sustainability

MDPI

Article

Indicator Method as a Way of Analyzing the Level of Implementation of the Objectives of Sustainable Development

Andrzej Pacana [1,*], Karolina Czerwińska [1], Lucia Bednárová [2] and Rastislav Petrovský [2]

[1] Faculty of Mechanical Engineering and Aeronautics, Rzeszow University of Technology, Al. Powstancow Warszawy 12, 35-959 Rzeszow, Poland; k.czerwinska@prz.edu.pl

[2] Faculty of Mining, Ecology, Process Control and Geotechnologies, Technical University of Kosice, Letna 9, 04200 Kosice, Slovakia; lucia.bednarova@tuke.sk (L.B.); rastislav.petrovsky@tuke.sk (R.P.)

* Correspondence: app@prz.edu.pl

Abstract: The purpose of this study was to propose a combination of methods as part of the analysis of progress in the context of the achievement of one of the Sustainable Development Goals (Goal 12: responsible consumption and production) by Poland and Slovakia using sustainable development indicators. The method used was diagnostic survey, comparative analysis, and within the framework of data collection, the techniques of content analysis and desk research, which were integrally combined in the research procedure. The implementation of the analysis indicated that surveillance using sustainable development indicators is associated with difficulties (for example, gaps in the availability of standardized data and difficult access to adequate data) and generalizations and subjectivity. This analysis showed that the countries are successively striving to meet the provisions that are related to Goal 12. Estimates of the degree of achievement of the goal are adequate for the duration of the goal. Priority activities of the countries should focus on increasing the level of development of ecological agriculture, striving to increase the efficiency of use of available resources, changing the approach to available resources (moving away from linear development), and changing consumption patterns (increased development of a closed-loop economy). Future research areas will focus on analyzing the level of implications of the goals of Agenda 2030 in Poland and Slovakia and developing developmental forecasts for both countries.

Keywords: sustainable development indicators; sustainable development; Agenda 2030; national economy; management and quality

check for updates

Citation: Pacana, A.; Czerwińska, K.; Bednárová, L.; Petrovský, R. Indicator Method as a Way of Analyzing the Level of Implementation of the Objectives of Sustainable Development. *Sustainability* **2024**, *16*, 195. https://doi.org/10.3390/su16010195

Academic Editor: Davide Settembre-Blundo

Received: 10 November 2023
Revised: 18 December 2023
Accepted: 22 December 2023
Published: 25 December 2023

1. Introduction

In the second half of the 20th century, the effects of unsustainable industrial development became apparent, so the beliefs associated with scientific and technological development and the hopes of unlimited economic growth did not materialize. Industrial development could be described as structurally unsustainable, resource-intensive, extensive, and inefficient [1,2]. A significant number of environmental problems have not been solved, degradation of the natural environment has continued, and the ecological crisis has intensified [3,4]. The numerous ecological and social threats occurring in the world influenced preventive measures of global scope; this in turn resulted in the development of the assumptions of the idea of sustainable development [5,6].

The concept of sustainable development takes as a priority the pursuit of the best possible economic outcome while respecting the natural environment and social development [7,8]. It is a broad concept of development which takes into account many areas of human activity. Due to its broad specificity, there are many definitions of the concept of "sustainable development" in the literature [9–11]. Environmental sustainability refers to the prudent use and protection of environmental resources to meet the needs of present and future generations while maintaining the integrity of ecosystems and health [12]. The cited definition highlights the essence of balancing the environmental, social, and economic spheres to ensure the long-term well-being of the planet and its inhabitants [13–16].

In today's reality, an approach that promotes the notion among the ruling classes that economic growth should not be based solely on the growth of production, employment, the GDP index, or income should be taken as important in the development of the idea of sustainable development [17,18]. Economic development should at least sustain the current state of natural, relational, and social capital, which will help ensure intergenerational equity [19,20]. Therefore, assumptions related to sustainable growth should be considered appropriate in a macroeconomic context [21]. The idea of sustainable development emphasizes not only the implementation of innovative solutions, the steady growth of intangible assets, and the elimination of poverty or barriers to growth, but also the possibility of renewing natural resources and protecting the environment, which is particularly important in the new global reality [22,23]. The foundations of sustainable development are considered to be people (environmental influencers), our planet (the area/object of human influence), and partnership (the method of action), because only consolidated activities of efforts will make it possible to achieve the goal—prosperity and peace in the world [24].

The Sustainable Development Summit was held in New York on 25 September 2015. The 193 member states of the United Nations (UN) unanimously adopted a new agenda, with the main goal and objective of eliminating global poverty by 2030 and building a sustainable future. The 2030 Agenda contains 17 Sustainable Development Goals (SDGs) which aim to shape policies and funding around the world from 2015 to 2030 [25–28]. The specifics of the Sustainable Development Goals are outlined in the literature [29–31].

A priority of official statistics, which was established in Agenda 2030, is to track progress toward the Sustainable Development Goals. Tracking progress is performed from a three-pronged perspective [32]:

- Global—the plane coordinated by the Statistical Commission of the United Nations (UN);
- World regions—the plane within which there are regional agencies of the United Nations (in our region, the United Nations Economic Commission for Europe—UNECE);
- National—the plane within which national statistical offices are established (in Poland, the CSO; in Slovakia, the Statistical Office of the Slovak Republic).

Monitoring progress toward the Sustainable Development Goals at the global and regional levels is conducted using a set of so-called global sustainable development indicators (SDG indicators) [33,34]. At the national level, instead of global indicators, countries have the option of using their own sets of indicators, with the proviso that they must be able to track key (for a specific country) problems and areas [35,36].

Among other things, Agenda 2030 establishes Sustainable Development Goal 12—ensure patterns of sustainable consumption and production. As the description of this goal indicates, sustainable consumption and production involves promoting efficient use of energy and other resources, sustainable infrastructure, access to basic services, decent jobs, and working conditions (including in the environmental field), and a better quality of life on earth [37–40].

The idea of sustainable consumption and production promotes the concept that something should be performed in the best possible way for a significant amount with fewer resources. The implication of this approach leads to an increase in the net benefits of economic activity by reducing the level of resource consumption [41,42] and the scale of pollution and degradation, while improving the quality of life on earth [43].

The description of Goal 12 emphasizes that sustainable consumption and production commits to the systematic cooperation of the actors involved in the entire supply chain, starting with producers and ending with consumers [44]. As reported in the literature, this activity implies conducting educational, promotional, and other actions aimed at consumers to raise awareness of sustainable consumption and the lifestyle that comes with it [45]. Activities undertaken may include conducting information campaigns on product standards and labeling, as well as engaging consumers in public procurement issues [46,47].

Unsustainable production and consumption is one of the most serious challenges of the modern world, mainly because it has a measurable, harmful impact on the environment. The difficulty, therefore, is to ensure the continuation of economic growth and the achievement of socioeconomic development goals on the one hand, and to minimize the destructive impact on the environment on the other hand [48,49]. Sustainable consumption and production not only make it possible to reduce the economic, environmental, and social costs of production, but can also assist in the fight against poverty or global warming, as they involve building sustainable infrastructure, using energy efficiently, and enabling access to basic services and decent labor [50].

In the literature, there are very few studies on the analysis of the level of implementation of individual Sustainable Development Goals. Studies in the literature most often refer not to comparisons of achievements in this area (of individual goals) but to results on a larger number of goals at the scale of selected cities [51], one country [52–54], the entire European Union [55], or a global perspective [56], and these presentations are not based on a homogeneous methodology. There is a lack of effective methodologies to standardize the research process capturing comparative analyses of the level of implementation of the objectives of sustainable development (as a whole and in relation to individual objectives) by individual countries due to the situation in a particular region of the European Union. There is also a lack of analyses indicating a comparison of the level of implementation of the objectives of sustainable development by neighboring countries Poland and Slovakia. The presented observations constitute a research gap.

Based on the considerations presented, the purpose of this study is to propose a method for analyzing progress in the context of the achievement of one of the 17 Sustainable Development Goals by Poland and Slovakia using sustainable development indicators. The purpose of this study refers to the comparison of at least two countries due to the situation in the region—countries with similarities in macro terms—and to determine the level of achievement of a specific sustainable development goal. The criteria for the similarity of countries include the location of the country, economic history, macro environment, and culture of consumption and production. Achievements in the implementation of Sustainable Development Goal 12, under the title of responsible consumption and production, were studied. The method presented takes into account the life cycle and multi-criteria analysis of relevant variables on SDG 12. This analysis covered available statistical data from 2004 to 2021. The research period adopted for this study covers 11 years before the signing of Agenda 2030 and 6 years after its adoption. This period makes it possible to identify the impact of Agenda 2030 on the activity of the surveyed countries in the field of sustainable development and to present trends of post-activity. Covering the analysis not only of the period after the adoption of the Agenda (whose implementation was not immediate) but also of the period before its adoption makes it possible to clearly present the growth of activity in the field of caring for responsible consumption and production (SDG12). Accordingly, this study poses the following research questions:

- What is the level of implementation of Sustainable Development Goal 12 under the title of responsible consumption and production in Poland and Slovakia (similar countries in macro terms in terms of the location of the country, economic history, macro environment, and culture of consumption and production)?

The added value of this study is the filling of the identified research gap and the diagnosis of the current level of fulfillment of Sustainable Development Goal 12—responsible consumption and production. The realization of the analysis indicates that surveillance by means of sustainable development indicators is associated with difficulties (for example, gaps in the availability of standardized data and difficult access to adequate data) and generalizations and subjectivity. The analysis of available data for Poland and Slovakia has shown that these countries are gradually striving to meet the provisions related to Goal 12. The use of the proposed analysis has allowed us to develop recommendations for Poland and Slovakia. Priority actions should focus on increasing the level of development of ecological agriculture, striving to increase the efficiency of use of available resources, changing the approach to available resources (moving away from linear management), and changing consumption patterns (increased development of a closed-loop economy).

2. Methods

The filling of research gaps and the creation of new knowledge is closely related to the examination of the current state of scientific knowledge (axiology of knowledge) and the identification of statements flowing from previous research and literature studies. The cognitive procedure aimed at formulating the current state of knowledge is the foundation for the implementation of research analyses. The consistent research procedure proposed in this study includes nine structured stages, which were carefully planned based on the choices made for the sake of reliability and credibility of the research results.

Sustainable Development Goals must be formulated in such a way that it is possible to measure them. For this reason, they were created based on the SMARTER method (the successive letters of the method's name stand for: S—specific, M—measurable, A—achievable, R—relevant or realistic or reward, T—timebound, E—exciting or evaluated, and R—recorded or reward). For this reason, to determine the degree of achievement of the various goals, this study's research procedure focuses on indicator analysis. Figure 1 summarizes the stages of the research procedure.

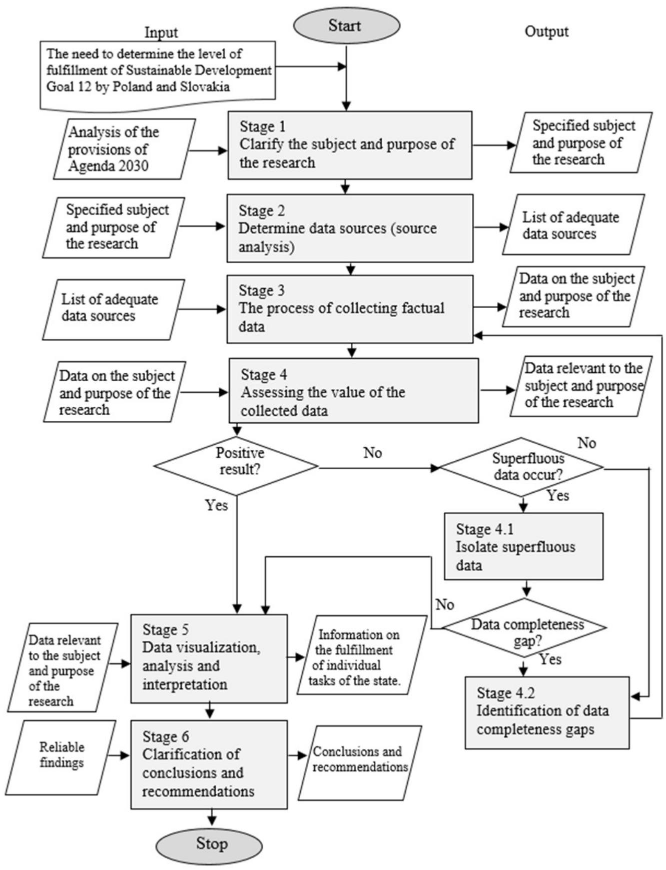

Figure 1. Synthetic representation of the stages of the research post. Source Own elaboration.

The research procedure was divided into six steps, which included:

- Stage 1—clarification of the object and purpose of the research—determination of the subject and scope of the studied phenomena. What follows is the determination of the desirability of implementing the research undertaken. At this stage, it is necessary to determine the span of the time interval and the uniform units of time for this interval. It is also crucial to determine the spatial scope of this study and the list of units to perform a comparative analysis. This stage is related to the development of explanations of the processes and phenomena occurring in the analyzed reality.

- Stage 2—determine data sources (source analysis)—the stage allows you to gain the knowledge you need, based on data that already exist, that is, that have been collected or generated by others. In this stage, it is necessary to gather knowledge about available data sources. This stage is fundamental in terms of obtaining the data needed for use, interpretation, or storage. Data sources play an important role in the data life cycle and are indispensable for data analysis, reporting, and information-based activities. Potential sources of knowledge in relation to the issue under study can be statistics and compilations (public statistics and data from statistical offices and state institutions), official documents (numerical summaries, reports, censuses, regulations, minutes, and other materials produced by offices, organizations, and institutions), results of social research (project reports, summaries, descriptions, and databases), other data, and information available online (expert statements and scientific articles).
- Stage 3—the process of collecting factual data—the process of obtaining adequate sets of data collected as material necessary for the analysis of a specific research purpose and to obtain original results. Quantitative data relating to facts should be collected, specifically, factual information that is used for socio-economic mapping of distinguished units, processes, or events. The collection of this type of information is aimed at detecting missing factual information in complex collections. Does the application of the factual information process include the polythematic and often fragmentary nature of the information contained in a single source, the systematic application of factual information from a specific subject area, and the need to verify the information (to which step 4 refers)?
- Stage 4—assessing the value of the collected data—assessing the quality and relevance of the emerged data in this study in the context of achieving the established research objective. Evaluation in terms of the usefulness of the collected data refers to determining its quality and completeness and bringing it to comparability in time and space. In the case of superfluous data—inadequate in relation to the purpose of this study—these data should be isolated so that they do not hinder the study and do not distort the results of the analyses (Stage 4.1—isolate superfluous data). According to Stage 4.2—identification of data completeness gaps—once the gap and completeness gaps are identified, they should be filled in again by implementing Stage 3—the process of collecting factual data.
- Stage 5—data visualization, analysis, and interpretation—indicator analysis uses indicators of sustainable development that are relevant to the studied goal, which are basic monitoring tools that show in a measurable way the essence and level of implementation of a given goal. Indicator analysis makes it possible to create a statistical picture of the studied country in the context of the implementation of the new development paradigm—sustainable development. In this step, comparative analysis was also used, that is, a juxtaposition with each other and parallel interpretation of the events made between related countries and those between which there is no connection in order to identify convergences or divergences of a certain significance. The method of analysis is based on a coherent set of research activities in which analytical activities play a key role. With regard to cross-country comparative research, the goal is to find out why certain phenomena occur in certain situations, places, and systems. This was followed by data visualization—to identify and organize relevant data, preliminary presentation of research results in accordance with scientific research standards and principles of effective communication is required. Interpretation of the results was carried out with the aim of identifying similarities or differences that exist between the studied units in the established context. It was also conducted to define conclusions and reflections on the established purpose of this study. This step should follow a cause-and-effect framework. Conclusions must be supported by the collected data and must follow from the interpretation of the data, and recommendations should in

turn follow from the key findings of this study. It is necessary to identify development recommendations for the analyzed units (countries), that is, to propose measures to improve the situation. In addition, conclusions and recommendations should not be general theses but should refer to specific assumptions.

- Stage 6—clarification of conclusions and recommendations—defining conclusions and reflections on the established purpose of this study. This step should follow a cause-and-effect system. Conclusions must be supported by the collected data and must follow from the interpretation of the data and recommendations should in turn follow from the key conclusions of this study. It is necessary to identify development recommendations in relation to the analyzed units (countries), that is, to propose measures to improve the situation. In addition, conclusions and recommendations should not be general theses but should refer to specific assumptions.

The structured method of research makes it possible to effectively achieve the research objective of analyzing the degree of implementation of the 12th objective (responsible consumption and production) of sustainable development on the territory of two countries—Poland and Slovakia—against the background of the achievements of the European Union.

3. Findings and Discussion

The 2030 Agenda for Sustainable Development, adopted in September 2015, is a United Nations (UN)-established, thorough plan for world development with a vision to 2030. The following section presents the implication of the proposed research post involving integrally combined methods according to the life cycle and multi-criteria analysis of relevant variables on SDG 12.

Stage 1 (Clarify the subject and purpose of the research)

This study analyzed Sustainable Development Goal 12 (SDG 12)—responsible consumption and production—established in Agenda 2030. Goal 12 is embedded in the European Commission's Priorities under the "European Green Deal" and is concerned with ensuring patterns of sustainable consumption and production. The subject of this study was SDG 12. The aim of this study was to propose a method for analyzing progress in the context of Poland and Slovakia's achievement of one of the 17 Sustainable Development Goals using sustainable development indicators.

Stage 2 (Determine data sources (source analysis))

The analysis of data sources consisted of the identification of existing data, i.e., data that already exist, so that there is no need to elicit it through surveys or interviews. Based on the analysis of the sources, the following were considered useful sources of data, in the context of achieving the purpose of this research: statistics and compilations (public statistics, data from statistical offices—including the European Statistical Office, results of social research (project reports), and information available online (expert statements and scientific articles).

Stage 3 (The process of collecting factual data)

As part of the implementation of the research, on the basis of the identified data sources, a set of adequate quantitative data was created relating to the facts—the achievements of the analyzed countries (Poland and Slovakia against the background of the EU) in terms of individual tasks included in Sustainable Development Goal 12. The data collected are from the maximum available time frame (2004–2021) and cover the period before the adoption of Agenda 2030 and several years after its adoption by EU countries. Specific values are included in Table A1 in Appendix A.

Stage 4 (Assessing the value of the collected data)

In this stage, the data collected in Stage 3 were evaluated. The value of the collected data was assessed, with particular attention given to its quality (relevance) and completeness in the context of achieving the stated research objective. Data were subject to evaluation because there were periods in the assumed time frame when indicator data were missing.

Stage 5 (data visualization, analysis, and interpretation)

Monitoring of progress in the implementation of SDG 12 is carried out using indicator analysis based on appropriately selected sustainability indicators [57]. The following indicators were used in this study as part of Stage 5 implementation: consumption of chemicals by hazardousness, raw material consumption (RMC), average CO2 emissions per km from new passenger cars, circular material use rate, generation of waste by hazardousness, gross value added in environmental goods and services sector, and energy productivity.

Adequate input data are required to assess the progress in implementing the various provisions using the indicators indicated. Difficulties in collecting them and occasional shortcomings in reporting by the relevant entities are pointed out in [58–61]. The practice of reporting on corporate social responsibility (CSR), including sustainability, is more common in Western Europe than in Central and Eastern Europe (CEE), and long-time empirical research on these practices in the region has been sporadic and fragmented [62–64]. As a result, the research periods of the two countries were sporadically different.

The first indicator analyzed was consumption of chemicals by hazardousness. This indicator shows the amount of aggregate consumption of chemicals for the European Union (EU). Consumption of chemicals is calculated according to the equation: Consumption = Production + Imports − Exports, so it is the sum of the volume of production (PRODCOM) and the volume of net imports of chemicals (COMEXT). The data included in the indicator are for hazardous and non-hazardous chemicals and show the total consumption of all chemicals. It is important to note that the two subcategories of hazardous chemicals—hazardous to human health and hazardous to the environment—overlap by definition, with the result that their sum does not equal the total consumption of hazardous chemicals. This value is expressed in millions of tons. Figure 2 shows the dynamics of change of the indicator in question in the EU.

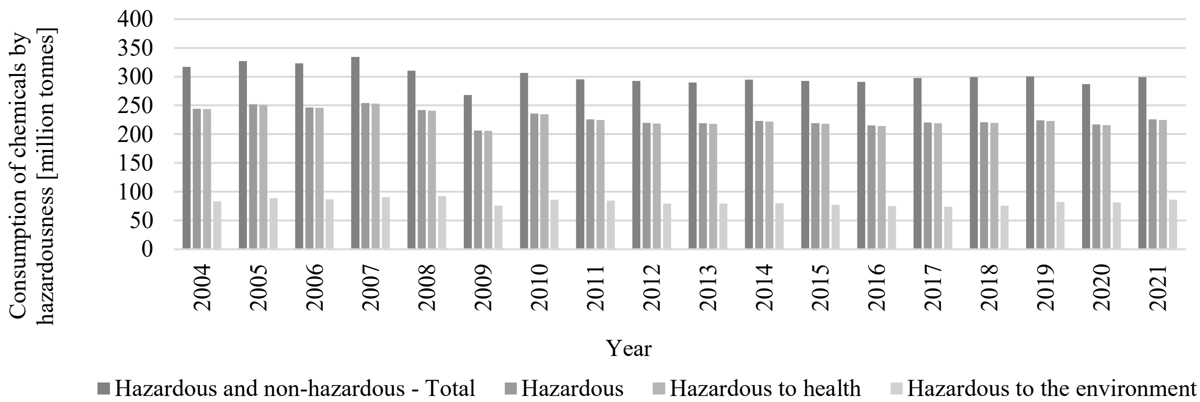

Figure 2. Dynamics of changes in the indicator of consumption of chemicals by hazardousness for the European Union. Source: Own elaboration based on [65].

The total consumption of all chemicals in the period under consideration decreased by 5.58%, while the hazardous chemicals category was reduced by 7.49%. Taking into account that the values of the indicator consist of 27 member countries, this result can be considered satisfactory. The Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) framework practiced in member countries has contributed to improving the protection of human health and the environment through better identification and management of hazardous chemicals.

Redundant extraction and exploitation of scarce natural resources is one of the factors causing irreversible degradation of the natural environment. Raw material consumption (RMC), also referred to as the material footprint, is used to assess the level of use of natural resources for the needs of economies. The material footprint represents the global demand for the extraction of materials (minerals, metal ores, biomass, and fossil energy resources) caused by the consumption of goods and services in a geographic reference area. Data on material footprints come from material flow accounts, which model the flows of natural resources from the environment to the economy. The data refer to domestic extraction of materials measured in gross tons of material (for example, gross ore or gross harvest), as well as imports and exports measured by estimates of traded raw material equivalents (domestic and foreign extraction required to produce traded products). Thus, the RMC indicates the amount of extraction that is required to produce the goods demanded by end-users in the geographic reference area, regardless of where in the world the extraction of the material took place. Figure 3 shows the dynamics of change in the RMC of Poland and Slovakia compared to the EU.

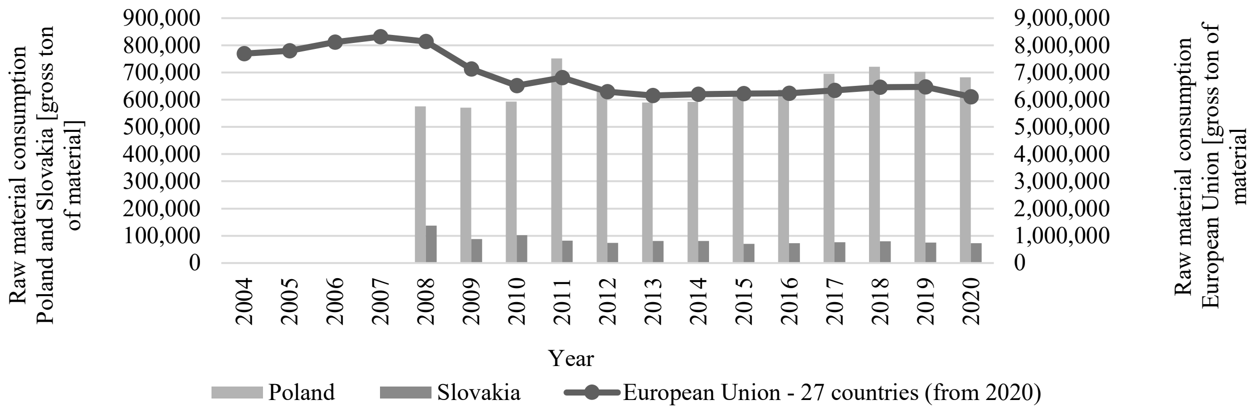

Figure 3. Dynamics of changes in the RMC index of Poland and Slovakia in comparison with the European Union. Source: Own elaboration based on [65].

According to estimates, the amount of raw materials required to satisfy global consumption in a year (material footprint) is 92 billion tons, and actual material consumption (material consumption) is close to this value [66]. There is a noticeable difference in the level of the material footprint from region to region. In the European Union, the level of material footprint (in the period under review) decreased by 20.58%, and by 47.19% in Slovakia. In Poland, the level of RMC increased by 18.53%. The Polish economy is among the six EU economies in which the level of material consumption exceeds that of raw materials (by 70 million tons). This means that the materials sourced by Poland also satisfy consumption demand in other countries. A similar situation has been observed in countries such as Sweden, Romania, Estonia, Bulgaria, and Ireland.

Overconsumption of limited land resources results in land degradation and a reduction of biodiversity, so Poland should take measures related to the rational management of available resources.

For the needs of the world economy, construction non-metallic raw materials and non-metallic raw materials are mined to the greatest extent. Annual consumption of each of these raw materials has reached 6 tons per capita worldwide. Third place is occupied by biomass, with an annual consumption of 3 tons per person [66].

Another indicator analyzed indicates the average carbon dioxide (CO2) emissions per kilometer emitted by new passenger cars in a given year. The emissions reported are based on type approval and may differ slightly from the actual CO2 emissions of new vehicles. The test procedure for CO2 emissions was changed from the new European test cycle (NEDC) to the worldwide light vehicle test procedure (WLTP) in 2020–2021. Figure 4 illustrates the dynamics of change of the indicator in question for Poland and Slovakia in relation to the EU.

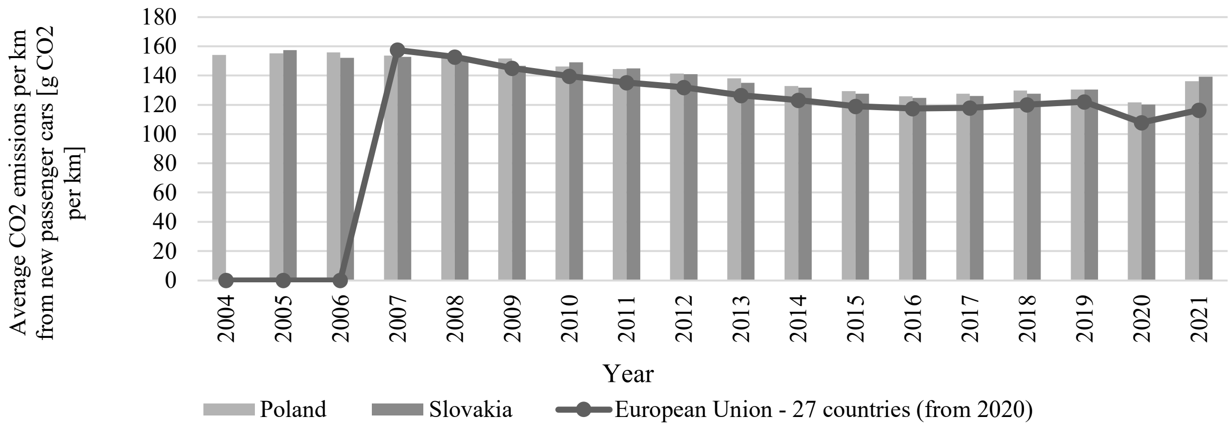

Figure 4. Dynamics of changes in the index of average CO2 emissions per km from new passenger cars in Poland and Slovakia in comparison with the European Union. Source: Own elaboration based on [65].

Transportation generates more than a quarter of the European Union's total greenhouse gas emissions, with more than 70% of the indicated emissions produced by road transport. According to Figure 4, in the EU, the level of average carbon dioxide emissions of newly registered passenger vehicles between 2007 and 2016 decreased from a value of 157.5 g/km in 2007 to 117.6 g/km in 2016, after which an increase to 122.1 g of CO2 per kilometer (g/km) was observed in 2019. Despite the increase in the value of the indicator, the result obtained was below the target set for 2015–2019 for the entire EU fleet, which was 130 g/km. Both Poland and Slovakia saw similar dynamics of change in the analyzed indicator. However, in 2019, both countries reached values slightly higher than 130 g/km, specifically, 130.4 g/km. The established target for the period 2020–2024 assumes CO2 emissions of 95 g/km. In 2020 and 2021, the EU failed to meet the existing target (in 2020, average CO2 emissions were 107.9 g/km, while in 2021, the value was 116.3 g/km). Poland and Slovakia also saw an increase in the value of the indicator; thus, these countries based on the 2020 and 2021 tables failed to meet the established target. The main reason for the increase in emissivity was the increased production of cars in the sport-utility segment and the increased average weight of vehicles.

In the 2025–2030 time frame, new, stricter standards in relation to CO2 emissions will come into force for passenger and commercial vehicles, as well as (for the first time) trucks. These changes are expected to reduce emissions from new passenger vehicles by a further 15% by 2025 with respect to 2021, and by 37.5% from 2030 onward. This demonstrates the need for further efforts to increase car efficiency and the spread of zero-emission cars.

The circular material use indicator fits in with the Agenda 2030 priority of the need to increase the efficiency of the level of resources use and to change the approach to resources away from linear management. The priority also points to a change in consumption patterns through the development of a circular economy. The circular material use rate measures the share of materials recovered and reintroduced into the economy in relation to total material consumption. Total material use, on the other hand, is measured by summing aggregate domestic material consumption (DMC) and circular material use. The DMC parameter is defined in economy-wide material flow accounts. The level of material circulation is approximated by determining the amount of recycled waste located at domestic recovery facilities, which is reduced by imported waste for recovery plus exported waste for recovery abroad. The import and export of waste for recycling (the amount of imported and exported waste for recovery) is approximated based on European statistics of international trade in goods. A higher value of the closed-loop factor should be pursued. This shows that more secondary materials are replacing virgin raw materials, thus reducing the environmental impact of virgin material extraction. Figure 5 indicates the variation of the circular material use rate for Poland and Slovakia in relation to the values achieved by the EU.

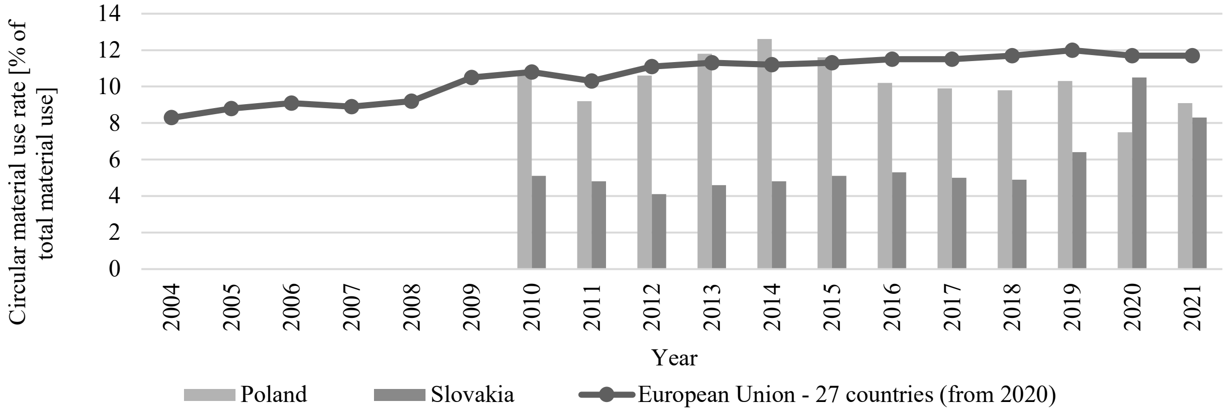

Figure 5. Dynamics of changes in the circular material use rate of Poland and Slovakia in comparison with the European Union. Source: Own elaboration based on [65].

During the analyzed period, one can notice an upward trend in the EU's circular material use rate. From 2004 to 2021, there was an increase of 40.96%. In Slovakia, an upward trend of the indicator was observed in 2012–2016 and 2018–2020, but in 2021 it reached a value of 8.3%, which indicated a decrease of 20.95% with respect to 2020. The value reached by Slovakia in 2021 was lower than the EU by 29.05%. Despite the values of the circular material use indicator for Poland oscillating close to the values recorded for the EU, a slight downward trend was observed from 2014 to 2018 (a decrease of 22.2%). In 2021, the value of the indicator in question was 22.2% lower than the value of the indicator for the EU. The obtained values of the indicator by Poland and Slovakia in 2021 place these countries in 11th and 12th place, respectively, among EU member states. European Union countries should strive to increase the value of the circular material use indicator because its higher value indicates that more secondary raw materials are replacing primary raw materials, which reduces the level of extraction of the primary environment, thereby reducing the negative impact on the environment.

This analysis also covered the indicator of generation of waste by hazardousness. The indicator determines the total amount of waste generated in a country, including the main mineral waste (all activities according to the Statistical Classification of Economic Activities in the European Community (NACE) and households). Mainly, mineral waste, dredged material, and soil are included. This inclusion of the indicator leads to significant amounts of waste in countries with increased economic activity, which include mining and construction. As one of the few indicators, it is updated every two years. The values of the indicator for Poland, Slovakia, and the EU over the years 2004–2020 are shown in Figure 6.

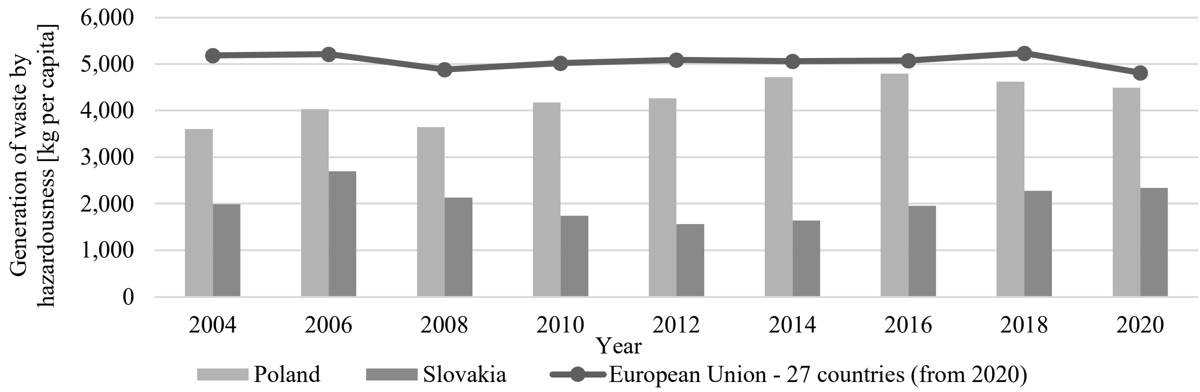

Figure 6. Dynamics of changes in the index of generation of waste by hazardousness of Poland and Slovakia in comparison with the European Union. Source: Own elaboration based on [65].

From 2004 to 2020, relatively small changes were observed in the value of the indicator for the EU. Over 18 years, the value of the indicator of generation of waste by hazardousness decreased by 7.15%. Greater variability was observed for Poland, where an upward trend took place from 2008 to 2016 (an increase of 31.49%), followed by a decrease in the indicator in 2018 by 3.58%, and in 2020 by 6.27% compared to 2016. These changes placed Poland in 15th place in 2020 among EU member states. The level of generation of waste by hazardousness of Slovakia was in the range of 1558 kg per capita in 2012 compared to 2340 kg per capita in 2020. An increase in the analyzed indicator has been observed in Slovakia since 2012, which brought the country into 26th place in 2020 among EU member states. According to Agenda 2030, both Poland and Slovakia should increase the efficiency of waste management to minimize the amount of hazardous waste generated.

The environmental goods and services sector (EGSS) is defined as that part of a country's economy that produces goods and services used in domestic or foreign resource management and environmental protection activities. EGSS gross value added indicates the contribution of the environmental goods and services sector to GDP. This contribution is defined as the difference between the sector's production value and intermediate consumption. It should be noted that the EU strategy does not include either quantitative targets related to employment growth or the results of the environmental goods and services sector. Nevertheless, the development of the EGSS sector is monitored. Figure 7 indicates the values of the gross value-added index in the EGSS of Poland and Slovakia (left axis) in relation to the EU (right axis).

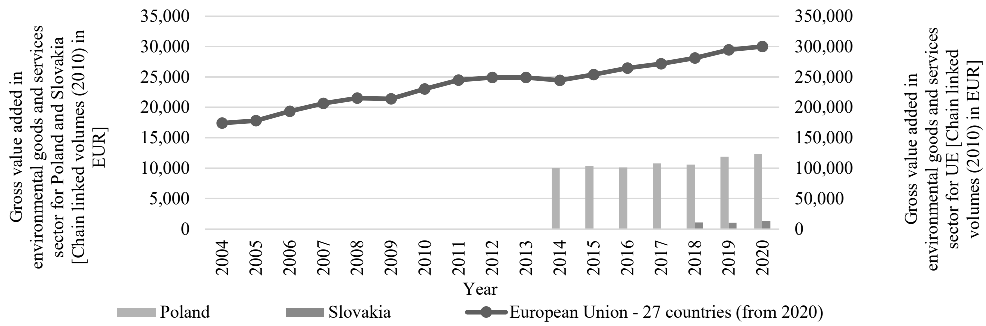

Figure 7. Dynamics of changes in the index of gross value added in the environmental goods and services sectors of Poland and Slovakia in comparison with the European Union. Source: Own elaboration based on [65].

In relation to the EU, the value of the EGSS gross value-added index increased by 72.17% over the 2004–2020 period. This growth was largely related to the development of energy efficiency, renewable energy, and increased levels of spending on green infrastructure. Data on Poland's environmental goods and services sector are only available from 2014. In that year, the EGSS sector's share of GDP reached 2.22%. In the following years, after some fluctuations, the share of the EGSS sector increased to 2.56% of GDP and in 2020 exceeded the EU average. This value allowed Poland to reach 10th place among EU member states. Data on Slovakia's EGSS sector are only available from 2018. In 2020, the country reached the 19th position among EU member states. The value added within the EGSS sector grew relatively quickly during the period under review—growth even took place during the time shortly after the 2008 economic downturn. This was partly a result of Europe's competitiveness and innovation in the global market, but also support in the form of public spending on renewable energy and environmental protection.

The future directions of the EGSS sector are strongly linked to the way in which active green growth and renewable energy policies are pursued in Europe, and from its impact on the level of competitiveness of the European Union in the global market.

As part of the analysis of the level of implementation of Goal 12 of Agenda 2030, the energy productivity indicator was also examined. This indicator is the result of dividing gross domestic product (GDP) by gross available energy in a given calendar year. The indicator is used to measure the amount of economic output produced per unit of available gross energy. In turn, available gross energy indicates the amount of energy products that are needed to meet the demand of entities within a specific geographic area. Thus, energy productivity measures the amount of economic benefits resulting from the use of primary energy. Economic output is reported in two ways: in units of euros (in chained volumes relative to the 2010 reference year at 2010 exchange rates) or in units of PPS (purchasing power standard). The first method is used to observe the evolution of a specific region over time, while the second method allows the comparison of member states in a given year. This study used the second option described. The values of the energy productivity index for Poland, Slovakia, and the EU over the years 2004–2021 are shown in Figure 8.

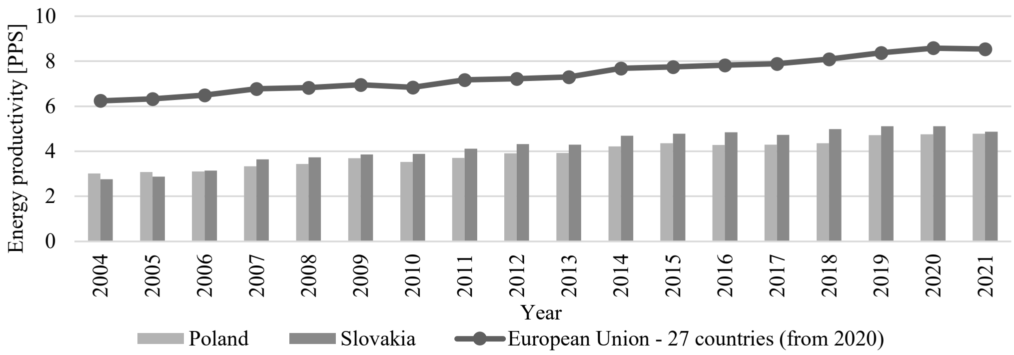

Figure 8. Dynamics of changes in the energy productivity index of Poland and Slovakia in comparison with the European Union. Source: Own elaboration based on [65].

An upward trend for the energy productivity indicator is identified in each of the countries analyzed. Between 2004 and 2021, Slovakia saw an increase of 76.44%, Poland 58.27%, and the EU 36.63% (Figure 8). Both Poland and Slovakia, however, are not leaders in energy productivity. Despite the upward trend in the value of the energy productivity index, a considerable distance is still observed from the EU average.

It should be remembered that improving the efficiency of the energy system reduces the EU's energy dependence and the adverse environmental impact of energy consumption and production. For this reason, the EU is implementing programs to support and encourage energy efficiency improvements. Activity at the public level is focused on public buildings and mass transportation, as the potential for savings is still greatest in these areas. At the household level, programs take the form of incentives for energy efficiency (for example, a clear indication of the level of energy demand for products, energy-efficient household appliances, and lighting). Another area subject to interference is housing construction and the tightening of regulations on the energy efficiency of newly built units while supporting the thermal upgrading of existing housing stock.

Stage 6 (Clarification of conclusions and recommendations)

SDG 12 requires the realization of systemic activity on the part of policymakers, researchers, business units, and consumers to effectively adapt to established sustainable practices. This goal provides for the realization of sustainable production and consumption appropriate to resource efficiency, developed technological capabilities, and reduced global waste, respectively. The monitoring of progress in the implementation of SDG 12 is performed through voluntary national reviews (VNRs). The implementation (VNR) also seeks to optimize experience-sharing activities (successes, challenges, and lessons learned) in the context of accelerating the implications of the 2030 Agenda goals and targets. The VNR also aims to strengthen pro-environmental government policies and institutions and mobilize multi-stakeholder partnerships and support for the implementation of the Sustainable Development Goals.

The countries analyzed in this study are striving to meet the goals and provisions of SDG12 of the 2030 Agenda. Their specific characteristics and economic level over the period under study have changed towards a more efficient and sustainability-oriented development. The priorities for both Poland and Slovakia should be:

- Developing ecological agriculture;
- Striving to increase efficiency in the use of available resources;
- Changing the approach to available resources (moving away from linear development);
- Changing consumption patterns (increased development of a closed-loop economy).

Increasing the European Union's climate ambition is a key intention of both the REPowerEU plan and the European Green Deal. The goal of the aforementioned initiatives is to make Europe the first climate-neutral continent. According to the initiatives, this goal is to be achieved by 2050, while ensuring future energy stability and affordability.

Sustainability goals, like any other, are subject to the merits of their creation based on the SMARTER method (the successive letters of the method's name stand for: S—specific, M—measurable, A—achievable, R—relevant or realistic or reward, T—timebound, E—exciting or evaluated, and R—recorded or reward) [67]. As such, they must be dimensioned. Indicator-based analyses should be used to determine their level of achievement, because then the degree of goal attainment can be unambiguously determined. The methodological course of action presented in this study, applied to the analysis of the level of fulfillment of Sustainable Development Goal 12—responsible consumption and production—by Poland and Slovakia, allowed the identification of difficulties in the application of indicator analysis and enabled the following conclusions to be distinguished:

- The need to standardize adequate data (on variables considered in the application of sustainable development indicators) for EU member countries;
- The need to increase access to data on sustainable development in individual countries;
- Generalizations and subjectivity due to the specifics of indicator analysis.

In addition, it was noted that almost any aggregate indicator is not a perfect measure and their analysis requires an appropriate approach. The variables to be analyzed in specific countries are influenced by a significant number of factors that differentiate countries' economies, such as climatic differences, variations in industrialization, and the structure of a given economy. Often, analyses at the level of sectors of the economies (industry, construction, transportation, and agriculture) would enable more meaningful comparisons. However, even analyses of aggregate indicators, especially over a longer research period, depict the direction of change and allow a great deal of information to be extracted.

4. Conclusions

The systematization of measures for the realization of sustainable development is implemented through Agenda 2030, which is a strategy for the development of the world by 2030 consistent with the assumptions of sustainable development. Therefore, the purpose of this study refers to the comparison of at least two countries due to the situations in the region—countries with macro similarities—and the determination of the level of achievement of a specific sustainable development goal. The criteria for the similarity of countries included the location of the country, economic history, macro environment, and culture of consumption and production. Achievements in the implementation of Sustainable Development Goal 12, under the title of responsible consumption and production, were studied. The method presented takes into account the life cycle and multi-criteria analysis of relevant variables on SDG 12. This analysis covered available statistical data from 2004 to 2021.

The realization of this research made it possible to provide answers to the research question posed in this study. As part of the determination of the degree of fulfillment of SDG 12, it was found that both Poland and Slovakia are gradually striving to achieve the provisions associated with it. These countries still fall below the values achieved by the EU and have not yet fully achieved the provisions of SDG 12. Due to the multiplicity of indicators for monitoring the degree of achievement of Goal 12, it is difficult to quantify to what extent the entire sustainable development goal has been achieved. However, it can be estimated that the average degree of fulfillment of the described tasks leading to the achievement of the goal leads to (an estimated) 51% for Poland and 45% for Slovakia. This value is difficult to count, but since we are in the middle of the goal's implementation period, the indicators are promising for its achievement. Recommendations based on the analysis concerned the adoption of more absolute priorities relating to increasing the development of ecological agriculture, striving to increase the efficiency of the use of available resources, changing the approach to available resources (moving away from linear development), and changing consumption patterns (increased development of a closed-loop economy).

The research course of action involving the use of indicator analysis made it possible to identify difficulties, which made it possible to point out several conclusions. There is a need to standardize adequate data related to the Sustainable Development Goals and to increase access to sustainable development data in individual countries. An important issue is also the problem associated with the use of internal indicators by individual countries, which greatly hinders the realization of comparative analyses. Studies are prone to generalizations and subjectivity due to the specifics of indicator analysis.

Future research areas will focus on analyzing the level of implications of the sustainable development provisions and the level of fulfillment of the other goals of Agenda 2030 in Poland and Slovakia.

Author Contributions: Conceptualization, A.P. and K.C.; methodology, A.P. and K.C.; software, L.B. and R.P.; validation, A.P., L.B. and K.C.; formal analysis, A.P., L.B. and K.C.; investigation, A.P. and K.C.; resources, A.P. and K.C.; data curation, R.P. and K.C.; writing—original draft preparation, A.P., L.B., R.P. and K.C.; writing—review and editing, A.P. and L.B.; visualization, A.P. and K.C.; supervision, A.P. and K.C.; project administration, A.P. and L.B.; funding acquisition, L.B. and R.P. All authors have read and agreed to the published version of the manuscript.

Funding: This contribution/publication is the result of the project "Research of alternative energy sources' implementation impact on industries of energy management processes" and is supported by the Operational Program Integrated Infrastructure (ITMS: 3131011T564).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data are contained within this article.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

Table A1. Values of the index of chemical consumption by harmfulness for the European Union in 2004–2021.

Time	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Hazardous and non-hazardous—Total	317.1	327.2	323.1	334.1	310.2	268.1	306.3	295.5	292.6	289.9
Hazardous	244.3	251.8	246.5	254.2	241.9	206.2	235.6	225.6	219.8	218.9
Hazardous to health	243.5	251.0	245.7	253.3	240.9	205.5	234.6	224.6	218.8	217.9
Hazardous to the environment	83.5	88.7	86.7	90.7	92.1	75.9	86.2	84.4	79.7	79.6
Time	**2014**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**-**
Hazardous and non-hazardous—Total	294.9	289.9	294.9	292.5	290.8	297.5	299.3	300.4	287.1	-
Hazardous	223.1	218.9	223.1	219	215.3	220.1	220.6	224.2	217.1	-
Hazardous to health	221.9	217.9	221.9	217.9	214.3	219.1	219.7	223.1	216.0	-
Hazardous to the environment	80.2	79.6	80.2	77.5	74.8	74.0	75.5	82.1	81.0	-

Source: Own compilation based on [65].

Table A2. Dynamics of changes in the RMC index of Poland and Slovakia in comparison with the European Union.

Time	2004	2005	2006	2007	2008	2009
European Union—27 countries (from 2020)	7,691,752.299	7,801,703.76	8,113,099.338	8,316,599.578	8,141,305.082	7,131,797.444
Poland	0	0	0	0	575,637.592	570,733.577
Slovakia	0	0	0	0	137,303.051	88,162.954
Time	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
European Union—27 countries (from 2020)	6,511,693.599	6,813,450.789	6,289,683.454	6,158,612.429	6,203,694.413	6,224,028.955
Poland	592,707.095	751,362.657	640,913.669	589,270.469	592,218.662	619,705.246
Slovakia	101,633.665	81,717.872	74,357.275	80,850.027	80,619.252	70,052.486
Time	**2016**	**2017**	**2018**	**2019**	**2020**	**-**
European Union—27 countries (from 2020)	6,238,260.23	6,343,007.426	6,464,015.97	6,469,454.3	6,108,243.183	-
Poland	636,088.732	695,327.284	721,062.854	702,496.862	682,340.264	-
Slovakia	72,858.026	76,484.407	79,656.385	75,442.619	72,505.784	-

Source: Own compilation based on [65].

Table A3. Dynamics of changes in the index of average CO2 emissions per km from new passenger cars in Poland and Slovakia in comparison with the European Union.

Time	2004	2005	2006	2007	2008	2009
European Union—27 countries (from 2020)	0	0	0	157.5	152.8	145.0
Poland	154.1	155.2	155.9	153.7	153.1	151.6
Slovakia	0	157.4	152.0	152.7	150.4	146.6
Time	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
European Union—27 countries (from 2020)	139.6	135.3	132.0	126.4	123.1	119.1
Poland	146.2	144.5	141.3	138.1	132.9	129.3
Slovakia	149.0	144.9	141.0	135.1	131.7	127.6
Time	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
European Union—27 countries (from 2020)	117.6	118.0	120.1	122.1	107.9	116.3
Poland	125.8	127.6	129.8	130.4	121.7	136.2
Slovakia	124.8	126.1	127.6	130.4	120.2	139.2

Source: Own compilation based on [65].

Table A4. Dynamics of changes in the circular material use rate of Poland and Slovakia in comparison with the European Union.

Time	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
European Union—27 countries (from 2020)	8.3	8.8	9.1	8.9	9.2	10.5	10.8	10.3	11.1	11.3
Poland	0	0	0	0	0	0	10.8	9.2	10.6	11.8
Slovakia	0	0	0	0	0	0	5.1	4.8	4.1	4.6
Time	**2014**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**-**
European Union—27 countries (from 2020)	11.2	11.3	11.5	11.5	11.7	12	11.7	11.2	11.3	-
Poland	12.6	11.6	10.2	9.9	9.8	10.3	7.5	12.6	11.6	-
Slovakia	4.8	5.1	5.3	5	4.9	6.4	10.5	4.8	5.1	-

Source: Own compilation based on [65].

Table A5. Dynamics of changes in the index of generation of waste by hazardousness of Poland and Slovakia in comparison with the European Union.

Time	2004	2006	2008	2010	2012	2014	2016	2018	2020
European Union—27 countries (from 2020)	5186	5214	4881	5017	5086	5062	5074	5235	4815
Poland	3601	4028	3645	4171	4266	4714	4793	4621	4492
Slovakia	1986	2699	2133	1741	1558	1636	1953	2277	2340

Source: Own compilation based on [65].

Table A6. Dynamics of changes in the index of gross value added in the environmental goods and services sector of Poland and Slovakia in comparison with the European Union.

Time	2004	2005	2006	2007	2008	2009
European Union—27 countries (from 2020)	174,317.28	177,971.84	193,301.04	206,527.33	215,272.44	214,110.47
Poland	0	0	0	0	0	0
Slovakia	0	0	0	0	0	0
Time	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
European Union—27 countries (from 2020)	230,014	244,779.55	249,186.83	249,161.64	244,424.13	253,854.23
Poland	0	0	0	0	9983.61	10,339.38
Slovakia	0	0	0	0	0	0
Time	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
European Union—27 countries (from 2020)	264,541.57	271,717.11	281,050.18	294,514.2	300,134.8	-
Poland	10,129.19	10,762.14	10,565.95	11,893.58	12,308.08	-
Slovakia	0	0	1053.93	1040.91	1359.02	-

Source: Own compilation based on [65].

Table A7. Dynamics of changes in the energy productivity index of Poland and Slovakia in comparison with the European Union.

Time	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
European Union—27 countries (from 2020)	6.25	6.33	6.49	6.77	6.83	6.96	6.84	7.17	7.22	7.30
Poland	3.02	3.08	3.11	3.34	3.44	3.69	3.53	3.70	3.91	3.92
Slovakia	2.76	2.87	3.14	3.64	3.73	3.86	3.88	4.11	4.32	4.30
Time	**2014**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**-**
European Union—27 countries (from 2020)	7.68	7.75	7.83	7.89	8.09	8.37	8.59	7.68	7.75	-
Poland	4.22	4.36	4.28	4.30	4.36	4.72	4.76	4.22	4.36	-
Slovakia	4.69	4.78	4.85	4.73	4.98	5.11	5.11	4.69	4.78	-

Source: Own compilation based on [65].

References

1. Moya-Clementa, I.; Ribes-Giner, G.; Pantoja-Diaz, O. Configurations of sustainable development goals that promote sustainable entrepreneurship over time. *Sustain. Dev.* **2020**, *28*, 572–584. [CrossRef]
2. Gajdzik, B.; Grabowska, S.; Saniuk, S.; Wieczorek, T. Sustainable Development and Industry 4.0: A Bibliometric Analysis Identifying Key Scientific Problems of the Sustainable Industry 4.0. *Energies* **2020**, *13*, 4254. [CrossRef]
3. Lazar, S.; Potocan, V.; Klimecka-Tatar, D.; Obrecht, M. Boosting Sustainable Operations with Sustainable Supply Chain Modeling: A Case of Organizational Culture and Normative Commitment. *Int. J. Environ. Res. Public Health* **2022**, *19*, 11131. [CrossRef] [PubMed]
4. Agbedahin, A.V. Sustainable development, Education for Sustainable Development, and the 2030 Agenda for Sustainable Development: Emergence, efficacy, eminence, and future. *Sustain. Dev.* **2019**, *27*, 669–680. [CrossRef]

5. Akhmedova, M.G. On society sustainable development. *Rev. Inclusiones* **2019**, *6*, 278–287.
6. Pacana, A.; Czerwińska, K. Model of Diagnosing and Searching for Incompatibilities in Aluminium Castings. *Materials* **2021**, *14*, 6497. [CrossRef]
7. Olkiewicz, M.; Wolniak, R.; Skotnicka-Zasadzien, B. Implementation of ISO 14001 Standard in the European Union Countries. *Rocz. Ochr. Srodowiska* **2019**, *21*, 868–880.
8. Plonka, A.; Dacko, M.; Satola, L.; Dacko, A. The idea of sustainable development and the possibilities of its interpretation and implementation. *Energies* **2022**, *15*, 5394. [CrossRef]
9. D'Adamo, I.; Lupi, G.; Morone, P.; Settembre-Blundo, D. Towards the circular economy in the fashion industry: The second-hand market as a best practice of sustainable responsibility for businesses and consumers. *Environ. Sci. Pollut. Res.* **2022**, *29*, 46620–46633. [CrossRef]
10. Szabo, M.; Csete, M.S.; Palvolgyi, T. Resilient Regions from Sustainable Development Perspective. *Eur. J. Sustain. Dev.* **2018**, *7*, 395–411. [CrossRef]
11. George, G.; Haas, M.R.; Joshi, H.; McGahan, A.M.; Tracey, P. *Handbook on the Business of Sustainability: The Organization, Implementation, and Practice of Sustainable Growth*; Edward Elgar Publishing: Northampton, MA, USA, 2022; pp. 1–584.
12. Yuan, M.H.; Lo, S.L. Ecosystem services and sustainable development: Perspectives from the food-energy-water Nexus. *Ecosyst. Serv.* **2020**, *46*, 101217. [CrossRef]
13. Jananipriya, R.; Usha, S. Green Brands Representation Through Colour Trademarks for Sustainable Business Practices and Environmental Concerns. *ECS Trans.* **2022**, *107*, 11479–11486. [CrossRef]
14. Singh, R.K.; Kumar Mangla, S.; Bhatia, M.S.; Luthra, S. Integration of green and lean practices for sustainable business management. *Bus. Strategy Environ.* **2020**, *31*, 353–370. [CrossRef]
15. Ulewicz, R.; Blaskova, M. Sustainable development and knowledge management from the stakeholders' point of view. *Pol. J. Manag. Stud.* **2018**, *18*, 363–374. [CrossRef]
16. Sztumski, W. Reflection on the Human Living Environment in Connection with Sustainable Development. *Probl. Rozw.* **2021**, *16*, 39–44. [CrossRef]
17. Eskelinen, T. Interpreting the sustainable development goals through the perspectives of utopia and governance. *Forum Dev. Stud.* **2021**, *48*, 179–197. [CrossRef]
18. Machada, D.D.; Matos, F.R.N. Reflections on sustainable development and sustainability: Polysemic categories. *Reun.-Rev. Adm. Contab. Sustentabilidade* **2020**, *10*, 14–26.
19. Ramzy, O.; El Bedawy, R.; Anwar, M.; Eldahan, O.H. Sustainable Development & Good Governance. *Eur. J. Sustain. Dev.* **2019**, *8*, 125–138. [CrossRef]
20. Grabowska, S.; Saniuk, S.; Gajdzik, B. Industry 5.0: Improving humanization and sustainability of Industry 4.0. *Scientometrics* **2022**, *127*, 3117–3144. [CrossRef]
21. Singh, M. Social Justice and Sustainable Development. *Probl. Rozw.* **2019**, *14*, 57–62.
22. Stefan, M.; Badea, C.G.; Troaca, V.A.; Constantinescu, C. Analysis of community environmental policy under sustainable development. *Qual. Access Success* **2019**, *20*, 618–623.
23. Guerra, J.B.S.O.A.; Hoffmann, M.; Bianchet, R.T.; Medeiros, P.; Provin, A.P.; Iunskovski, R. Sustainable development goals and ethics: Building "the future we want". *Environ. Dev. Sustain.* **2022**, *24*, 9407–9428. [CrossRef]
24. Maxwell, D.; Sheate, W. Enabling Sustainable Development through sustainable consumption and production. *Int. J. Environ. Sustain. Dev.* **2006**, *5*, 221–239. [CrossRef]
25. Gabay, C.; Ilcan, S. Leaving no-one behind? The politics of destination in the 2030 Sustainable Development Goals. *Globalizations* **2017**, *14*, 337–342. [CrossRef]
26. Hope, J. Globalising sustainable development: Decolonial disruptions and environmental justice in Bolivia. *Area* **2020**, *54*, 176–184. [CrossRef]
27. Weber, H. Politics of 'Leaving No One Behind': Contesting the 2030 Sustainable Development Goals Agenda. *Globalizations* **2017**, *14*, 399–414. [CrossRef]
28. Spann, M. Politics of Poverty: The post-2015 sustainable development goals and the business of agriculture. *Globalizations* **2017**, *14*, 360–378. [CrossRef]
29. Manero-Salvador, A. 2030 Agenda, Global Law, and International Law. *Iberoam. J. Dev. Stud.* **2022**, *11*, 102–125. [CrossRef]
30. Fernandez, J.O.; Iniesta, R.P.; Sanchez-Fuentes, A.J. A Quantitative summary of compliance with the 2030 Agenda in the European Union1. 2030 Agenda compliance in the EU. *Papeles Eur.* **2022**, *35*, 83760. [CrossRef]
31. Garcia-Sanchez, I.M.; Amor-Esteban, V.; Aibar-Guzman, C.; Aibar-Guzman, B. Translating the 2030 Agenda into reality through stakeholder engagement. *Sustain. Dev.* **2022**, *12*, 941–958. [CrossRef]
32. Bornemann, B.; Weiland, S. The UN 2030 Agenda and the Quest for Policy Integration: A Literature Review. *Politics Gov.* **2021**, *9*, 96–107. [CrossRef]
33. Peng, Y.X.; Zhang, H.J. Global sustainable development evaluation methods with multiple-dimensional: Sustainable development index. *Front. Environ. Sci.* **2022**, *10*, 957095. [CrossRef]
34. Campos, G.S. An analysis of the 2030 Agenda from Political Theory: Opportunities as a transformative tool. *Politica Soc.* **2023**, *60*, 1–11. [CrossRef]

35. Diaz-Galan, E. The 2030 Agenda for Sustainable Development's legal value: A new regulatory trend? *Iberoam. J. Dev. Stud.* **2023**, *11*, 30–52. [CrossRef]
36. Gudemann, L.; Munnich, R. Quality and Sensitivity of Composite Indicators for Sustainable Development. *Austrian J. Stat.* **2023**, *52*, 82–100. [CrossRef]
37. Mensah, K.; Wieck, C.; Rudloff, B. Sustainable food consumption and Sustainable Development Goal 12: Conceptual challenges for monitoring and implementation. *Sustain. Dev.* **2023**, 572. [CrossRef]
38. Baccarello, M.; Di Foggia, G. Sustainable Development Goals Data-Driven Local Policy: Focus on SDG 11 and SDG 12. *Adm. Sci.* **2022**, *12*, 167. [CrossRef]
39. Pacana, A.; Czerwińska, K. Comparative Tests of the Quality of the Piston Combustion Chamber for a Diesel Engine. *Teh. Vjesn.-Tech. Gaz.* **2020**, *27*, 1021–1024. [CrossRef]
40. Mathai, M.V.; Isenhour, C.; Stevis, D.; Vergragt, P.; Bengtsson, M.; Lorek, S.; Mortensen, L.F.; Coscieme, L.; Scott, D.; Waheed, A.; et al. The Political Economy of (Un) Sustainable Production and Consumption: A Multidisciplinary Synthesis for Research and Action. *Resour. Conserv. Recycl.* **2021**, *167*, 105265. [CrossRef]
41. Pacana, A.; Czeriwńska, K. Analysis of the causes of control panel inconsistencies in the gravitational casting process by means of quality management instruments. *Prod. Eng. Arch.* **2019**, *25*, 12–16. [CrossRef]
42. Gunawan, J.; Permatasari, P.; Tilt, C. Sustainable development goal disclosures: Do they support responsible consumption and production? *J. Clean. Prod.* **2020**, *246*, 118989. [CrossRef]
43. Stanikis, J.K. Sustainable consumption and production: How to make it possible. *Clean Technol. Environ. Policy* **2012**, *14*, 1015–1022. [CrossRef]
44. Pineiro-Villaverde, G.; Garcia-Alvarez, M.T. Sustainable Consumption and Production: Exploring the Links with Resources Productivity in the EU-28. *Sustainability* **2020**, *12*, 8760. [CrossRef]
45. Salimath, M.S.; Chandna, V. Sustainable consumption and growth: Examining complementary perspectives. *Manag. Decis.* **2021**, *59*, 1228–1248. [CrossRef]
46. Greenland, S.J.; Nguyen, N.; Strong, C. Irresponsible marketing and the need to support pro-sustainable production and consumption. *J. Strateg. Mark.* **2023**. [CrossRef]
47. Chopra, S.S.; Perera, O.; Sheffi, Y.; Srivastava, S.K. Aligning Purchasing Power with Sustainable Production and Consumption. *One Earth* **2020**, *3*, 3–4.
48. Carlsen, L. Responsible consumption and production in the European Union. A partial order analysis of Eurostat SDG 12 data. *Green Financ.* **2021**, *3*, 28–45. [CrossRef]
49. Hirschnitz-Garbers, M.; Tan, A.R.; Gradmann, A.; Srebotnjak, T. Key drivers for unsustainable resource use—Categories, effects and policy pointers. *J. Clean. Prod.* **2016**, *132*, 13–31. [CrossRef]
50. Di Vaio, A.; Palladino, R.; Hassan, R.; Escobar, O. Artificial intelligence and business models in the sustainable development goals perspective: A systematic literature review. *J. Bus. Res.* **2020**, *121*, 283–314. [CrossRef]
51. Weymouth, R.; Hartz-Karp, J. Principles for Integrating the Implementation of the Sustainable Development Goals in Cities. *Urban Sci.* **2018**, *2*, 77. [CrossRef]
52. Andreica, R.; Jaradat, M. Analysis of economic development and sustainable development of Romania. *Metal. Int.* **2011**, *16*, 9–12.
53. Firoiu, D.; Ionescu, G.H.; Bandoi, A.; Florea, N.M.; Jianu, E. Achieving Sustainable Development Goals (SDG): Implementation of the 2030 Agenda in Romania. *Sustainability* **2019**, *11*, 2156. [CrossRef]
54. Boto-Alvarez, A.; Garcia-Fernandez, R. Implementation of the 2030 Agenda Sustainable Development Goals in Spain. *Sustainability* **2020**, *2*, 2546. [CrossRef]
55. Rybalkin, O.; Lavrienenko, O.; Danilevica, A.; Lizinska, W. Sustainable Development Green Index: Measuring Progress Towards Sustainable Development Goals in The European Union. *Entrep. Sustain. Issues* **2023**, *10*, 279–292. [CrossRef] [PubMed]
56. Ostapenko, T.; Kolesnyk, M. Nanoeconomics and innovative marketing as factors of sustainable development in global environment. *Balt. J. Econ. Stud.* **2021**, *7*, 159–167. [CrossRef]
57. Romero Martin, G.; Caraballo, M.A.; Merchan Hernandez, C. From affective polarization to fruitful politics: A new public leadership inspired by the UN's 2030 Agenda. *Int. J. Public Leadersh.* **2023**, *19*, 81–93. [CrossRef]
58. Garcia-Pena, C.; Diaz, B.; Munoz, M.M. Balancing the sustainability in the 2030 agenda: The OECD countries. *J. Integr. Environ. Sci.* **2022**, *19*, 243–271. [CrossRef]
59. Hąbek, P.; Wolniak, R. Assessing the quality of corporate social responsibility reports: The case of reporting practices in selected European Union member states. *Qual. Quant.* **2016**, *50*, 399–420. [CrossRef]
60. Siwiec, D.; Pacana, A. Model Supporting Development Decisions by Considering Qualitative-Environmental Aspects. *Sustainability* **2021**, *13*, 9067. [CrossRef]
61. Metaxas, T.; Tsavdaridou, M. Green CSR practices: A European approach. *Int. J. Environ. Sustain. Dev.* **2014**, *13*, 261–283. [CrossRef]
62. Uyar, A.; Karmani, M.; Kuzey, C.; Kilic, M.; Yaacoub, C. Does Governance Quality Explain the Sustainability Reporting Tendency of the Public Sector? Worldwide Evidence. *Int. J. Public Adm.* **2022**, *45*, 931–947. [CrossRef]
63. Kliestikova, J. CSR reporting in specific conditions of Slovak Republic. In Proceedings of the Selected Papers of 5th World Conference on Business, Economics and Management (Bem-2016), Istanbul, Turkey, 12–14 May 2016; pp. 159–167.

64. Pacana, A.; Bednarova, L.; Pacana, J.; Liberko, I.; Wozny, A.; Malindzak, D. Effect of selected factors of the production process of stretch film for its resistance to puncture. *Przemysł Chem.* **2014**, *93*, 2263–2264.
65. Available online: https://ec.europa.eu/eurostat (accessed on 22 July 2023).
66. Available online: https://raportsdg.stat.gov.pl (accessed on 22 July 2023).
67. Lawor, B.; Hornyak, M. Smart goals: How the application of smart goals can contribute to achievement of student learning outcomes. *Dev. Bus. Simul. Exp. Learn.* **2012**, *39*, 259–267.