

## Economics and management

### Ekonomika ir vadyba

# ASSESSING THE PROGRESS OF EU COUNTRIES TOWARDS ACHIEVING THE SUSTAINABLE DEVELOPMENT GOALS

Valeriia YAKOVENKO  , Milena SERŽANTĖ  

Vilnius Gediminas Technical University, Vilnius, Lithuania

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**Abstract.** This study evaluates the extent to which European Union countries are meeting the Sustainable Development Goals (SDGs). It analyses a range of factors to measure the progress being made. The research pays attention to areas such as reducing poverty, promoting gender equality and examining labour markets. The AHP (Analytic Hierarchy Process) method was utilised to determine the importance of the indicators, while the COPRAS method was applied to evaluate and rank the countries according to the effectiveness of their sustainable development policies. The data indicated that Finland, Denmark, and Sweden are at the leading positions in implementing sustainable development, whereas Germany and Spain show less favourable results. The analysis also showed that the main factors impacting sustainable development are the risk of poverty, the gender unemployment gap and long-term unemployment.

**Keywords:** sustainable development, SDGs, poverty, gender inequality, unemployment, corruption, socio-economic indicators.

 Corresponding author. E-mail: [valeriia.yakovenko@stud.vilniustech.lt](mailto:valeriia.yakovenko@stud.vilniustech.lt)

## 1. Introduction

The European Union's Sustainable Development Policy is designed to integrate environmental, economic and social objectives across coherent and linked strategies. Launched in 2019, the European Green Deal is on track to meet the EU's climate goals. This agenda emphasises the advancement of renewable energy, the reduction of emissions, and the shift to a circular economy (Rocchi et al., 2022). The circular economy contributes to the environment by reducing waste, reusing resources and improving resource efficiency (Androniceanu et al., 2021). Meanwhile, it is seeking to integrate sustainable development into business practices. Businesses are now required to be aware of the impact their operations have on the community and the environment, as companies are legally obliged to be upfront about managing their environmental impact and complying with compliance regulations. Equitable aid and support for regions and sectors worst impacted by environmental challenges is also being sought by the EU. The Transitional Justice initiative is designed to alleviate adverse impacts on state employment and provide assistance to employees by offering access to new skills training (Tu et al., 2023).

By endorsing the 2030 Agenda for Sustainable Development, the European Union aimed to assist all EU Member States in reaching 17 pivotal United Nations goals,

referred to as the Sustainable Development Goals (SDGs). They centred on reducing poverty, delivering high-quality education, protecting the environment, improving resource efficiency and ways of production (Rocchi et al., 2022). The Sustainable Development Goals have been formulated following a consensus among governments, enterprises and civil society. The General Assembly of the United Nations has the mandate to develop and promote them through various dedicated institutions (Brodny & Tutak, 2023).

Despite a broad list of UN SDGs indicators, this study uses a limited but carefully selected set of indicators that reflect socio-economic aspects of sustainable development. These include: people at risk of poverty or social exclusion, the gender employment gap, the long-term unemployment rate, the corruption perception index and the income share of the bottom 40% of the population. All selected indicators refer to specific Sustainable Development Goals, including SDG 1, SDG 5, SDG 8, SDG 10, SDG 12 and SDG 16, which allow a comparable cross-country analysis.

Denmark, Germany, Spain, Lithuania, Austria, Sweden and Finland were selected for the analysis, which represent different models of sustainable development, levels of economic growth and regional features of the EU. This selection enhances the representativeness of the comparison and allows for the identification of differences in the progress of sustainable development between countries.

The analysis is based on Eurostat data for 2023, which ensures the relevance of the conclusions and enables for an assessment of the current level of progress in achieving the SDGs.

The study focuses on sustainable development at both the regional and national levels. Its main goal is to look at important signs of sustainable development in different countries to understand how they support the global strategy. The following tasks are necessary to accomplish the aim of the work:

- Review existing research to find key indicators that can be used for further analysis;
- Choose the best way to measure how well countries are making progress in sustainable development;
- Use these methods to evaluate the impact of sustainable development policies in various countries;
- Generalise the findings and reach scientifically valid conclusions.

The study uses multi-criteria analysis methods, specifically COPRAS (Complex Proportional Assessment based on Multicriteria Decision making method) and AHP (Analytic Hierarchy Process), to provide a thorough and fair comparison of results across different countries.

There are a limited number of studies in the scientific literature that use multi-criteria methods to comparatively assess the Sustainable Development of EU countries based on trusted data for 2023. Thus, this creates a research gap that this study seeks to fill.

## 2. System of indicators for assessing Sustainable Development Goals in the European Union countries

To evaluate sustainable development, it is essential to use indicators that cover not just economic factors but also social and institutional elements. A basic look at GDP or income levels alone is inadequate because it fails to show the full extent of social challenges and the unequal distribution of economic benefits. The indicators chosen are closely connected to the UN Sustainable Development Goals and address the most critical areas: fighting poverty, reducing inequality, creating good jobs, enhancing the quality of institutions, and increasing social inclusion. The study uses a limited set of indicators, as these are the ones for which comparable data are available for all selected countries for 2023. They also reflect the social and institutional areas of sustainability. The following sections provide an in-depth examination of selected measures.

In the study, we chose an indicator, namely the percentage of the population according to which the population is at risk of poverty. We were able to determine from this indicator that the biggest problem facing humanity is poverty. This indicator includes the percentage of people with income below the poverty line, as well as people with financial problems who cannot purchase basic necessities for themselves, in particular housing, healthcare, educa-

tion. A key indicator of the financial instability of the population is the cost of living (Eurostat, 2023e).

In order to form sustainable development in the country, it is necessary to eliminate poverty in all its manifestations (Rocchi et al., 2022). In order to achieve the goals of sustainable development, it is necessary to reduce structural inequality. In particular, it is necessary to reduce the level of inequality in society through the availability of basic services for all segments of the population.

The gender employment gap is the next indicator of the study. Inequality in society is due to the difference in employment between men and women, which allows us to conclude about the inequality of society and the economy in certain sectors. In particular, the additional burden of women with household and family affairs. The fact that gender roles are a factor affecting the equality of women and men in the field of employment has been proven by Baum et al. (2016), analysing his work, they concluded that the gender gap in employment is associated with the achievement of Sustainable Development Goal 5 and Sustainable Development Goal 8, which focuses on a decent workforce and economic growth. This indicator reflects economic stability and the level of public participation in the economy, therefore it plays a significant role in the study.

The level of long-term unemployment requires special attention. The problem for employers is the long-term unemployment status of persons wishing to obtain a position, in particular, employers believe that potential employees lose their qualifications due to long-term unemployment. This leads to long-term unemployment and the lack of a permanent income, and therefore to the destabilisation of everyday life (Obert et al., 2019). Then, as a result, state funds and social support programs have to increase the scale of their work and cover a larger part of the population, which leads to the destabilisation of the state's economy. The unemployment rate is linked to Sustainable Development Goal 8 as it provides an assessment of the quality of the labour market (Daunorienė et al., 2015).

The Corruption Perceptions Index represents the degree of corruption in the public sector. Corruption affects the economy, worsening indicators, increasing inequality among the population and reducing the level of trust in government. All this makes it impossible to achieve Sustainable Development Goal 16.8, complicating the activities of enterprises, paralysing investments and stimulating the misuse of public funds. The growth of corruption is caused by weak state systems, making it impossible to fight poverty and injustice (Yu & Huarng, 2024). The elements listed above are components of sustainable development and determine the quality of management of public resources.

By analysing the income share of the bottom 40% of the population, we can determine how equal a country's income is, in particular, how much money people in the bottom 40% earn, which allows us to determine how equitably economic growth is distributed across different

segments of the population. Sustainable Development Goal 10 is about reducing this inequality (Ziolo et al., 2021). Countries should be able to measure the share of income that goes to people with low incomes and determine the percentage of people who are in financial hardship. In addition to identifying inequality, the index also measures a country's ability to deliver economic outcomes that benefit everyone, not just a privileged few (Mombeuil & Diunugala, 2021). In the context of cross-country benchmarking, this indicator measures the effectiveness of economic policies and their adequacy across all segments of the population.

Using the above indicators, we were able to consider the sustainable development of countries from different perspectives. We received a detailed analysis of each selected country and understood the specifics of the impact of each indicator on the overall development of the state.

### 3. Methodological background

The analytical hierarchy process allows you to make a decision taking into account various factors, their importance and significance. The algorithm of actions involves: defining the goal, selecting criteria, developing a structure and obtaining an assessment of sustainable development achievements in the final result.

In the process of working with the framework, a pairwise comparison of indicators is carried out for each criterion. To carry out the comparison, a group of experts is formed, which includes specialists in the field of sustainable development, economics and social policy, their selection is carried out taking into account their professional experience, academic qualifications and independence, which increases the reliability and independence of the assessments. Experts assess the importance of each indicator compared to others using the Saati scale (Atanasova-Pachemska et al., 2014). The results are entered into a matrix, where each row and column illustrates one indicator. After filling in the matrix, we adjust the data by dividing the resulting numbers by the sum of its column. After that, the average of each row in the adjusted matrix is found, and this average shows the local weight or importance of each indicator (Eq. 1):

$$\omega = \frac{\sum_{j=1}^n a_{ij}}{n}, \quad (1)$$

where:  $\omega$  – the specific weight of the  $i$ -th criterion;  $a_{ij}$  – the element of the normalised matrix;  $n$  – number of criteria.

The AHP method includes a consistency check to ensure the reliability of the assessments. The consistency index (CI, Eq. 2) and consistency ratio (CR, Eq. 3) are calculated (Dehbi et al., 2022):

$$CI = \frac{\lambda_{\max} - n}{n - 1}, \quad (2)$$

where:  $\lambda_{\max}$  – the largest value of the matrix of pairwise comparisons;  $n$  – number of criteria.

$$CR = \frac{CI}{RI}, \quad (3)$$

where:  $RI$  – a random index depending on the number of criteria.

If the CR is less than or equal to 0.1, the matrix is considered consistent, and the analysis can proceed. In this calculations the CR value met the established criteria, confirming the consistency of expert assessment. The weights obtained are further used in the COPRAS method, which integrates the relevance of indicators into the final comparative analysis of countries.

The COPRAS method evaluates how well different options perform based on various criteria. It identifies the best choice by comparing it to both the best possible and the worst possible outcomes (Rezaei, 2015). In this method, a decision matrix is created where each row represents an option, such as the different EU countries in this case, and each column represents a selected sustainability indicator. The numbers in the matrix show how each option scores on each criterion. To make the comparisons fair, the matrix is normalised, which means adjusting the values so they are on the same scale.

The formulation of the normalisation formula for each value in the matrix is as follows (Eq. 4):

$$\hat{x}_{ij} = \frac{x_{ij}}{\sum_{i=1}^m x_{ij}}, \quad (4)$$

where:  $x_{ij}$  – the original value of the  $i$ -th alternative for the  $j$ -th criterion, the sum is taken over all other options.

After normalising the decision matrix to a standard scale, each adjusted value is then multiplied by the weight assigned to that specific criterion. The formula used to calculate the weighted normalised value is (Eq. 5):

$$\tilde{x}_{ij} = \hat{x}_{ij} \cdot w_j, \quad (5)$$

where  $w_j$  – the weight of the  $j$ -th criterion (Dehbi et al., 2022).

The COPRAS method separates criteria into two groups: those that should be maximised, called beneficial criteria, and those that should be minimised, called non-beneficial criteria. The overall usefulness for each option is calculated as follows.

For beneficial criteria (Eq. 6):

$$S_{+i} = \sum_{j=1}^n \tilde{x}_{+ij}, \quad (6)$$

For non-beneficial criteria (Eq. 7):

$$S_{-i} = \sum_{j=1}^n \tilde{x}_{-ij}, \quad (7)$$

The following formula then determines the relative importance of each alternative (Eq. 8) (Zavadskas et al., 2009):

$$Q_i = S_{+i} + \frac{\sum_{i=1}^m S_{-i}}{S_{-i} \cdot \sum_{i=1}^m \frac{S_{-min}}{S_{-i}}}, \quad (8)$$

where:  $S_{\min} = \min_i S_i$ ;  $Q_i$  represents the overall performance score of the  $i$ -th alternative.

Based on the calculated utility scores, the different options, which in this case are European Union countries, are arranged according to how well they meet sustainability goals. The country with the highest  $Q_i$  score comes first, showing it does the best job in reaching the sustainability targets based on the chosen indicators. On the other hand, the country with the lowest  $Q_i$  score is placed last (Thakkar, 2021).

## 4. Results of the research

For the practical implementation of the study, five indicators related to the sustainable development goals were chosen: Persons at risk of poverty or social exclusion (Eurostat, 2023e), Gender employment gap (Eurostat, 2023b), Long-term unemployment rate (Eurostat, 2023d), Corruption Perceptions Index (Eurostat, 2023a) and Income share of the bottom 40% of the population (Eurostat, 2023c). The data for these indicators were collected from official sources and are presented in percentages. The first approach used was the AHP method, as it is necessary to calculate the specific weight of each indicator before applying the next step of data normalisation. Each criterion was compared with the others to determine its relative importance compared to the others. Based on these comparisons, a matrix of pairwise comparisons was developed to show the relative importance of each criterion. To assess the relative validity of the indicators, the classic Saati scale from 1 to 9 (as well as reverse values from 1/9 to 1), was used. That ensures the correctness and comparability of the method with previous studies. The next step is to normalise this matrix and calculate the weights of the criteria (Table 1).

The ranges of values in the normalised matrix reflect the stability of expert assessments and were obtained based on all pairwise comparisons, rather than for individual countries, which increases the reliability of the results.

The Persons at risk of poverty indicator has one of the highest average values, which is 0.275. The values in this row show that this factor is consistently important,

with numbers ranging from 0.273 to 0.279, which shows it plays a major role compared to other factors. The average value for the gender gap in employment is 0.218, with the weights for this indicator ranging from 0.209 to 0.220, which shows it is consistently important compared to other factors, but not as important as some others. Long-term unemployment measure in the normalised matrix, its average value is 0.184, and the values in each row range from 0.183 to 0.186. This indicator determines the problems in the economy, which are caused by a high unemployment rate against the background of a long time. It is also important to note that the corruption index also affects the overall indicator of the country's success in the economic and general sense. During this study, the corruption index, namely its average value, ranges from 0.14, and the value in each row from 0.138 to 0.146. This picture allows us to say that it affects the overall result of the analysis. Considering the results of the final indicator, we can conclude that people with low incomes, approximately 40%, have an average corruption index of 0.183, and the value itself ranges from 0.181 to 0.186, which indicates that this indicator is key in the study of social inequality. Taking into account all the data we received during the study, it is possible to make cross-country comparisons in the COPRAS framework.

The study was carried out on the examples of the countries of Denmark, Finland, Germany, Spain, Lithuania, Austria and Sweden. The choice of countries is due to the availability of comparative data and differences in socio-economic systems, all this allows us to present the comparison in the best possible way. The selected COPRAS method provides an opportunity to identify and study in detail different options for using several factors and present the importance of each of them in the most representative way. In our work, we will use the earlier calculated weights for the chosen factors to build a matrix, which is needed for the analysis. This matrix will help us find out which countries are best at including sustainable development ideas into their economic and social plans. The next step in applying this method is to calculate the normalised matrix. The normalised matrix is made by dividing each indicator value by the total of all the values

**Table 1.** Normalised matrix for AHP (source: composed by the authors)

Criteria	Persons at risk of poverty	Gender employment gap	Long-term unemployment rate	Corruption Perceptions Index	Income share of the bottom 40%	Average
Persons at risk of poverty	0.275	0.273	0.275	0.279	0.275	0.275
Gender employment gap	0.220	0.218	0.220	0.209	0.220	0.218
Long-term unemployment rate	0.184	0.181	0.183	0.186	0.183	0.184
Corruption Perceptions Index	0.137	0.146	0.138	0.140	0.138	0.140
Income share of the bottom 40%	0.184	0.181	0.183	0.186	0.183	0.183

**Table 2.** Normalised weighted matrix (source: composed by the authors)

	Non-Beneficial	Non-Beneficial	Non-Beneficial	Beneficial	Beneficial
	Persons at risk of poverty or social exclusion	Gender employment gap	Long-term unemployment rate	Corruption Perceptions Index	Income share of the bottom 40% of the population
Weights	0.275	0.218	0.184	0.14	0.183
Denmark	0.0347	0.0323	0.0074	0.0238	0.0278
Germany	0.0413	0.0444	0.0148	0.0206	0.0266
Spain	0.0514	0.0594	0.0638	0.0159	0.0242
Lithuania	0.0471	0.0087	0.0341	0.0161	0.0223
Austria	0.0343	0.0450	0.0163	0.0188	0.0274
Sweden	0.0306	0.0271	0.0237	0.0217	0.0262
Finland	0.0357	0.0012	0.0237	0.0230	0.0285

**Table 3.** Analysis of parameters of alternatives (source: composed by the authors)

Countries	$S_{+i}$	$S_{-i}$	$S_{\min}$	$S_{\min}/S_{-1}$	$Q_i$	$U_i$	Rank
Denmark	0.0516	0.0744	0.0606	0.8138	0.1661	86.41	2
Germany	0.0472	0.1005		0.6024	0.1320	68.66	6
Spain	0.0401	0.1746		0.3469	0.0889	46.23	7
Lithuania	0.0384	0.0899		0.6738	0.1332	69.29	5
Austria	0.0462	0.0956		0.6334	0.1353	70.40	4
Sweden	0.0479	0.0815		0.7433	0.1525	79.34	3
Finland	0.0515	0.0606		1.0000	0.1922	100	1
Sum		0.677		4,81352715			

for the chosen countries for that same indicator. The next step is making the normalised weighted matrix, which is shown in Table 2.

This table shows a normalised weight matrix with values linked to important socio-economic development indicators for the chosen countries: Denmark, Germany, Spain, Lithuania, Austria, Sweden, and Finland. Each number in the matrix shows the part of each indicator in the total for that country, adjusted according to the weights set during the AHP analysis. The next step is to find the total of beneficial and non-beneficial indicators, as well as the lowest value among the sums of non-beneficial indicators (Table 3).

This table shows the beneficial values of countries and the non-beneficial values for all alternatives. The  $U_i$  scores for Denmark and Sweden are very close to the maximum: Denmark scored 86.41 points, and Sweden scored 79.34 points. This shows that both countries have made great strides in sustainable development. Austria and Lithuania rank third and fourth with  $U_i$  scores of 70.40 and 69.29. These values indicate that both nations have been making good progress in sustainable development, but there is still much to be done compared to the leading nations. The somewhat higher value for Austria is likely due to more active policies and more decisive efforts in environmental protection and sustainable development. However, Germa-

ny and Spain have comparatively low  $U_i$  scores: Germany 68.66 and Spain 46.23. While these scores reveal that both are in a similar position, Germany appears to be slightly more advanced in terms of implementation. This may mean that Germany is better prepared to address sustainability issues than Spain, which may face greater difficulties and be less successful in addressing these matters.

## 5. Conclusions

In writing this paper, we considered indicators related to the Sustainable Development Goals and the circular economy. These included: poverty rate, gender gaps in employment opportunities, long-term unemployment, corruption index, efficiency and income distribution, which affect the success of achieving the Sustainable Development Goals in EU countries. The study used two methods: AHP to distribute the importance of indicators and COPRAS to compare the success of different countries in achieving the goals. In the analysis, we used official Eurostat data on selected EU countries to assess their efficiency. After conducting the study, it is important to say that we managed to come to the following conclusions, in particular, the poverty rate and the gender gap in employment have the greatest impact on achieving the country's sustainable development goals.

We concluded that in order to achieve growth for a country with such results, it is necessary to improve social integration and provide equal opportunities for all segments of the population. Significant progress has been observed as a result of the study of indicators in countries such as Australia and Lithuania, but there is an imbalance in employment and economic literacy, in particular the ability to distribute income from the point of view of implementing the Sustainable Development Goals. It can be argued that the countries of the European Union are in the right direction but need adjustments on certain criteria. However, there are differences that do not allow for full success in the economic and social spheres. An example of such differences is Germany and Spain, which, as a result of our study, showed the lowest indicators, and we concluded that these countries have socio-economic problems that require urgent stabilisation. The COPRAS method shows that countries with low poverty rates, stable gender equality and more stable institutional structures show better results. However, countries with low integrated results face social and economic problems. To improve this study, we consider it advisable to add more criteria and involve more countries to better understand the unique characteristics of different regions and how sustainable development policies change over time. Moreover, a wider sample of indicators will allow for a more detailed assessment.

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## ES ŠALIŲ PAŽANGOS VERTINIMAS SIEKIANT TVARIOS PLĖTROS TIKLŪ

**Santrauka.** Šiame tyrime vertinama, kiek Europos Sajungos šalys įgyvendina tvaraus vystymosi tikslus (TVT). Jame analizuojami įvairūs veiksniai, leidžiantys įvertinti padarytą pažangą. Tyrime dėmesys skiriamas tokioms sritims kaip skurdo mažinimas, lygiybės skatinimas ir darbo rinkų tyrimas. AHP (analitinis hierarchinis procesas) metodas buvo taikomas rodiklių svarbai nustatyti,

o COPRAS metodas – šalims vertinti ir reitinguoti pagal jų tvaraus vystymosi politikos veiksmingumą. Duomenys rodo, kad Suomija, Danija ir Švedija yra pirmajančios tvaraus vystymosi įgyvendinimo srityje, o Vokietija ir Ispanija rodo mažiau palankius rezultatus. Analizė taip pat parodė, kad pagrindiniai veiksniai, darantys įtaką tvariai plėtrai, yra skurdo rizika, lyčių nedarbo skirtumas ir ilgalaikis nedarbas.

**Reikšminiai žodžiai:** tvarus vystymasis, TVT, skurdas, lyčių ne-lygybė, nedarbas, korupcija, socialiniai ir ekonominiai rodikliai.