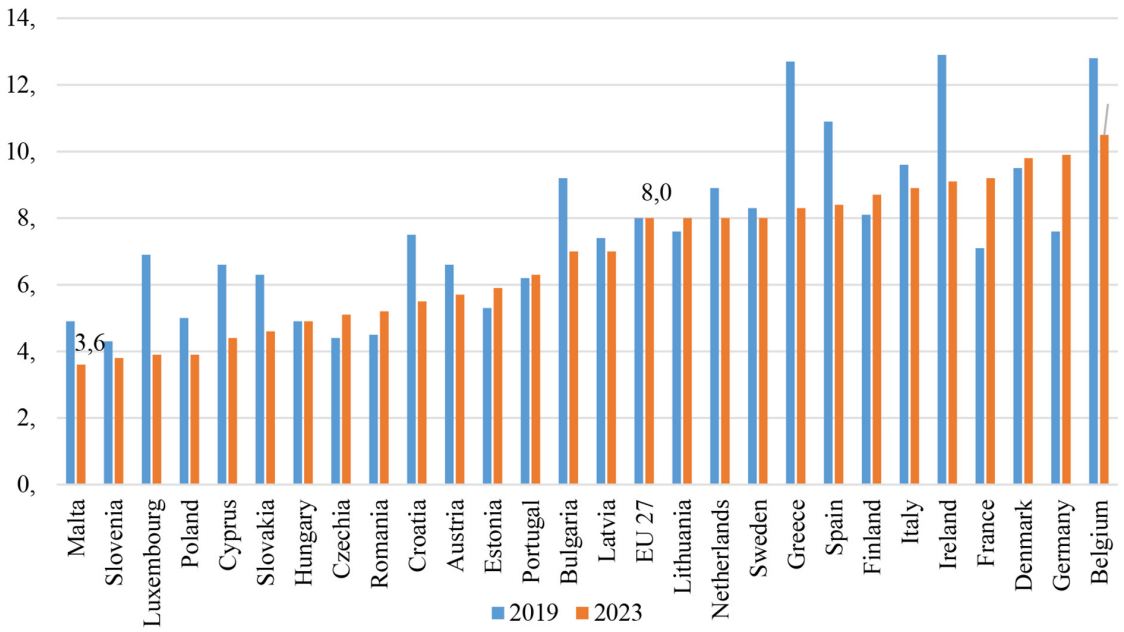

Figure 2. People living in households with very low work intensity in European Union countries in 2019 and 2023

Source: Eurostat (2024); Own processing

Figure 3 provides data on the percentage of individuals unable to cope with unexpected financial expenses across EU countries in 2019 and 2023. It is evident that in 2023, 31,2% of the population in the EU 27 faced this challenge. The lowest share of people unable to face unexpected financial expenses was recorded in Malta and the Netherlands (15,9%) and the highest share was in Bulgaria (46,7%). Compared to year 2019, the largest increase of this indicator was recorded in Luxembourg by 44,31% and the largest decrease was recorded in Slovenia by 31,21%. In the EU 27 was recorded increase of this share by 0,97%.

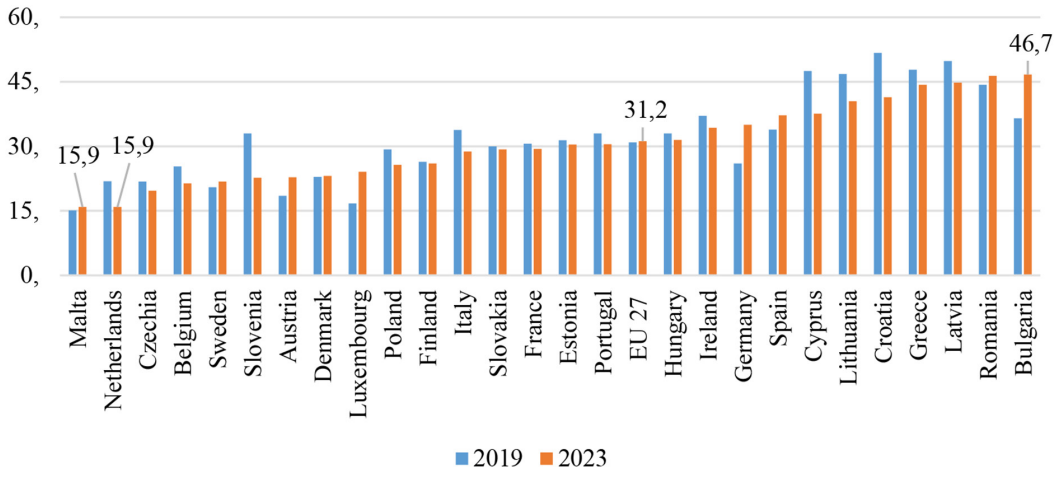

Figure 3. Inability to face unexpected financial expenses in European Union countries in 2019 and 2023

Source: Eurostat (2024); Own processing

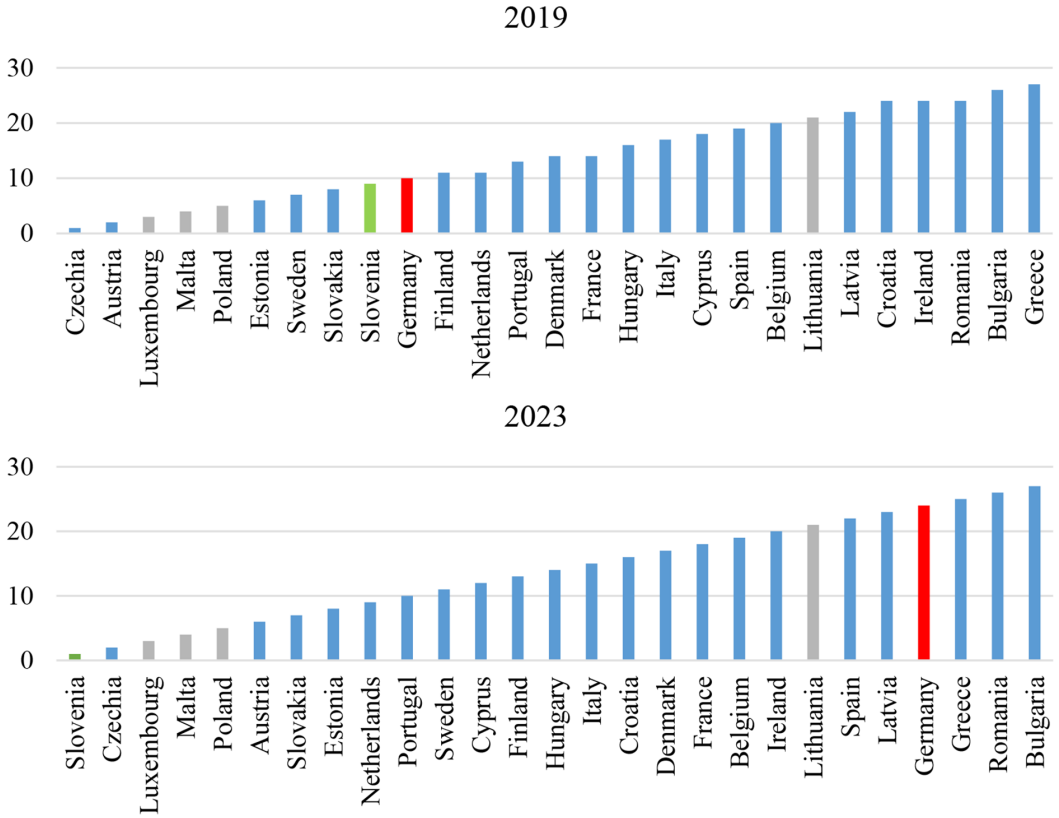

Figure 4. Countries' order using the distance from a fictitious object method in 2019 and 2023

Source: Own processing

Figure 4 presents the ranking of European Union countries based on the calculated values of the integral indicator for the years 2019 and 2023. In 2019, the top positions were occupied by the Czech Republic, Austria and Luxembourg, while the lowest-ranked countries were Greece, Bulgaria and Romania. By 2023, the leading position was held by Slovenia, followed by the Czech Republic and Luxembourg, with the bottom positions occupied by Bulgaria, Romania and Greece.

Table 1. Change in order in 2023 compared to 2019

Country	Change	Country	Change	Country	Change
Slovenia	-8	Belgium	-1	Romania	1
Croatia	-7	Slovakia	-1	Estonia	2
Cyprus	-6	Lithuania	0	Finland	2
Ireland	-4	Luxembourg	0	Denmark	3
Netherlands	-3	Malta	0	Spain	3
Portugal	-3	Poland	0	France	3
Greece	-2	Bulgaria	1	Austria	4
Italy	-2	Czechia	1	Sweden	4
Hungary	-2	Latvia	1	Germany	14

Source: Own processing

A comparison of the rankings (Table 1) revealed that the order remained unchanged for Luxembourg, Malta, Poland and Lithuania. Negative values in this table indicate an improvement in ranking, positive values indicate a decline. The largest decline in ranking was recorded in Germany, which dropped by 14 places, possibly indicating a worsening ability to address social and economic challenges. Conversely, Slovenia improved by 8 places, suggesting positive progress in addressing socio-economic issues.

4. FUTURE RESEARCH DIRECTIONS

Future research could focus on a more detailed analysis of the factors influencing changes in the rankings of countries, as well as an exploration of regional disparities within individual EU states. Another potential direction is to expand the evaluation by incorporating additional indicators.

5. CONCLUSION

The paper focused on comparing European Union countries based on three indicators related to poverty and social exclusion (the percentage of the population severely socially and materially deprived, the percentage of the population living in households with very low work intensity and the percentage of the population unable to face unexpected financial expenses) in the years 2019 and 2023.

The results of our analysis confirmed the hypothesis that the level of poverty and social exclusion in EU countries was worse in 2023 (post-COVID-19) compared to 2019 (pre-COVID-19).

When evaluating EU countries using the distance from a fictitious object method, which considers analyzed indicators, we observed significant changes in the ranking of European Union countries between 2019 and 2023. The most significant decline in ranking was observed in Germany, whereas Slovenia achieved the greatest improvement.

Findings in this paper highlight the differing dynamics of socio-economic conditions across EU countries, which may be the result of varying policies, economic stability, or responses to crises.

The results also emphasize the need to focus on identifying factors that contribute to the improvement or deterioration of indicators in individual countries and to encourage the exchange of best practices among member states.

This study was limited by the availability of data for European Union countries. The main contribution of the study is the ranking of European Union countries based on poverty and social exclusion indicators for the years 2019 and 2023, using the integral indicator calculated through the distance from a fictitious object method.

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