

Sustainability Assessment and the Importance of Environmental Indexes for Companies Operating in Slovakia

This paper assesses the sustainability of companies in Slovakia, emphasizing environmental indexes. We analyze commonly used indexes, with a focus on ESG (Environmental, Social, and Governance) and SDG (Sustainable Development Goals) indexes. The ESG index is a key indicator, evaluating companies' efforts in minimizing environmental impact, including energy efficiency, waste management, greenhouse gas emissions, and biodiversity protection. It provides investors with a tool to assess and compare the environmental sustainability of companies, promoting investments in environmentally responsible firms. The SDG index measures countries' progress towards UN's Agenda 2030 sustainable development goals, enabling comparison of environmental protection performance among countries. By comparing the ESG and SDG index scores for selected EU-27 countries, with Slovakia serving as a case study, we aim to identify their relative positions in terms of sustainability and the performance of individual countries within the EU. This information can be utilized as a guide for decision-making by firms and organizations in Slovakia, enabling them to take concrete measures to support sustainable development and improve their environmental, social, and governance performance. While data source and methodology variations can affect index results, critical analysis is recommended for informed decision-making.

Keywords: Sustainability Assessment, Environmental Indexes, ESG Index, SDG Index, EU-27, Slovakia

Introduction

In recent years, the search for higher efficiency of the production process has become a more relevant problem for thinking about microeconomic foundations, about the relationship between energy, the environment and growth. Private companies and their production technology are slowly moving away from their dependence on fossil energy sources. In addition, the roles of non-governmental organizations and a better institutional framework for environmental resources have become key inputs for achieving the goal of sustainable expansion of prosperity. In order to obtain an energy-efficient combination of inputs in the long term, it is necessary to increase the efficiency and productivity of the company's processes. To be effective and efficient, these profits should come from various sources such as technology, business models, management decisions, institutional directives, and regulatory policies.

The current energy crisis, climate change and increasingly serious environmental problems have begun to raise public concerns about environmental issues. Especially in recent decades, rapid economic growth has led to excessive consumption of natural resources and environmental degradation. Green

1 consumption is sustainable consumer behavior characterized by consumption that
2 is compatible with the protection of the environment for the present and for future
3 generations, which has attracted the attention of businesses and consumers in
4 recent years. The purchase and consumption of "green", ecological,
5 environmentally friendly products on a daily basis is beginning to be considered an
6 effective way of solving environmental problems.

7 We can conclude that consumption is inherently linked to sustainability,
8 because every decision about what to buy, how much to buy, how much to
9 consume and how to dispose of waste has a direct impact on the environment and
10 future generations. The essence lies in the ideas of how human decisions affect the
11 quality of the environment, how human values and institutions shape our demands
12 to improve its quality, and especially, how to design effective public policies to
13 achieve said improvements. Understanding the psychology behind environmental
14 or sustainable behavior is central to a sustainable future and large-scale behavioral
15 change. However, despite this, the obvious importance and substantial impact of
16 research in these areas is relatively low and significantly lagging behind. In the
17 European Union, there is a strong tendency to centrally introduce various kinds of
18 measures restricting currently used technologies and to promote others. There is a
19 constant emphasis on the need for sustainable development, investment in
20 innovative technologies through continuous and increased research and
21 development (R&D) spending.

22 A growing number of companies in various industries are currently pursuing
23 sustainable development goals in order to improve business efficiency, manage
24 stakeholder expectations or achieve compliance with legislation. This also applies
25 to companies that are under pressure from their stakeholders to manage and
26 improve their sustainability performance. This requires the development of
27 credible tools and measurement systems to capture and monitor sustainability.

28 The main goal of this professional article is to assess the sustainability of
29 companies operating in Slovakia, with an emphasis on the importance of
30 environmental indices. These indices provide us with a detailed view of the
31 companies' efforts to minimize the negative impact on the environment and enable
32 a comparison of their sustainability. The results of this study can serve as a guide
33 for the decision-making of companies and organizations in Slovakia, which will
34 enable them to take concrete measures to support sustainable development and
35 improve their environmental, social and management performance.

36 37 38 **Literature Review**

39 *Indices of Environmental Economics*

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41
42 In this section, we will provide an overview of global environmental indices
43 and their relevance to environmental economics, how they are used to evaluate the
44 effectiveness of environmental policies and measures, or how they are used to
45 measure the environmental impact of investment decisions.

46 In the next part, we will offer a detailed overview of the most important

1 environmental indices in terms of their purpose of application, number of
2 indicators, number of categories, sustainability dimensions, data sources,
3 normalization, category weights, method of aggregation and interpretation of
4 results. We will also take a closer look at specific indices that are used in the
5 assessment of the state of the environmental economy or the most well-known
6 indices affecting the sustainability of companies and organizations.

7 8 *Assessment of the State of Environmental Economics*

9
10 The state of the environmental economy is important to evaluate and assess in
11 larger contexts, while it is necessary to consider the sustainability of the systems
12 that are necessary for its existence. The assessment of the state of the
13 environmental economy can be carried out using **environmental indices** and
14 various **models** and **methods** that make it possible to quantitatively evaluate the
15 impact of economic activities on the environment and provide recommendations
16 for policy and decision-making on sustainable development.

17 *Environmental indices* are tools used to quantify and compare environmental
18 quality between different countries and regions. These indices include various
19 indicators such as greenhouse gas emissions, air and water quality, waste levels,
20 the amount of renewable energy sources and others.

21 Unlike environmental indices, we also know *environmental models* and
22 *methods* as versatile tools that contribute to scientific research, policy
23 development, decision-making by simulating the consequences of different
24 management strategies, risk assessment, resource management and public
25 involvement in environmental matters. Their applications go beyond
26 environmental indices and provide valuable insights into the complex interactions
27 between human activities and the natural world. Among the most used models are
28 linear programming, cost-benefit analysis, decision trees and various types of
29 econometric models.

30 31 *Global Environmental Indices*

32
33 Global environmental indices are important in the evaluation and assessment
34 of the state of the environment and sustainability, especially in terms of economic
35 activities. They provide measurable indicators that can be used to monitor the
36 impact of human activity on nature and how countries and societies strive to
37 minimize negative impacts and achieve sustainable development. Indices can thus
38 be useful to investment funds, businesses, governments and the public who seek to
39 invest, trade, manage and evaluate their activities and decisions in terms of their
40 environmental impact. In addition, global environmental indices can also be used
41 to compare performance between different countries, sectors and companies and to
42 identify areas where improvement is needed.

43 In the global discourse, sustainability is understood as a broad political
44 concept that is divided into three "dimensions" or "pillars": *environmental*,

1 *economic* and *social*.¹ Each of these three dimensions has its own unique purpose:
 2 the **environmental dimension** focuses on the protection of the environment, the
 3 renewability of natural systems and the sustainable use of natural resources to
 4 ensure their availability for future generations; the **economic dimension** focuses
 5 on the sustainability of economic growth and ensuring economic prosperity for
 6 current and future generations; the **social dimension** focuses on ensuring social
 7 justice and ensuring a dignified life for all people, regardless of their social status
 8 or financial means. In practice, this means that all three dimensions need to be
 9 considered when deciding how to ensure sustainable development.

10 Tables 1 and 2, divided into two parts, summarize the most important
 11 information about: (1) the main purpose of the index application; (2) the number
 12 of indicators and their relationship to the primary dimensions of sustainability; (3)
 13 number of categories; (4) dimensions of sustainability; (5) proposed and used data
 14 sources for each index; (6) the data normalization method used; (7) structure of
 15 indicators and component weights; (8) the method of aggregation of indicators
 16 used in the overall assessment; (9) interpretation of index results.

17
 18 **Table 1.** Comparison of selected environmental indices (Part I)

Index	(1) The purpose of the index application	(2) Number of indicators	(3) Number of categories	(4) Dimensions of sustainability
EPI ²	Measurement of current environmental capacity	32	11	environmental, social
EFI ³	Measurement of environmental resources	6	-	environmental
ESI ⁴	Measuring the long-term ability to protect the environment	76/21	5	environmental, social
EVI ⁵	Measuring environmental sensitivity	50	3	environmental, social
DJSI ⁶	Measuring business sustainability	depending on the sector (60 sectors)	3	environmental, social, economic
ESG ⁷	Measurement of the environmental, social and management practices of the company	depending on the data provider	3	environmental, social, economic

¹Purvis, Ben, et al. (2019). "Three pillars of sustainability: in search of conceptual origins". Sustainability Science. 14 (3): 681–695. doi:10.1007/s11625-018-0627-5. ISSN 1862-4065

²EPI Team. 2018 EPI Report; Yale University: New Haven, CT, USA; Columbia University: NY, USA, 2018.

³Galli, A.; Wackernagel, M.; Iha, K.; Lazarus, E. Ecological Footprint: Implications for Biodiversity. Biol. Conserv. 2014, 173, 121–132. <https://doi.org/10.1016/j.biocon.2013.10.019>

⁴Esty, D.C. et al. 2005. Environmental Sustainability Index: Benchmarking National Environmental Stewardship; Yale Center for Environmental Law & Policy: New Haven, CT, USA, 2005.

⁵Pratt, C.R.; Kaly, U.L.; Mitchell, J. Manual: How to Use the Environmental Vulnerability Index (EVI); SOPAC Technical Report 384; 2004. (accessed on 13 December 2022). URL: <<http://gsd.spc.int/sopac/evi/Files/EVI%202004%20Technical%20Report.pdf>>

⁶Dow Jones Sustainability Indices Methodology. (accessed on 13 December 2022). Available online: <https://www.spglobal.com/spdji/en/documents/methodologies/methodology-dj-sustainability-indices.pdf>

⁷MSCI ESG Indexes and MSCI Analytics (accessed on March 2020). URL: <<https://www.msci.com/our-solutions/indexes/esg-indexes>>

SDG 8	Measuring countries' efforts to achieve sustainable development goals	247	17	environmental, social, economic
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1 *Note:* WHO 2010. EPI - Environmental Performance Index; EFI - Ecological Footprint Index; ESI -
2 Environmental Sustainability Index; EVI - Environmental Vulnerability Index ; DJSI - Dow Jones
3 Sustainability Index; ESG - Environmental, Social and Governance Index; SDG Index –
4 Sustainable Development Goals Index.
5

6 **Table 2.** Comparison of selected environmental indices (Part II)

Index	(5) Data sources	(6) Normalization	(7) Category weights	(8) Aggregation method	(9) Interpretation of results
EPI	Primary, secondary, expert, forecasts, among others: WB, IEA, IMF, WRI, IHME, WWF, OECD, Eurostat, UNSD	linear transformation	PCA (Principal Component Analysis)/ expert	arithmetic	Ranking of countries; scale 0-100
EFI	Secondary, among others: FAO, IEA, UNSD, UNDP	none	Expert (conversion parameter)	arithmetic	Standardized global hectares (corresponding to average biological productivity); A value > 1 indicates unsustainability
ESI	Primary, secondary, among others: OECD, UNHABITAT, WHO, EEA, WRI, WWF, UNEP, FAO, UNFCCC, UNSD, WB, WEF, WTO, UNICEF, UNDP, DJSG, ITU, UNESCO, UNCCD, UNCBD	standard score	equivalent at the level of sub-indicators a indicators (expert)	arithmetic (except component level)	Ranking of countries; scale 0–100; The probability that the country will be able to effectively protect the environment in the coming decades
EVI	Secondary, among others: WRI, FAO, WB, UNEP, OECD, UNDP, EEA, EPA	none (point scale 1-7)	none	arithmetic (in the absence of data, the indicator is omitted)	Ranking of countries; 0–700 is reflected on a 5-point qualitative scale of susceptibility to environmental problems; Results and availability of data for indicators are reported; Results for the components are also provided
DJSI	Primary	none (point scale 0 - 100)	Expert	arithmetic	0–100 scale for the index and each of the components and indicators; Comparison with median and best

⁸ United Nations, Department of Economic and Social Affairs (2022). ISBN: 978-92-1-101448-8. URL: <<https://unstats.un.org/sdgs/report/2022/The-Sustainable-Development-Goals-Report-2022.pdf>>

					score
ESG	Primary, secondary, among others: MSCI, S&P Global, FTSE Russell, Bloomberg, Morningstar	none	Expert	arithmetic (except the importance level of the indicator)	Ranking of countries; scale 0–10; ESG Risk Ratings have a scale of 0-100
SDG	Primary, secondary, among others: MSCI ESG Research, Sustainalytics, RobecoSAM, FTSE Russell	min-max normalization on a scale from 0 to 100	Expert	arithmetic	Ranking of countries; scale 0–100

1 *Note:* DJSI—Dow Jones Sustainability Indexes; EEA—European Environment Agency;
2 EPA—Environmental Protection Agency; Eurostat—European Statistical Office; FAO—United
3 Nations Food and Agricultural Organization; IEA—International Energy Agency; IHME—Institute
4 for Health Metrics and Evaluation; IMF—International Monetary Fund; ITU—International
5 Telecommunication Union; OECD—Organisation for Economic Co-operation and Development;
6 UNCBD—United Nations Convention on Biological Diversity; UNCCD—United Nations
7 Convention to Combat Desertification; UNDP—United Nations Development Programme;
8 UNEP—United Nations Environment Programme; UNESCO—United Nations Educational
9 Scientific and Cultural Organization; UNFCCC—United Nations Framework Convention on
10 Climate Change; UNHABITAT—United Nations Human Settlements Programme; UNICEF—
11 United Nations Children’s Fund; UNSD—United Nations Statistics Division; WB—World Bank;
12 WEF—World Economic Forum; WHO—World Health Organization; WRI—World Resources
13 Institute; WTO—World Trade Organization; WWF—World Wildlife Fund.

14
15 In addition to the listed indices in the table, we record many global
16 environmental indices that are used in the assessment of the state of the
17 environmental economy. Some of the most famous include:

- 18
19 • **Environmental Performance Index (EPI)** – created by Yale University and
20 Columbia University, evaluates 180 countries based on their performance in
21 32 environmental indicators.⁹
22 • **Ecological Footprint Index (EFI)** – measures the impact of human activity
23 on the environment by calculating the necessary space for resource
24 production and waste absorption for a given population.¹⁰
25 • **Environmental Sustainability Index (ESI)** – evaluates the ability of
26 countries to maintain the economy and the environment.¹¹

⁹Wolf, M. J., et al. (2022). *2022 Environmental Performance Index*. New Haven, CT: Yale Center for Environmental Law & Policy. URL: <epi.yale.edu>

¹⁰Kitzes, J. (2009). *Ecological Footprint Standards 2009*. Oakland: Global Footprint Network. URL: <https://www.footprintnetwork.org/content/uploads/2019/05/Ecological_Footprint_Standards_2009.pdf/>

¹¹Saisana, M. (2014). *Environmental Sustainability Index (ESI)*. In: M. A. C. Encyclopedia of Quality of Life and Well-Being Research. Springer, Dordrecht. URL: <doi.org/10.1007/978-94-007-0753-5_899>

- 1 • **Green Growth Index** – measures the sustainability of the economy based on
2 consideration of environmental factors.¹²
- 3 • **Happy Planet Index (HPI)** – created by the New Economics Foundation,
4 includes indicators that measure the quality of life and the impact of human
5 activities on the environment.¹³
- 6 • **Climate Change Performance Index (CCPI)** – evaluates the performance of
7 countries in the field of climate protection, it also includes an assessment of
8 environmental policy and the impact on the health and quality of life of
9 residents.¹⁴
- 10 • **Environmental Vulnerability Index (EVI)** – aimed at measuring the
11 vulnerability of countries in relation to environmental impacts and the
12 country's ability to protect its environment.¹⁵

13
14 In addition to the global environmental indices mentioned above, which are
15 used to quantify and compare environmental quality between different countries
16 and regions, there are other global environmental indices that companies can use
17 to assess their environmental performance and compare with their competitors.
18 Some of these indices are global and industry-wide, while others are sector-
19 specific.

20 The most well-known indices affecting the sustainability of companies and
21 organizations are, for example:

- 22
23 • **Carbon Disclosure Project (CDP)** – evaluates companies according to their
24 efforts to reduce greenhouse gas emissions and improve their environmental
25 performance. CDP evaluates this information and publishes it in a score
26 called CDP Scorin.¹⁶
- 27 • **Dow Jones Sustainability Index (DJSI)** – measures the environmental,
28 social and economic performance of companies and includes more than 2,000
29 companies worldwide. This index is compiled by S&P Dow Jones Indices.¹⁷
- 30 • **Global Reporting Initiative (GRI)** – provides a framework for transparent
31 and comprehensive reporting on the environmental, social and economic
32 performance of companies. The GRI defines frameworks and standards for

¹²Acosta, L.A., et al. (2019). *Green Growth Index: Concepts, Methods and Applications*. GGGI Technical report No. 5, Green Growth Performance Measurement Program, Global Green Growth Institute, Seoul.

¹³Marks, N. et al. (2006). *The Happy Planet Index: An Index of Human well-being and environmental Impact*. NEF. URL: <https://neweconomics.org/uploads/files/54928c89090c07a78f_ywm6y59da.pdf>

¹⁴Burck, J. et al. (2023). *Results: Monitoring Climate Mitigation Efforts of 59 Countries plus the EU – covering 92% of the GGE*. URL: <<https://www.germanwatch.org/sites/default/files/ccpi-ksi-2023-kurzfassung.pdf>>

¹⁵Schepelmann, P. et al. (2010). *Towards Sustainable Development: Alternatives to GDP for measuring progress*. Wuppertal Institut für Klima, Umwelt, Energie GmbH 2010. 23-38. ISBN 978-3-929944-81-5.

¹⁶Whelan, T., & Fink, C. (2016). *The comprehensive business case for sustainability*. HBR.

¹⁷Naqvi, M., & Jus, M. (2019). *The Benchmark that Changed the World: Celebrating 20 Years of the Dow Jones Sustainability Indices*. ESG Data, Rankings & Benchmarking.

1 reporting and evaluating environmental factors.¹⁸

- 2 • **ESG Index** (Environmental, Social and Governance – ESG) – evaluates
3 environmental, social and administrative factors affecting the sustainability of
4 companies. ESG indices are compiled by various companies and
5 organizations (MSCI, S&P Global, FTSE Russell, RobecoSAM, ISS ESG
6 and Bloomberg) and serve as a tool for investment decision-making.¹⁹

7
8 One of the most well-known indices affecting the sustainability of companies,
9 the ESG index, will be discussed in more detail in the results section, where we
10 will zoom in on the ESG index on individual Slovak representatives of the
11 automotive industry.

12 13 14 **Methodology**

15
16 Based on the established main goal of the professional article, we will
17 describe the basic methodology and research methods through which we will try to
18 draw conclusions in order to maximize benefits not only from the point of view of
19 economic theory, but also economic practice.

20 It is important to note that the analysis of environmental economics indices
21 and their subsequent application will be carried out in the decision-making of
22 firms in imperfectly competitive markets. Imperfect competition can occur in
23 different industries and in different forms. Industries such as the *automotive*
24 *industry* (e.g. Volkswagen Slovakia, a.s.), *energy* (e.g. Slovenské elektrárne, a.s.),
25 *telecommunications* (e.g. Orange Slovensko, a.s.), *the financial sector* (e.g.
26 Slovenská sporiteľňa, a.s.) and the like are often susceptible to imperfect
27 competition. These companies are not alone in the market in their industry, but
28 they have a significant market share and their competition is limited, which can
29 affect prices, supply and quality of service to customers.

30 One of the best-known ESG indices in the automotive industry is the MSCI
31 World Automobiles ESG Leaders Index. It includes automobile companies
32 worldwide, from large international brands to smaller local companies (*Toyota*,
33 *BMW*, *General Motors*, and others). This index evaluates companies based on
34 environmental performance, social factors and governance.

35 We are gradually getting to the main goal of this article, which is to compile
36 an analysis of the ESG index for 4 car manufacturers operating in Slovakia:

- 37
38 • **Volkswagen AG** (SK: Volkswagen Slovakia, 1991)
39 • **Stellantis NV** (SK: Stellantis Slovakia, 2006)
40 • **Kia Motors Corporation** (SK: Kia Slovakia, 2006)
41 • **Jaguar Land Rover** (SK: Jaguar Land Rover Slovakia, 2018)
42

43 Due to the unavailability of the ESG index score of SK representatives, we

¹⁸Global Reporting Initiative. URL: <<https://www.globalreporting.org/about-gri/>>

¹⁹MSCI (2023). *30 years of ESG Indexes*. URL: <<https://www.msci.com/our-solutions/indexes/esg-indexes>>

1 decided to conduct a global analysis of selected automotive concerns. We chose
 2 CSRHub ESG as our source database, which has access to employee,
 3 environmental, community and governance ratings of large companies in North
 4 America, Europe and Asia.

7 **Results**

9 One of the important tools in environmental economics are environmental
 10 indices, which play an important role in measuring and evaluating the
 11 environmental efficiency of various economic entities, such as enterprises,
 12 industries, regions, or countries. These indices provide relevant information on
 13 how successfully these entities manage their environmental impact and are able to
 14 achieve their environmental goals.

15 We can consider environmental indices as an important entry into the
 16 knowledge of environmental economics, and their importance has been increasing
 17 rapidly in recent years due to the increasing awareness of environmental problems
 18 and the need to solve them. With the help of indices, we can quantify
 19 environmental data and factors such as emissions, waste, resource use and other
 20 environmental impacts, and create measurable indicators from them that can be
 21 used to assess the environmental impact of economic activity.

23 *Application of ESG and SDG environmental indices to EU-27 countries*

25 The ESG index is currently one of the important indicators in the field of the
 26 environment, which evaluates the environmental, social, and governmental factors
 27 of companies and investment products. It focuses on environmental aspects and
 28 measures how well companies take care of the environment and try to minimize
 29 their negative impact. The ESG index considers various factors such as energy
 30 efficiency, waste product management, greenhouse gas emissions and biodiversity
 31 protection. It provides investment companies and investors with an important tool
 32 for evaluating and comparing companies in terms of their environmental
 33 sustainability. This index helps to support and stimulate investments in
 34 ecologically responsible companies and contributes to sustainable development
 35 and environmental protection.

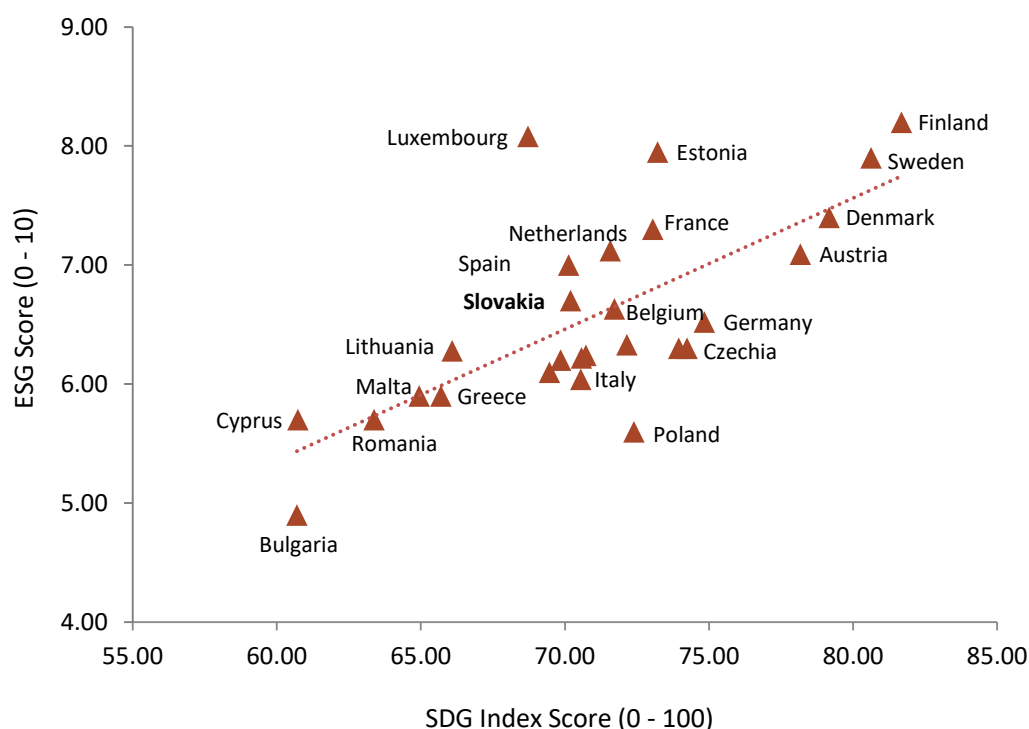
36 The SDG index, also used as the "*sustainable development goals index*",
 37 represents an indicator that measures and evaluates the progress of countries in
 38 meeting the sustainable development goals set by the United Nations (UN) as part
 39 of the 2030 Agenda.²⁰ Using the SDG index, it is possible to compare and evaluate
 40 the performance of individual countries in the area environmental protection and
 41 contribute to global efforts to achieve sustainable development. We consider it an
 42 important tool for monitoring progress and supporting measures to protect the
 43 environment and achieve the goals of sustainable development at the global level.

44 Based on the above-mentioned characteristics of the ESG and SDG indices,

²⁰Jones P, Hillier D, Comfort D, (2017). The sustainable development goals and the financial services industry. Athens Journal of Business and Economics, 3(1), 37-50.

we decided to compare their scores for selected EU-27 countries, with the help of which we identify their pan-European position in the area of sustainability and the performance of individual countries. The practical use of this information can serve as a guide for decision-making and taking measures to support sustainable development and improve the environmental, social and government performance of countries within the European Union. However, it is important to keep in mind that the results of these indices may vary depending on the data sources, measurement and evaluation methods, and therefore critical analysis and comparisons are necessary.

Figure 1. Comparison of ESG and SDG index score of EU-27 countries for 2022



Source: Own processing according to MSCI ESG Fundamentals Country Score, and UN (SDG Score), 2022

Before we evaluate the results from Figure 1 and 2, it is important to realize how the individual indices or index scores expressed. The ESG score uses a scale from 0 to 10, most commonly within ESG rating agencies such as MSCI. The SDG index uses a scale from 0 to 100 to evaluate the success of countries in achieving the sustainable development goals set by the United Nations.

Figure 1 shows that by comparing the values of the ESG index and the SDG index, we obtained a group of strong countries with a significant commitment to sustainability and achieve high performance in the areas of environmental, social and governmental factors. **Finland** with the SDG index (81.68) and ESG (8.20), **Sweden** with the SDG index (80.63) and ESG (7.90), **Denmark** with the SDG index (79.17) and ESG (7.40). This means that the selected Scandinavian countries achieve high values due to a strong emphasis on extensive environmental policies

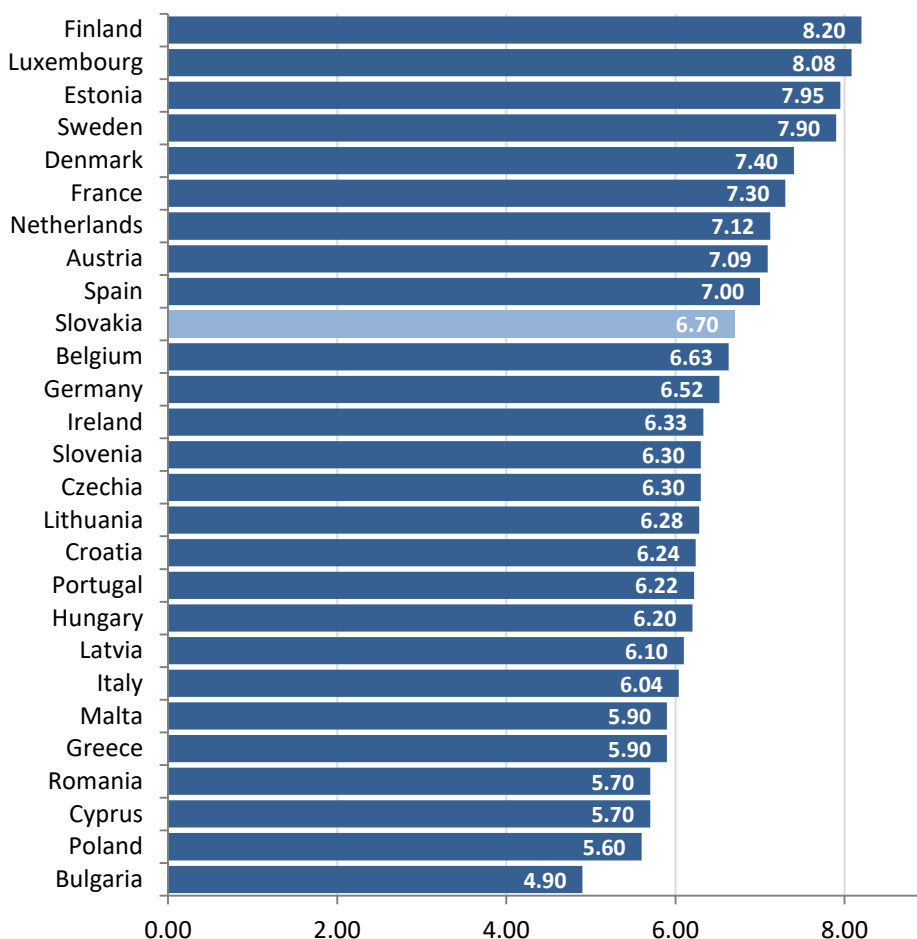
1 and commitments that focus on reducing greenhouse gas emissions, using
2 renewable energy sources, protecting biodiversity and improving air and water
3 quality. Furthermore, they are characterized by high social justice and a high
4 quality of life for their residents, where they have well-developed social programs
5 aimed at healthcare, education, pensions and social security. Their effective
6 legal and regulatory frameworks promote transparency, anti-corruption, and
7 responsible governance, fostering collaboration among businesses, citizens, and
8 government for sustainable development. Investments in renewable energy,
9 resource efficiency, and a socially just economy boost their ESG and SDG results,
10 setting an example for other nations and encouraging global cooperation in
11 sustainability and environmental protection.

12 Our neighboring country **Austria** is not far behind the mentioned countries
13 with an SDG (78.17) and ESG (7.09) index, followed by **Germany** with an SDG
14 (74.84) and ESG (6.52) index. Within the Visegrad group (V4), we can evaluate
15 the initial position of the **Czechia** with a value of 74.24 and ESG (6.30) according
16 to the SDG index. It is followed by **Poland** with 72.40 and ESG (5.60), **Slovakia**
17 with a score of 70.20 and ESG (6.70) and in last place **Hungary** with a value of
18 69.85 and ESG (6.20).

19 In this case, we could approach several factors that can explain the similar
20 placement of the V4 countries in the assessment of the ESG and SDG indices. One
21 of the reasons is the **significant dependence on fossil fuels** such as coal and gas in
22 their energy mix, which can negatively affect their ESG and SDG results, as these
23 fuels have a significant negative impact on the environment and climate. The
24 economies of these countries are **largely based on industry**, including heavy
25 industry and manufacturing with high greenhouse gas emissions.²¹ In some cases,
26 these countries may **lag behind in terms of infrastructure** and **investment** in
27 renewable energy sources and environmentally sustainable projects. Lack of
28 sufficient resources and investments may affect their ability to achieve higher
29 values in the ESG and SDG indices. **Regulatory frameworks** and **political will**
30 can also have a significant impact on environmental performance and
31 sustainability efforts.

32
33

²¹Jones P, Comfort D, (2021). The sustainable development goals and leading European retailers. Athens Journal of Business and Economics, 7(1), 105-122.

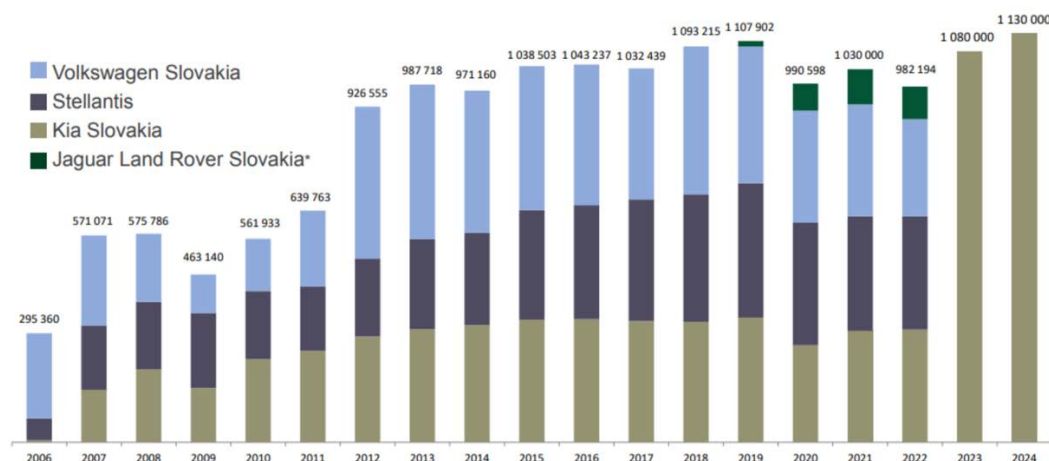
1 **Figure 2.** *ESG reporting on sustainability in EU-27 countries for 2022*

2
3 *Source:* Own processing according to MSCI ESG Fundamentals Country Score, 2022

4
5 *The automotive sector and its current situation in Slovakia*

6
7 Picture no. 3 we reach the position of the Slovak automotive sector and
8 according to current data obtained from the Association of the Automotive
9 Industry of the SR, the production of cars in Slovakia reached slightly more than
10 one million eighty thousand vehicles in 2023, which represents an approximately 4
11 percent increase compared to the previous year. It is also interesting that in
12 February 2024 this year, the **17,000,000th** vehicle was produced in Slovakia
13 (ZAP, 2024). Car production per capita places Slovakia at the top of the world,
14 **198 passenger motor vehicles** produced per 1,000 inhabitants in 2023. This
15 indicator is followed by the Czechia, Slovenia, Hungary, Germany, Spain and
16 Sweden.

17
18

1 **Figure 3.** Slovakia - vehicle production over the past years (2006 – 2024)

2
3
4 Source: Own processing according to ZAP | Automotive Industry Association of Slovakia, 2024

5 Note: The last years 2023 and 2024 offer only preliminary results of all car manufacturers together,
6 as ZAP worked with incomplete data.

7
8 At the beginning of 2021, we could observe a significant increase in car
9 production and sales, and forecasts showed that 2021 will be a strong competitor
10 to the record year 2019. In comparison, this year Slovakia produced 1.11 million
11 cars and sold 101,568 vehicles. However, the semiconductor crisis and the new
12 waves of the COVID-19 pandemic did not help this forecast, but Slovak
13 automakers dealt with it relatively well. Car brands such as *Jaguar Land Rover*
14 and *Volkswagen* focused on producing higher-priced vehicles, which protected
15 them from larger impacts. *KIA Motors Slovakia* had almost no problems with the
16 supply of chips and at the end of the year it started production of the fifth
17 generation Sportage model. Starting from the second quarter, the *Stellantis*
18 *Slovakia* plant (historical name: until January 2021, Groupe PSA Slovakia) was
19 the most affected, which had to cancel 111 production shifts.

20 However, despite the worsened situation, the automotive industry in 2022
21 accounted for 50.3 percent of total industrial production in Slovakia and accounted
22 for more than 42 percent of the country's total exports. The number of employees
23 in this area increased by more than 10,000 employees. Direct employment was at
24 the level of 176,000 workers, while the total number of employees reached
25 261,000.

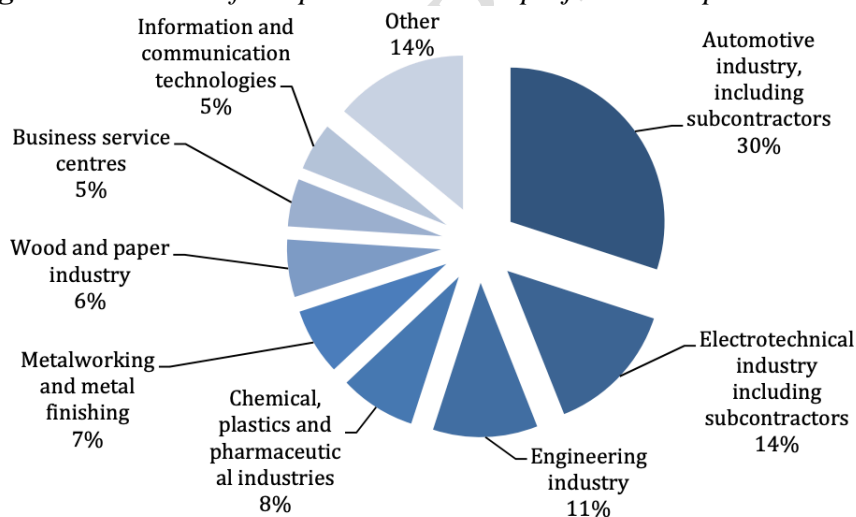
26 SARIO (Slovak Investment and Trade Development Agency) has been
27 operating in Slovakia since 2003 under the auspices of the Slovak Ministry of
28 Economy, whose task is to support Slovakia's investment, export and innovation
29 potential (SARIO, 2022a). The activity of the SARIO agency includes not only the
30 support of the expansion of established companies and foreign investments with
31 export potential, but also the diversification of sectors, the increase of added value
32 and employment in the least developed regions of Slovakia. During the last twenty
33 years, 609 investment projects were implemented, which created almost 136,000
34 jobs and brought investments of more than 13.5 billion euros (SARIO, 2022b). In
35 recent years, we can observe the trend of increasing investments with higher added

1 value, such as research and development centers, technology and design centers, as
 2 well as an increased number of large investments with multiplier effects on the
 3 subcontracting network. In 2021, 29 investment projects with a total value of 464
 4 million euros were completed, creating more than 3,000 new jobs.

5 From the point of view of the regional distribution of investments, in the last
 6 two years (2020 - 2021) it was found that the position of the Banská Bystrica
 7 Region weakened slightly, while the position of the Trnava Region strengthened.
 8 The Prešov region still lags behind, not only in terms of the number of completed
 9 projects, but also in terms of the number of jobs created. In the structure of
 10 completed investment projects by country of origin in the period from 2002 to
 11 2021, Germany is the clear leader (19%), which is in line with Slovakia's foreign
 12 trade. The second highest share is South Korea (9%), followed by the USA (7%)
 13 and Austria (6%).

14 Figure no. 4 illustrates the distribution of **completed projects by sector**, with
 15 the automotive industry including subcontractors accounting for nearly a third, the
 16 electrical engineering industry including subcontractors accounting for
 17 approximately one-seventh, and the engineering industry accounting for a ninth.
 18 The SARIO agency played a role in the realization of automotive industry
 19 investments, including *Jaguar Land Rover* in Nitra (2015), *Stellantis Slovakia* in
 20 Trnava (2003), *Kia Slovakia* in Žilina (2004), as well as in the expansion of the
 21 *Volkswagen Slovakia* plant in Bratislava (2008, 2020).

22
 23 **Figure 4.** Structure of completed investment projects in the period 2002-2021



24
 25 *Source:* Based on SARIO data (2022b)

26
 27 In the coming years, the further development of Slovakia's foreign trade will
 28 be largely influenced by the situation in the automotive industry, as it is important
 29 for the Slovak economy from various points of view. In addition to making up a
 30 third of industrial exports, it represents 13% of Slovakia's total GDP and more than
 31 half of industrial production, where it employs nearly 300,000 people. The
 32 automotive sector is currently facing a number of challenges, including the impact
 33 of the pandemic, which has manifested itself mainly in the disruption of supply

1 chains. The war conflict in Ukraine poses a challenge to Slovakia's foreign trade
 2 by reducing trade with Russia and Ukraine.

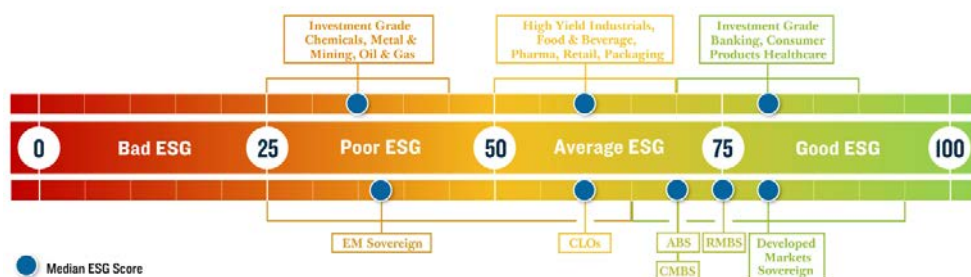
3 In addition to global events such as the pandemic and the war conflict in
 4 Ukraine, the automotive sector across Europe is also facing a transformation due
 5 to decarbonization, which includes the automation and electrification of vehicles.
 6 The successful management of this transformation is critical for Slovakia, as it
 7 would be reflected in macroeconomic indicators and the development of regions
 8 with significant automobile production. If Slovakia could successfully transform
 9 the automotive sector, it could strengthen its position in electric vehicle
 10 production. However, it should be emphasized that the transformation should also
 11 include the reduction of individual transport and the support of public transport,
 12 which could lead to a decrease in the demand for cars. The impact of the
 13 pandemic, the war conflict in Ukraine, the transformation of the automotive sector
 14 and Slovakia's ability to face these challenges remain important factors for the
 15 future export and overall performance of the Slovak economy in the coming years.

16
 17 *Application of the ESG index to the Slovak automotive sector*

18
 19 ESG indices are used to evaluate environmental, social and government
 20 criteria that have an impact on the performance of companies within their industry.
 21 In the case of the automotive industry, there are various ESG indices that evaluate
 22 these criteria for individual automotive plants. In addition, there are other ESG
 23 indices in the automotive industry, such as the S&P Global Clean Energy Index,
 24 which focuses on companies producing clean energy and technologies for its use.
 25 This index also includes automakers that are engaged in the production of electric
 26 vehicles or other alternative drives, such as Tesla.

27 Figure 5 shows the scoring scale of the ESG index score from 0 to 100
 28 percent, according to which we can interpret the obtained results of the analyzed
 29 companies.

30
 31 **Figure 5. Scoring scale of the ESG index score (0-100%)**



32
 33 *Source: Own processing according to CSRHub ESG*

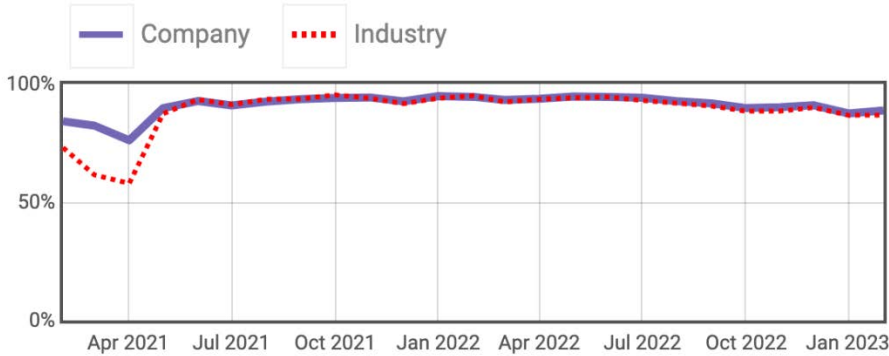
34
 35 Figures 6, 7, 8 and 9 show us the history of the ESG index rating for all four
 36 automotive representatives compared to the industry from April 2021 to January
 37 2023, when we can observe interesting developments by period.

38 Due to the unavailability of the ESG index scores for Slovak representatives,
 39 we decided to conduct a global analysis of selected automotive concerns. We used

1 *CSRHUB ESG*²² as our source database, which provides ratings on employee,
 2 environmental, community, and governance performance for large companies in
 3 North America, Europe, and Asia.

4

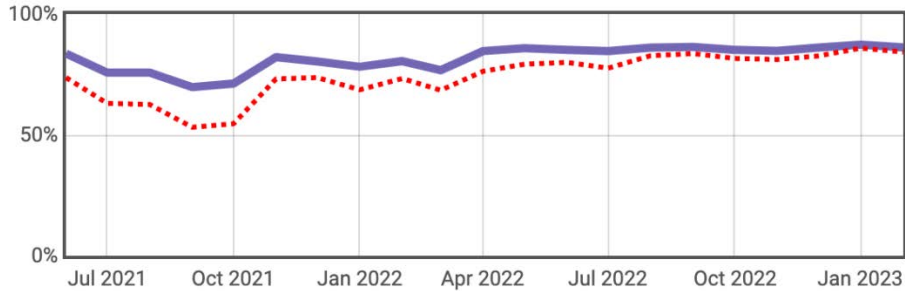
5 **Figure 6.** *ESG index evaluation history - Stellantis NV*



6

7

8 **Figure 7.** *ESG index evaluation history - Jaguar Land Rover*



9

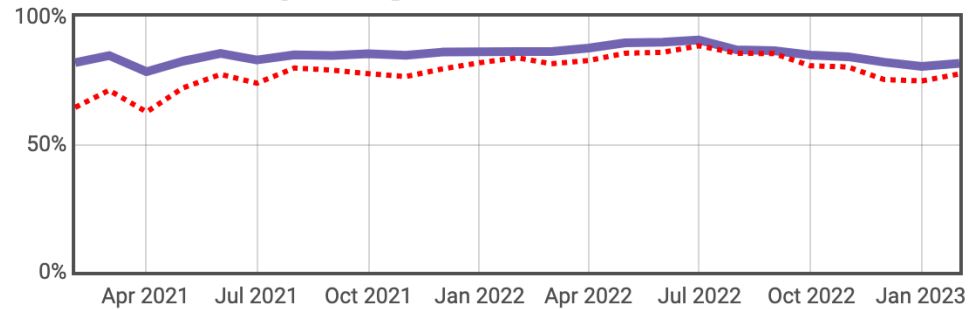
10

Source: Own processing according to CSRHub ESG

11

12

Figure 8. *ESG index evaluation history - Kia Motors Corporation*

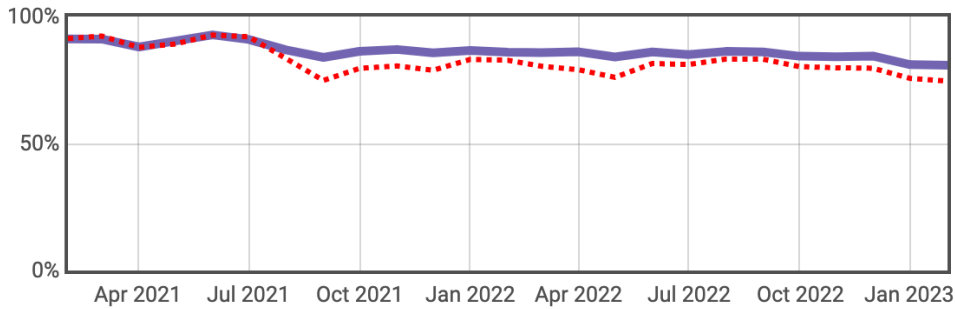


13

14

²²The first company to combine data from 10 leading Socially Responsible Investing (SRI) (aka ESG) analytics companies and over 600 NGOs, government agencies, news outlets, social media groups, smaller for-profits and publishers. The tools combine more than 510 million pieces of data on sustainability and CSR performance into a consistent set of ratings.

1 **Figure 9. ESG index evaluation history - Volkswagen AG**



2
3 *Source: Own processing according to CSRHub ESG*

4
5 By analyzing the ESG index for four automotive representatives, according to
6 the *CSRHub ESG database*, we obtained the results shown in Table 3, which show
7 **Stellantis NV**²³ as the leader with the highest ESG score of 89%. **Jaguar Land**
8 **Rover**²⁴ came in second with an ESG score of 86%. In third place we see **Kia**
9 **Motors Corporation**²⁵ with an ESG score of 82%. Last place was taken by
10 **Volkswagen AG**²⁶ with an ESG score of 81%.

11
12 **Table 3. Automotive Company ESG Index Rating in 2023**

<i>Automotive companies</i>	<i>Stellantis NV</i>	<i>Jaguar Land Rover</i>	<i>Kia Motors Corporation</i>	<i>Volkswagen AG</i>
<i>ESG score</i>	89 %	86 %	82 %	81 %
<i>Order of success</i>	1.	2.	3.	4.



13
14
15
16
17
18
19 *Source: Own processing according to CSRHub ESG*

20
21
22 **Conclusions**

23
24 The overall results achieved in the ESG index indicate that the given
25 companies achieve a high level in the field of environmental, social and
26 governance factors. This result indicates that companies are actively concerned

²³A concern that was created in January 2021 by the merger of the French company Groupe PSA with the Italian-American company Fiat Chrysler Automobiles. It is a joint-stock company based in the Netherlands.

²⁴Jaguar Land Rover Limited is a British multinational automobile company based in Great Britain, which was founded in 2008. It is a subsidiary of the Indian automobile company Tata Motors.

²⁵Kia Motors Corporation is a sister company of the South Korean corporation Hyundai Motor Company, and also a member of the Hyundai Motor Group, which was founded in 1944.

²⁶The Volkswagen Group, with its headquarters in Germany, is one of the leading and largest manufacturers of cars and commercial vehicles, which was founded in 1937.

1 with sustainability and responsible management of their business with minimal
2 negative impact on the environment and with respect to employees and society as
3 a whole.

4 Based on the analysis of rating agencies and investment companies focused
5 on ESG performance of companies, we found that for most Slovak companies this
6 concept is still relatively new. Finding a balance between sustainability and
7 responsible business, with minimal negative impact on the environment and with
8 an emphasis on employees and society, is the key to assessing company
9 performance through ESG criteria. This concept is more often discussed in
10 companies with an international context, especially since 2021, when it began to
11 be talked about the obligation to publish information on sustainability according to
12 the exact standards that are currently being finalized at the European level.

13 According to analyzes by Mazars, approximately 30 Slovak companies are
14 currently dealing with the issue of sustainability, but only a third of them would
15 meet the stricter criteria for reporting. What is new is that this published
16 information will have to undergo an independent audit and companies will store it
17 in a central digital system. Under the new rules, companies should start publishing
18 reports on non-financial indicators in 2025 for the year 2024.

19 ESG indices are becoming an increasingly popular tool for investors who
20 want to invest in companies that consider environmental and social factors as well
21 as the management of their businesses. These indices are often used to measure
22 and compare the performance of companies based on their ESG scores. The higher
23 the company's ESG score, the higher the rating of its environmental, social and
24 governance performance. Investor interest in ESG indices has increased in recent
25 years, as more and more people and companies seek to invest in sustainable
26 development and consider environmental and social factors when making
27 investment decisions.

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