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KEY INDICATORS AS A SOURCE OF ANALYSIS OF THE LEVEL OF PROGRESS OF SUSTAINABLE DEVELOPMENT

Karolina CZERWIŃSKA[1], Andrzej PACANA[2*], Dušan KUDELAS[3]

[1] Rzeszow University of Technology; Faculty of Mechanical Engineering and Aeronautics; k.czerwinska@prz.edu.pl, ORCID: 000-0003-2150-0963
[2] Rzeszow University of Technology; Faculty of Mechanical Engineering and Aeronautics; app@prz.edu.pl, ORCID: 0000-0003-1121-6352
[3] Technical University in Košice, Faculty of Mining, Ecology, Slovakia; dusan.kudelas@tuke.sk, ORCID: 0000-0002-0304-6202
* Correspondence author

Purpose: The purpose of the study was to analyze the importance of the issue and the level of sustainable development in the context of the functioning of Poland and Slovakia against the background of the European Union, based on a system of indicators, and to analyze the level of implementation of selected sustainable development goals by these countries.
Design/methodology/approach: The research process was based on the diagnostic survey method. The techniques used for data collection were content analysis and desk research. The study covered the years 2000-2021.
Findings: Both in theory and in practice, a problem has been recognized, namely that the surveillance methods developed are fraught with various disadvantages (e.g., standardization or uniformity of data for all EU countries). Within the framework of each of the examined indicators (from the area of SDG7, SDG8, SDG9), Poland showed a rise in the ranking of EU member states between 2000 and 2021. Slovakia, on the other hand, only in relation to the indicator of ross domestic expenditure on R&D by sector (SDG9) showed a decline in placement.
Research limitations/implications: A limitation of the study's implementation is the potential constraints on the availability of the data needed to calculate indicators to monitor the degree to which the Sustainable Development Goals are being met.
Practical implications: The results of the research will positively influence the planning of further activities by both the analyzed countries, Poland and Slovakia. The results of the research provide constructive information that may prove useful for the development of future strategic plans related to the implementation of the goals of the concept of sustainable development.
Originality/value: The study fills a research gap in the field of comparative analysis of selected spectra of Poland and Slovakia against the background of the European Union in the context of the implementation of sustainable development goals (Development Agenda 2030).

Keywords: sustainability, sustainability management, key indicators, monitoring indicators.

Category of the paper: Research paper.

1. Introduction

The processes of globalization, industrialization and dynamic economic development have contributed significantly to the destruction of the environment. Progressive climate change, which is the result of greenhouse gas emissions in the perspective of years, will have an adverse impact on the development of countries and the functioning of society (Hajduk-Stelmachowicz, 2014; Pacana, Czerwinska, 2017). The answer to such circumstances is the implementation of the premises of the concept of sustainable development in the area of macro and microeconomic functioning. The essence of the idea of sustainable development concerns the sustainable reduction of economic and social disparities and the protection of the environment (Kusljic, 2022; Vig, 2022). Enterprises wishing to maintain a stable position in the EU market must take care of the appropriate level of competitiveness. One of the fundamental conditions for mature competition has become the formulation and implementation of developmental strategies that take into account pro-environmental activities. This is important because the development of manufacturing companies is largely conditioned by the performance of activities that do not relate to caring for the environment (Fljtikova et al., 2023; Dagbanja, 2022). In highly developed countries, manufacturing companies do not identify legal restrictions (or other tools) to protect the environment as a form of state restructuring against manufacturing industries, but rather as a zone of competitiveness (Benavides-Sanchez et al., 2022; Grebski et al., 2022; Trąpczyński et al., 2019).

The purpose of the study was to analyze the importance of the issue and the level of sustainable development in the context of the functioning of Poland and Slovakia against the background of the European Union, based on a system of indicators. An additional objective is to analyze the level of implementation of selected sustainable development goals from the 17 Sustainable Development Goals (SDGs) adopted in New York at the 2015 Sustainable Development Summit by Poland and Slovakia. The study covered the years 2000-2021, and the research process was based on a diagnostic survey method. The techniques used for data collection were content analysis and desk research.

2. Issues and stages of sustainable development emergence

There are many definitions of sustainable development in the literature, as the issue is inherently multidimensional. Basically, sustainable development refers to development in which a state of balance is achieved between three main dimensions, that is, economic, social and environmental (Shilla et al., 2020; Lazar et al., 2021). On the economic dimension, balance means striving for steady economic development. Balance on the social dimension indicates

the protection of public health and social integration. And with regard to the environmental dimension, it means an emphasis on striving to care for and protect natural resources and the environment in such a way as to enable future generations to meet their needs (Staniszewska et al., 2020; Hajduk-Stelmachowicz, 2017).

Sustainable development is the subject of a considerable amount of both theoretical and practical analysis. The complexity of the concept contributes to the fact that there is no single, leading and universally accepted definition. There is also a lack of consensus on the issue of measuring the determinants of sustainable development and measuring the level of implementation of the idea. The progressive development of the idea of sustainable development has been closely linked to the need to effectively address climate change (Anstorga, Valdes, 2021; Ulewicz, Blaskova, 2018). The stages of the emergence of the concept of sustainable development are shown in Figure 1. Milestones (shaded boxes - Figure 1) in the implementation of the concept are considered to be: 1992 Earth Summit, Millennium Declaration, 2002 Johannesburg Summit and 2012 Rio de Janeiro Summit, 2030 Development Agenda (Transforming Our World) (Fonseca et al., 2020).

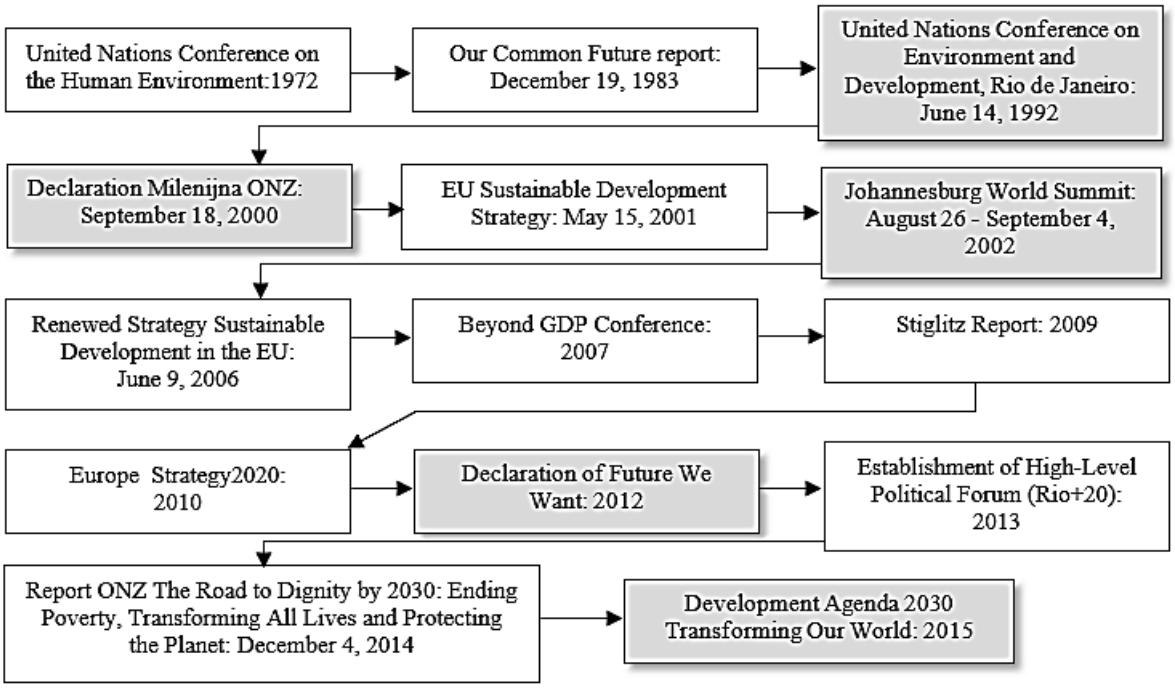

Figure 1. The stages of formation of the concept of sustainable development are presented.

Source: own compilation based on: Misztal, A., (2019). Zrównoważony rozwój przedsiębiorstw a Stopień Rozwoju społeczno-Gospodarczego. Studia i Prace Kolegium Zarządzania i Finansów, nr 174, s. 33-45. https://doi.org/10.33119/SIP.2019.174.2.

Implementing such a multifaceted concept and monitoring the level of its implementation requires a clear definition of the method of measurement and indication of measures. The implementation of the goals and targets is monitored worldwide by appropriate indicators (Bassen et al., 2023; United Nations Statistics Division, https://unstats.un.org/…, 19.04.2023).

3. Sustainable development indicators

Sustainability indicators are a fundamental tool for monitoring the progress of the concept's implications. They enable the development of a statistical picture of the country from the perspective of implementing a new development paradigm (Bassen et al. 2023). However, there is no universally accepted definition of the term "indicator". Usually, the terms "indicator" and "gauge" are terms that appear interchangeably in the literature. However, it should be noted that the feature of the indicator is the comparability of its results, which allows for indicating the position of a given variable/object in relation to other variables/objects (Czerwińska, 2020). In this approach, the indicator is a function of one or more features (for example, odor emission per km2 - the indicator is a function of feature 1: odor emission and feature 2: area) (Czerwińska et al., 2020a).

The beginning of the creation of a set of sustainable development indicators concerns the concretization of this idea of enterprise development. Indicators are developed in order to supervise the implementation of planning documents (for example: policies, programs, strategies) created successively at the local, regional, national and European Union levels (Sakharov, Andronova, 2022). Determining the progress of the implementation of the assumptions of the development concept is possible thanks to the concretization of the sustainable development paradigm by identifying: development principles (basic selection of indicators), goals (positive target states) and orders (economic, social, environmental, institutional and political) (Peng, Zhang, 2022).

The principles of sustainable development are the main verifier of the implementation of the declaration of the development idea contained in the documentation (policy objectives, strategies, programmes). The basic principle is the principle of intergenerational justice – "All future generations have the right to live and enjoy all the environmental values they know, just as you do, or even better" (Dyatlov, Selishcheva, 2020; Trusina, Jermolajeva, 2021). With regard to the selection of indicators, particular importance can be attributed to the sets of rules that have been defined at the various stages of the implementation of the concept of sustainable development (Figure 1) (Balas, Molenda, 2016).

Further levels of specifying the idea of sustainable development, which can be measured with the use of indicators, are in the form of patterns. This applies to governance and development goals. The relationships and connections between the fundamental categories for measuring the implementation of sustainable development are presented in Figure 2.

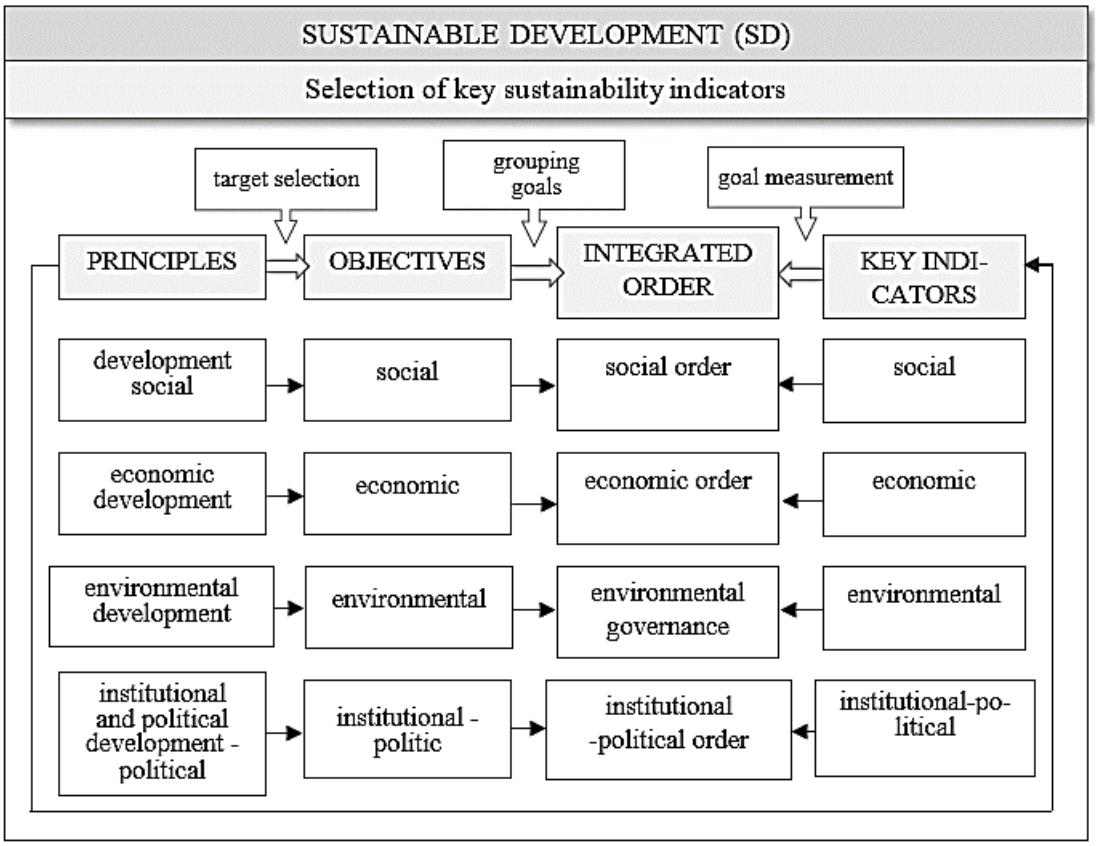

Figure 2. The idea of creating and selecting national sustainable development indicators in the context of ensuring integrated governance.

Source: own compilation based on: Wskaźniki Zrównoważonego Rozwoju Polski, 2011, s.16.

It should be noted that in the understanding of sustainable development as an interdisciplinary category, the role of the link that simplifies the interpretation and understanding of this idea is played by integrated governance (Figure 2). It forces one to respect the interdisciplinary approach, since without such a grasp of the concept it is difficult to understand the main meaning of the idea of development. Integrated order is defined as a positive target state of developmental change (like a goal) that integrates the component orders in a non-contradictory and coherent way (Pondel, 2021). The literature on the subject indicates that sustainable governance is a benchmarking way of presenting a development pattern, i.e. a target arrangement of sustainable development (Gunnarsdottir et al., 2021). The constructive basis for the formation of integrated order is determined by a system of strategic goals with social, economic, environmental and institutional-political specificity. The achievement of the indicated goals understood as positive, target states in a clearly specified time perspective is monitored by indicators of sustainable development. Therefore, when selecting these indicators, governance should be integrated through the use of composite indicators for more than one governance (Balas, Molenda, 2016).

4. Research methodology

Implementation of the research to achieve the stated goal of the study required structured undertakings. Figure 3 shows the stages in the implementation of the study.

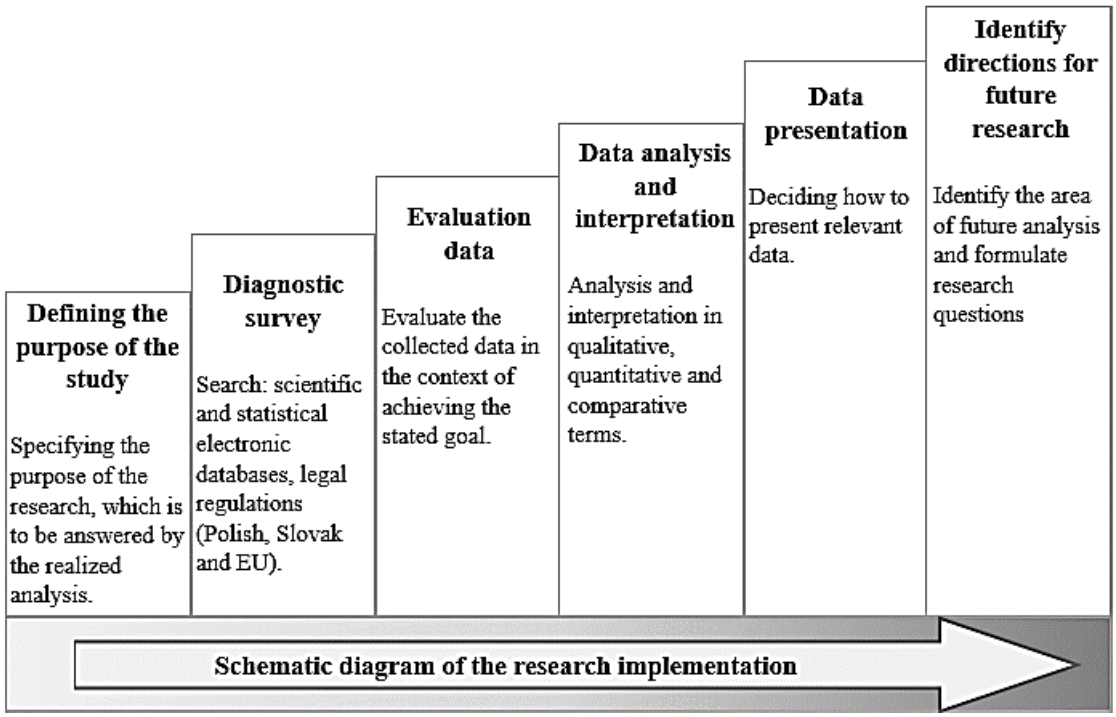

Figure 3. Idea diagram of the implementation of the study.

Source: own study.

The stages of research implementation consist of six stages: defining the purpose of the research, collecting data, evaluating data, analyzing and interpreting data, presenting data, and determining directions for future research (Figure 3). A synthetic description of each stage is as follows:

- defining the purpose of the research - the purpose of the research was not only to learn about reality, but also to assess it and, against this background, to draw general conclusions relevant not only for the studied collective (Poland, Slovakia and the European Union), but also for other countries in similar conditions;
- diagnostic survey - the creation of a comprehensive, representative and at the same time key set of data to be analyzed during the implementation of further stages. The data collection process was based on content analysis and desk research against electronic statistical and scientific databases and legislation relevant to the purpose of the study;
- data evaluation - involves evaluating the collected data in the context of specific needs and criteria related to the purpose of the study;
- data analysis and interpretation - making sense of the collected data;

- presentation of data - the stage is concerned with deciding how to organize the data and extract those data that will be included in the study;
- defining directions for future research - defines the area for further scientific inquiry, based on primary research.

The developed model for analyzing the degree of fulfillment of the goals of sustainable development of Poland and Slovakia against the background of the European Union allows the implementation of effective diagnostic studies.

5. Analysis of the degree of implementation of the concept of sustainable development of Poland and Slovakia

The 2030 Agenda for Sustainable Development sets out 17 Sustainable Development Goals (SDGs) and associated 169 tasks (targets) to be achieved by the world by 2030. They address achievements in 5 areas - the so-called 5xP: people, planet, prosperity, peace, partnership. The goals cover a wide range of challenges, such as poverty, hunger, health, education, gender equality, climate change, sustainable development, peace, social justice (Sustainable Development Goals, http://www.un.org.pl/, 19.04.2023). They replaced the Millennium Development Goals, which were to be achieved by 2015.

Due to the comprehensiveness of the issue and volume limitations, the study analyzed selected indicators of sustainable development that testify to the level of implementation of the development concept in Poland and Slovakia.

The analysis included selected indicators from the Sustainable Development Group 7 (SDG7), which SDG 7 implies providing general access to modern energy services, improving energy efficiency, as well as increasing the share of renewable energy. Because the European Green Deal recognizes energy efficiency as a key means of reducing cross-sectoral greenhouse gas emissions, the first indicator examined is the primary energy consumption rate. The indicator measures the level of a country's total energy demand excluding non-energy use of energy carriers. The values of the primary energy consumption indicator obtained by the analyzed countries against the EU are shown in Figure 4.

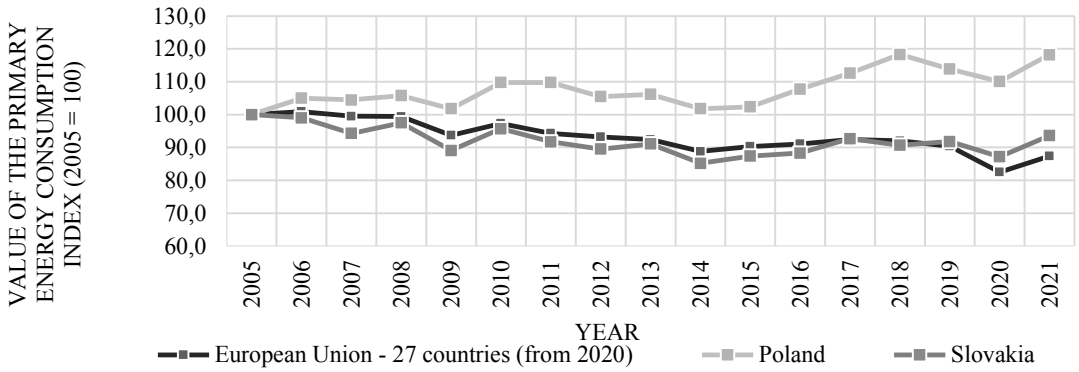

Figure 4. Dynamics of the primary energy consumption index for Poland and Slovakia against the EU. Source: own compilation based on: https://ec.europa.eu/eurostat access: 19.04.2023.

As agreed, the EU aimed to improve energy efficiency by 20% by 2020, in line with the Europe 2020 strategy, and by at least 32.5% by 2030, as regulated by the revised Energy Efficiency Levels Directive. From 2005 to 2020, the EU has reduced primary energy consumption by 17.5%, thus falling short of its target. Slovakia, on the other hand, has reduced consumption by 12.8% since that time frame. Poland is a country that has failed to reduce the value of primary energy consumption. In this country, consumption has increased by 10%, a negative result indicating the need for radical action. In order to transition to an affordable, reliable and sustainable energy system, Poland should improve access to clean energy research and focus its efforts on promoting investments in energy infrastructure and clean energy technologies. In relation to other EU countries, Poland ranked 22 in 2021, while Slovakia ranked 10.

Another indicator to be analyzed, energy productivity, is also included in SDG7. The indicator determines the amount of economic output produced per unit of gross available energy. Gross available energy is understood as the amount of energy products that are necessary to meet the demand of all entities within the analyzed geographic area. The value of economic production is presented in units of euros, which are chained to volumes up to the reference year (which was considered 2010) at exchange rates in effect from 2010, or it is expressed in units of PPS (purchasing power standard). The first way of expressing the value of the indicator is used to observe the change over time relative to a specific area. The second way of presenting the value, on the other hand, allows comparisons to be made between member states in a given year. The values of the energy productivity index by the analyzed countries against the EU are shown in Figure 5.

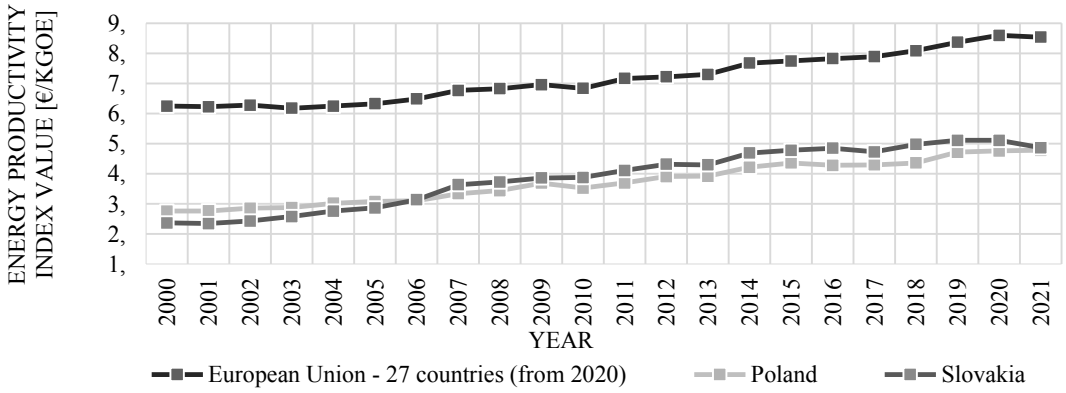

Figure 5. Dynamics of energy productivity for Poland and Slovakia against the EU.
Source: own compilation based on https://ec.europa.eu/eurostat access: 19.04.2023.

Based on the results of the study illustrated with Figure 4, one can see an upward trend in the value of the energy productivity index in Poland, Slovakia and the EU. The increase in the value of the indicator for Poland in the considered period was 73.2% (from the value of 2.76 €/kgoe in 2000 to 4.78 €/kgoe in 2021), while in Slovakia an increase in the value of the indicator of 105.4% was observed (from the value of 2.37 €/kgoe to 4.87 €/kgoe in the studied period). From 2006 to the end of the analyzed period, the values of the energy productivity indicator for Slovakia exceeded the values of the indicator achieved by Poland. In 2021, the difference in the level of energy productivity was less than 2%. In relation to other EU countries, Poland rose from 27th position (2000) to 25th (2021), while Slovakia rose from 29th position (2000) to 23rd (2021). The results show that the countries surveyed are steadily achieving the goals of providing affordable and clean energy and ensuring and promoting sustainable consumption and production patterns. The Erupean Union showed the smallest value of the growth rate of the energy productivity index - the value for the period under review was 36.6%.

The real GDP per capita indicator was also selected for analysis. This indicator is used to monitor progress in achieving Sustainable Development Goal Number 8 - SDG8 - Decent Work and Economic Growth. The goal is embedded in the European Commission's Priorities of the European Green Deal. SDG 8 promotes the importance of continuous economic growth and associated high levels of economic productivity. SDG8 also recognizes the creation of well-paid jobs of high quality and the achievement of global prosperity. The indicator values obtained by the analyzed countries against the EU are shown in Figure 6.

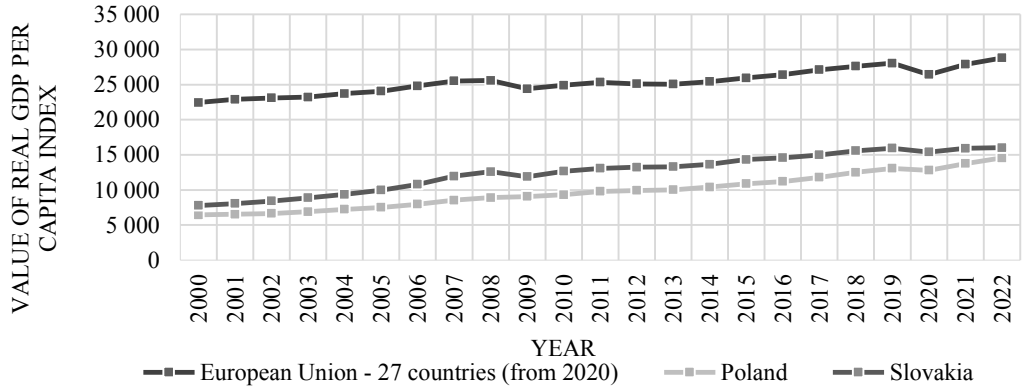

Figure 6. Dynamics of real GDP per capita for Poland and Slovakia against the EU.

Source: own compilation based on https://ec.europa.eu/eurostat access: 19.04.2023.

During the period 2000-2022, positive trends can be observed related to the growth of the real GDP per capita index in Poland, Slovakia and the EU. During the period under review, the values of the index in Poland increased by 125.7% (from 6,450 to 14,560 euros), in Slovakia by 105.8% (from 7,780 to 16,010 euros). In contrast, the EU-27 achieved an increase of 28.4% (from 22,450 to 28,810 euros). Despite the fact that in every year under review the value of the analyzed indicator in Slovakia was higher than in Poland, Poland is characterized by a significantly higher growth rate of real GDP per capita. In relation to other EU countries, Poland rose from 27th position (2000) to 25th position (2021), while Slovakia rose from 25th position (2000) to 23rd position (2021).

Within the framework of SDG9 - Innovation and Industrial Infrastructure, a balanced indicator of Gross domestic expenditure on R&D by sector was analyzed. SDG 9 encourages the creation of resilient yet sustainable infrastructure and urges inclusive and sustainable industrialization. It also emphasizes the importance of research and innovation to identify sustainable solutions to challenges at three key levels: social, economic and environmental. The indicator is used to keep a constant check on the implementation of progress in creating resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation. The cited rationale is related to the European Commission's priorities under "An economy that serves people" AND "Europe for the digital age." The level of fulfillment of the sustainable development premise in relation to the indicator of gross domestic expenditure on R&D by sector is illustrated in Figure 7.

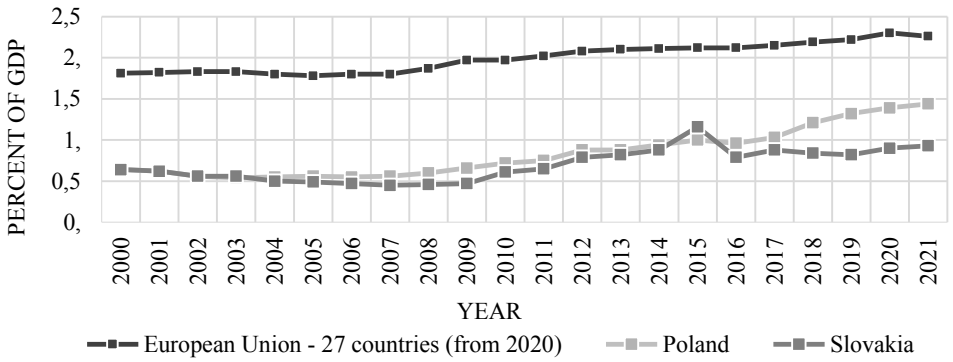

Figure 7. Dynamics of gross domestic expenditures on R&D by sector for Poland and Slovakia in comparison with the EU.

Source: own compilation based on https://ec.europa.eu/eurostat access: 19.04.2023.

The European Union has long set a goal of increasing R&D intensity to 3% of GDP. This goal was reaffirmed in the November 2021 Council Recommendation on the Pact for Research and Innovation in Europe. The value of the index of gross domestic expenditure on R&D by sector in 2021 was 2.26%, indicating an increase in the level of investment by 24.9% with respect to 2000. Since 2016, Poland has shown considerable dynamism - the increase in the value of the index reached 50% and in 2021 it was 1.44%. With respect to Slovakia, the highest value of the indicator was observed in 2015 - 1.16%. In 2016 there was a significant decrease (0.79%) and from 2019 an upward trend is visible. In relation to other EU countries, Poland from the 18th position (2000) reached the 17th position (2021), while Slovakia from the 19th position (2000) reached the 25th position (2021).

As presented through the study of selected indicators of sustainable development, the analysis of the situation of Poland and Slovakia in the context of meeting the assumptions of sustainable development is a complex process. The analyzed countries differ in the level of economic development, which has a direct impact on the bluntness of implemented improving and often radical changes in the social, environmental and economic areas. The Joint Europe 2020 Strategy and the 2030 Agenda for Sustainable Development set ambitious goals. However, it should be remembered that the significantly different economic levels of the countries of the community affect the different bluntness of countries' readiness for change.

6. Summary and conclusions

The issue of sustainable development is one of the overarching goals of the European Union. The progress of member countries in achieving the Sustainable Development Goals is constantly monitored using a set of indicators. The number of dimensions that are evaluated (economic, social and environmental dimensions) and the level of detail of the analyses carried out contribute to the fact that more than a hundred synthetic indicators are used for monitoring.

The purpose of the study was to analyze the importance of the issue and the level of sustainable development in the context of the functioning of Poland and Slovakia against the background of the European Union, based on the system of indicators. An additional objective is to analyze the level of implementation of selected sustainable development goals from the 17 Sustainable Development Goals (SDGs) adopted in New York at the 2015 Sustainable Development Summit by Poland and Slovakia.

As a result of the analysis of available scientific studies and data, it was found that both in theory and in practice a problem was recognized, namely that the developed surveillance methods are burdened with various inconveniences. An example of an inconvenience could be the standardization or unification of data for all Eiropean Union countries. These methods are also burdened with subjectivity and a certain generalization. However, the need for monitoring and systematic implementation of in-depth analysis of data and information on the progress of sustainable development implementation in member countries is undeniable.

The paper outlines the essence of sustainable development indicators and presents selected indicators under the three categories of sustainable development goals. Attention was paid to area 7 - affordable and clean energy, 8 - decent work and economic growth, and 9 - industry innovation and infrastructure. The indicators analyzed in relation to Poland's and Slovakia's performance against the progress of the European Union were primary energy consumption (SDG7), energy productivity (SDG7), real GDP per capita (SDG8) and rross domestic expenditure on R&D by sector (SDG9). Within each of the indicators examined, Poland has shown a rise in the ranking of EU member states over the analyzed period. Slovakia, on the other hand, only in relation to the indicator of rross domestic expenditure on R&D by sector (SDG9) showed a decline in placement.

The comparative analyses conducted in the article, as well as the analyses of the dynamics of change of selected indicators, indicate differentiated trends in the member countries in all areas studied.

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