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Key Corporate Sustainability Assessment Methods for Coal Companies

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Abstract: Many businesses view sustainability issues as important and design corporate sustainability strategies. However, creating such a strategy does not mean the company will progress in sustainable development because the factors influencing businesses remain largely unexplored. Based on a review of studies on corporate sustainability, we identified the major factors affecting any company's sustainability. They include government regulation, imperfect management, interaction with stakeholders, corporate self-regulation and self-reflection, and the regulatory framework, and can be consolidated into two groups. We also analyzed the groups of methods that can be used to assess a company's sustainability: traditional corporate sustainability assessment methods, circular economy assessment methods, ESG assessment methods, and non-financial performance indicators. For each group of methods, limitations were identified, and it was concluded that corporate sustainability assessments should factor in the environment in which the company operates. As part of this study, a lack of methods for assessing the corporate sustainability of coal companies was revealed, along with insufficient consideration of industrial factors in the prior literature. These factors are responsible for incorrect corporate sustainability assessments in the coal industry. Taking into account the division of Russian coal companies into three types (energy companies, metal manufacturers, and coal producers) and the aspects of their functioning against the backdrop of economic restrictions (including sanctions and embargoes), the authors prove that each group of companies requires an individual corporate sustainability assessment methodology.

Keywords: corporate sustainability; sustainable development; coal companies; corporate sustainability factors; corporate sustainability assessment methods; mineral assets; ESG

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1. Introduction

In recent years, corporate sustainability issues have become the subject of discussion at the international, national, and corporate levels. The steady growth of interest in these issues is confirmed by a large number of scientific publications [1–3], analytical reviews and studies [4–6], and international regulations [7–10].

By studying academic works and classifying approaches to assessing corporate sustainability (CS), we made a conclusion that there is currently no universal or holistic view on the phenomenon of sustainable development (SD) at the micro level of individual businesses. Other problems include underdeveloped theoretical foundations of sustainable development at various levels of the economy, a lack of systematization and integration of the already existing approaches to CS interpretation, a lack of a universal CS assessment methodology, and insufficient consideration of the specific features of the mining industry.

CS integrates the general SD principles (economic, environmental, and social) within company management, strategies, operations, and business processes. By means of doing business, companies can contribute to the sustainable development of the economy and society [11]. However, they are more interested in managing the internal environment and may neglect SD issues at the macro level.

Some CS studies focus on developing CS concepts and consider voluntary CS activities as a driving force for company performance. Other studies look at internal and external factors that foster or hinder the integration of CS principles into strategic management [12]. Researchers revealed that it can be difficult to implement a strategy that is consistent with SD principles and is formulated to address the Sustainable Development Goals (SDGs) relevant to the company [13–15]. Overall, CS methodologies, including the principles and tools for CS assessment and management relationship, are based on studying how CS is connected with sustainable development, corporate social responsibility (CSR), environmental, social, and governance (ESG) issues, and the company's competitive advantages.

As CS definitions and interpretations are inconsistent, CS factors are understudied, and current CS assessment methods lack in their consideration of specific features of individual industries, the scientific community has yet to develop a high-quality set of tools for measuring input parameters and results in assessments relevant for corporate sustainability management [16].

Researchers all over the world have worked on designing theoretical and methodological CS assessment approaches but their results are often inconsistent. There are two major reasons for this. The first one is that, for decades, SD has been predominantly studied at the global and national levels, with much less attention paid to individual businesses [17]. The second is the huge variety of CS assessment indicators, which is a result of multiple approaches to the CS definition [16].

Understanding, developing, and implementing a methodology and system for comprehensive CS analysis and assessment are aimed at making companies more competitive by means of [18]:

- Designing an effective system for short- and long-term corporate management that factors in both economic and non-economic consequences of the company's activity;
- Expanding the scope of the company's financial reporting and, consequently, increasing the value of its business results;
- Creating a communication environment through interacting with interested participants (stakeholders);
- Strengthening the company's financial performance and sustainability and, as a result, its market position [19].

The number of publications devoted to corporate sustainability assessment has been steadily growing since 2015 [20]. This trend can probably be explained by the fact that this is the year when the 17 Sustainable Development Goals were adopted. Two more reasons for this growth are discussed in a study by Silva et al. The first is that stakeholders are dissatisfied with the available approaches to measuring and assessing sustainable development; the second is that there is a gap between research and practice [21].

There are quantitative and qualitative CS assessment indicators (for example, non-financial CS reporting can be both quantitative and qualitative) [22,23]. In our opinion, quantitative assessments can be more informative for stakeholders since they make it possible to compare the company's sustainability with that of its competitors or the average for the market (if there is such a goal) and to monitor CS trends. This is what makes the quantitative approach to CS assessment dominant at present.

Studies identify two methodological approaches to CS assessment [24]:

(1) Single-index approach (methods proposed by Rahdari and Rostamy [25], Figge [26], and others);
(2) Composite-index approach (for example, the DJSI index, etc.).

The triple bottom line (TBL) concept serves as a foundation for many assessment methods but there is no universal approach to the selection of indicators within each area [24].

Different CS assessment methods demonstrate the following general trends [24]:

- Growth in the company's shareholder value and profits often serves as a CS indicator in the economic domain;

- The environmental domain is assessed through various ecological indicators with economic or natural units of measurement;
- The social domain is not always included in the assessment due to the complexity of measuring the company's impact on social processes at various levels.

In the scientific literature on the topic, many CS assessment methods focus on particular industries, such as agriculture [27–31], education [32], tourism [33], etc. Factoring in their aspects produces highly specialized indicators: agroecosystem efficiency indicators, tourism sustainability assessment maps, etc. However, there are no studies focusing on coal companies and their CS indicators. We will consider methods that may be applicable to the coal sector, taking into account its nature.

Researchers studying corporate sustainability in the coal sector highlight the lack of scientific articles devoted to the industry. The available studies can be divided into two groups [34]:

- Studies where the significant difference between the coal industry and other industries is not taken into account, with CS in the coal sector being viewed through the lens of general CS assessment principles;
- Studies that take into consideration the fact that the coal industry has specific features and a significant impact on the ecological, economic, and social aspects of the environment where the company operates.

It is difficult to agree with the studies belonging to the first group because coal companies undoubtedly have their individuality. The second approach is more justified but unfortunately, it is in the initial stages of development. This makes it necessary to provide a rationale for a set of CS assessment indicators to be applied to coal companies in the current conditions of sustainable development.

The objectives of our study are as follows:

1. Analyzing different CS assessment methods and determining the principles on which a methodology for assessing the corporate sustainability of coal companies can be based;
2. Substantiating a classification of factors for assessing corporate sustainability in the coal sector and identifying the most influential factors in light of current trends in the coal industry and institutional regulation.

2. Materials and Methods

This study is based on a comparative analysis, consolidation, and classification of CS factors and assessment methods discussed in academic articles selected by the authors.

Research methodology:

1. Analyzing CS assessment methods, which includes a study of assessment methods used in related areas (ESG, circular economy, sustainable development) [34]. The search for scientific publications was carried out using Science Direct and Scopus for the period from 2002 to 2022 by the keywords "assessment of corporate sustainability", "measuring corporate sustainability". Twenty-seven methods were assessed that are described in scientific publications, reports by research institutes (National Research Institute of Finance of the Ministry of Finance of the Russian Federation), and corporate reporting standards (SASB (Coal Operations) and GRI (GRI 12: Coal Sector 2022));
2. Comparing assessment indicators used in different CS assessment methods and their consolidation;
3. Analyzing CS factors and identifying those most significant for CS assessment. The analysis was carried out in order to identify factors affecting the resulting indicator of the CS assessment and to assess the significance and applicability of factors considered in the scientific literature for coal companies;
4. Analyzing trends in the coal industry in order to assess their impact and identify CS factors specific to coal companies;

5. Assessment of the institutional regulation impact on coal companies as the most important factor in determining the ability to provide CS.

Our literature review covers scientific articles indexed in the Scopus database, post-graduate studies, and documents published by analytical agencies on various CS aspects from 2002 to 2021.

This article consists of four sections. The Introduction analyzes the relevance of the study and formulates its objectives. The Materials and Methods section presents the methodology of the study. The Results and Discussion section presents a classification and analysis of CS assessment methods, an analysis of CS factors, the key trends in Russia's coal industry, and an analysis of the impact of institutional regulation on coal companies. The final section presents the main conclusions of the study.

3. Results and Discussion

3.1. An Analysis of Corporate Sustainability Assessment Methods for Coal Companies

Taking into account previous studies on the topic, we find it necessary to refine the definition of corporate sustainability for the coal sector. A coal company's corporate sustainability is its ability to manage economic and ESG risks, of which the key ones are ongoing changes in the structure of coal markets, decarbonization trends, and the fact that coal companies are often primary employers. This definition serves as a foundation for collecting and analyzing data on CS and ESG assessment, non-financial reporting standards, and circular economy assessment methods that cover the economic domain of sustainable development.

The methods analyzed were classified into groups: CS assessment methods, circular economy assessment methods, ESG assessment methods, and non-financial reporting standards used in the coal sector. Such classification is based on our previous studies of the concept of corporate sustainability and interrelated management concepts [34], and is presented in Figure 1.

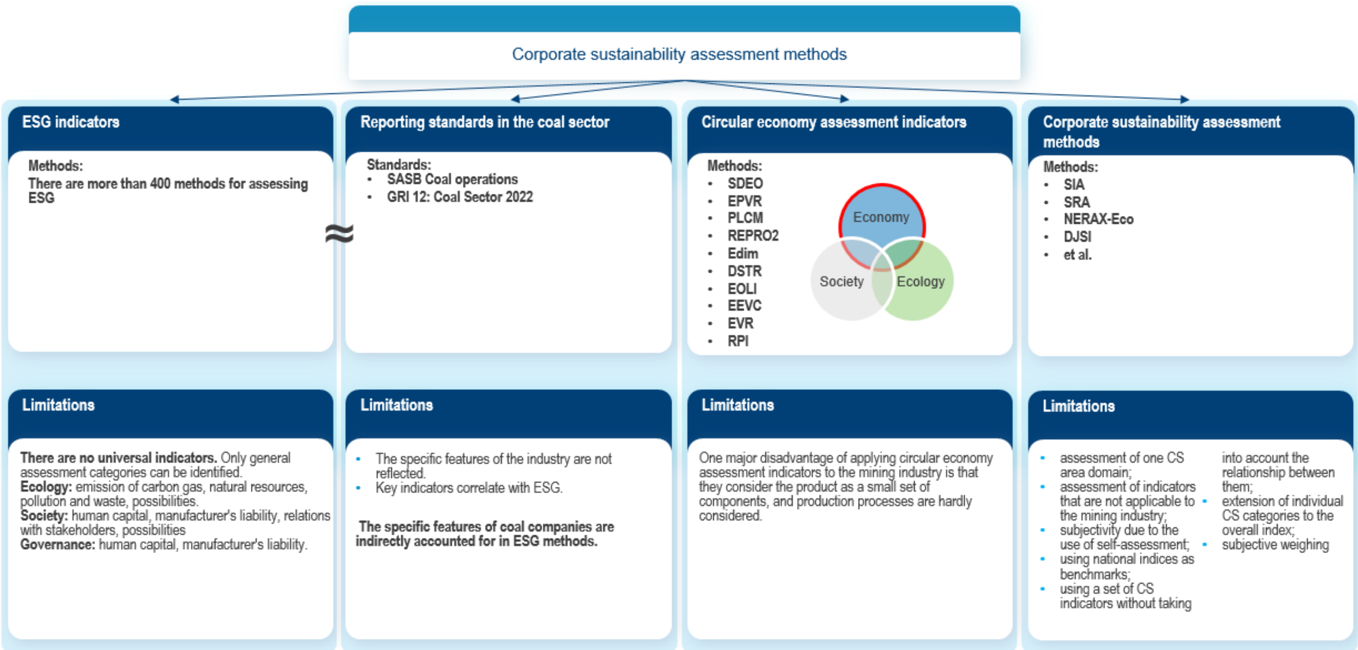

Figure 1. Corporate sustainability assessment methods [compiled by the authors].

CS assessment methods have limitations:

- Most of them assess only one individual CS domain (society, economy, or ecology). Examples include the Social Impact Assessment (SIA), Social Return Assessment (SRA), and NERAX-Eco environmental indicators;

- They analyze industrial indicators that are not applicable to the mining industry (agroecosystem efficiency indicators, tourism sustainability assessment maps, etc.);
- Some of them are subjective due to the use of self-assessment methods (for example, DJSI);
- Others are subjective due to the use of weighting factors for each CS domain (methods proposed by Nikolaou et al., Kocmanová et al. [24,35]);
- Using national indices as benchmarks (Figge et al. [36]);
- Using a set of CS assessment indicators without factoring in their relationships (for example, Labuschagne et al. [37]);
- Extending individual CS categories to the overall index (for example, the method proposed by Phillis et al. determines CS through environmental indicators; Munoz et al. use CSR for that purpose [38,39]);
- Lack of well-defined indicators (the method proposed by Rahdari and Rostamy [25]).

Since ESG methods are the intellectual property of rating agencies, in most cases they are not published in the public domain. In this regard, publications of scientific organizations with an analysis of ESG methods were considered.

Additionally, we analyzed SASB Coal Operations and GRI (GRI 12: Coal Sector 2022) reporting standards used to assess the performance of coal companies.

A comparison of ESG methods was carried out according to the evaluation indicators within each of the three components of the ESG. The analysis showed that there is no single list of indicators for environmental, social, and management components [40]. However, it is possible to single out groups of indicators that are used in ESG methods [41] (Table 1).

Table 1. Environmental indicators by ESG assessment methods [compiled by the authors].

ESG Component	Indicator Group	Examples of Indicators
Environmental indicators	Climate changeamimi (emission of carbon gas)	Release of carbon gas Carbon footprint Funding for environmental impact mitigation Company/product vulnerability to climate change
	Natural resources	Water scarcity Biodiversity Land use Sources of natural raw materials
	Pollution and Waste	Toxic emissions and waste Packaging materials and waste Electronic waste
	Possibilities	Clean technologies Green environment Energy transition
Social indicators	Human capital	Personnel Management Health and Safety Development of human capital Labor standards in the supply chain
	Manufacturer's liability	Product quality and safety Chemical safety Reliability of financial instruments Data privacy and security Responsible investment Security and demographic risks

Table 1. *Cont.*

ESG Component	Indicator Group	Examples of Indicators
	Relations with Stakeholders	Opposing interests and conflicts Public relations
	Possibilities	Availability of communication Financial accessibility Access to healthcare Nutrition and health
Government indicators	Human capital	Diversity on the Board of Directors Manager Compensation Responsibility Accountability
	Manufacturer's liability	Business ethics Anti-corruption measures Stability of the financial environment Tax transparency

Most of the indicators are quite general, which requires clarification and specification for specific companies.

Table 1 shows that the largest number of indicators for the environmental component is presented in two groups: indicators for CO_2 emissions and the use of natural resources. As ESG methods are associated with risk assessments, it can be concluded that such a number of indicators is intended to analyze risks in detail.

Indicators for the social component of the methodologies are more diverse than the environmental and management components. All social indicators are related to relationships with stakeholders, which indicates an increase in the influence of the importance of companies understanding their interests [42], and correctly assessing and building relationships with stakeholders for the CS. Otherwise, resources from stakeholders of the required quantity, quality, and time may not be received.

While corporate governance indicators are well-known and standardized, it is difficult to formalize their assessment and evaluate them objectively.

By comparing the ESG methods and their indicators, it was revealed that in each ESG domain, there are categories evaluated by all the agencies reviewed, which signals their importance for CS assessment. However, due to the fact that the agencies vary in their evaluations of individual categories, it is difficult to choose universal CS assessment indicators.

We also analyzed non-financial reporting standards—SASB (Coal Operations) and GRI 12: Coal Sector 2022—as they specialize in assessing the performance of coal companies. The aim was to identify indicators that are not covered by either CS or ESG or circular economy assessment methods. We found that the standards have a number of advantages (transparency, comparability, accuracy, comprehensiveness, and relevance), and their indicators correspond to those used in the ESG methods, which allows us to conclude that the specific features of coal companies are implicitly accounted for in the ESG methods [43,44].

Some studies focus on strong sustainability when considering CS assessment methods [24,45]. Given the relationship between strong sustainability and the conservation of natural and mineral assets, circular economy (CE) indicators were considered and their applicability to coal companies was assessed. Many researchers divide CE indicators into environmental, social, and economic or use similar categories. Studies differ in terms of how they group the same indicators [46–48].

We analyzed whether it is possible to apply CE indicators to CS assessment in its economic domain, studying all indicators labeled as economic, socioeconomic, or economic–environmental. They can be divided into three groups:

- Indicators evaluating the product and its design. They analyze each component of the product and reflect its overall circularity (SDEO, EPVR, PLCM, REPRO2, Edim, DSTR, EOLI, EOLI-DM) [49–56];
- Indicators considering environmental costs and efficiency (EEVC, EVR) [57,58];
- Indicators covering not only economic but also other factors for improving social and environmental development at the company or product level (for example, PR-MCDT) [59].

After classification, the following conclusions were drawn.

CE indicators evaluating the product and its design are less important for coal companies because they generate products that are meant for industrial purposes and have a limited and predetermined set of properties whose improvement does not always result in profits.

To assess the circularity of mining companies, only the reuse potential indicator is applied, which allows for making decisions on using waste as a resource [60]. This indicator provides information on the technical feasibility of waste reuse before assessing market conditions, showing how the development of new technology changes the use of waste.

The main idea of the indicator is that the ability to reuse waste is created by knowing where and how to reuse it. The reuse potential increases as technological capabilities expand, allowing more materials to be recovered from an existing product. Such a concept is inherently dependent on time, or on the emergence of innovations in production and consumption. Materials are transformed from waste to potential resources or vice versa, representing an evolutionary or revolutionary process. The reuse potential varies by country and region due to differences in the quality of materials, the level of technological development, and institutional regulation.

Finally, the reuse potential is affected by the amount of waste generated. If more waste becomes produced with all other conditions being equal, the need for technological development will increase, and the potential value of reuse will decrease if no additional technologies are developed. Moreover, the indicator does not reflect the real level of circularity as it does not explain which option is better: a more cost-effective technology or a technology that uses more waste as a resource.

The analyzed assessment methods do not consider the peculiarities of the coal industry. In our opinion, such an approach cannot objectively assess the CS of coal companies, since the coal industry has specific considerations that should be taken into account in the process of CS assessment method development [11,34]:

- Coal mining companies have a major impact on the environmental, economic, and social development of mining regions and countries with resource-based economies;
- They actively support and increase mineral assets;
- They efficiently and rationally use natural capital, including mineral assets, as well as soil, land, water, and forest resources;
- They develop and implement CSR strategies based on a combination of the balanced interests of stakeholders;
- They are associated with high environmental risks;
- The majority of social and environmental consequences of the coal companies' activities are long-term and are resolved by government involvement for a long time;
- The efficiency of the economic activity of a coal company depends on the mining and geological conditions of the fields and the physical and chemical properties of the minerals, as well as the economic and geographical location of the coal enterprise.

In our opinion, CS assessment should take into account not only the performance of the company but also the following factors:

1. Factors affecting CS. Academic studies discuss factors that can affect CS. Therefore, in CS assessment, it is necessary to take into account, among other things, how the company manages these factors;

2. Industrial factors. The functioning of the company is influenced by industry trends [61]. In our opinion, if there is a crisis in the industry, individual companies cannot maintain their sustainability. In addition, favorable factors in the development of the industry can stimulate CS. This means that the state of the industry affects the sustainability of its companies.

In our opinion, the resulting CS assessment indicator is sensitive to both groups of factors; therefore, it is advisable to take into account and consider these factors in CS assessments.

3.2. Factors Affecting Corporate Sustainability: Identification and Analysis

Our analysis shows that researchers discuss five major factors that can affect the implementation of a CS policy [62]: government regulation, imperfect management, interaction with stakeholders, corporate self-regulation and self-reflection, and the regulatory framework. Most researchers consider the role of government institutions and stakeholders in relation to these five factors.

In our opinion, these factors can be consolidated into two groups as follows:

Group 1: government regulation and the regulatory framework as the factors that are most often mentioned;

Group 2: imperfect management, interaction with stakeholders, corporate self-regulation, and self-reflection as factors manageable within the company.

From our literature review, we concluded that the growing demand for corporate sustainability among companies encourages researchers and practitioners to implement sustainability tools for successful future development. The public sector needs collaboration with stakeholders for mutual understanding and better synergies in sustainable development. Corporate management needs to implement CS strategies as it is a necessary precondition for ensuring high CS indicators [22]. If businesses are committed to the principles of CS and collaborate with the government, conditions are created for greater progress in the CS domain.

3.2.1. Corporate Sustainability Factors: Group 1

While the company is not responsible for the local community, the government can use legislation to ensure that business practices meet social requirements. This is especially important for coal companies as they have a massive impact on the territories where they operate, which makes it necessary for them to consider such issues as the rational use of minerals and other natural resources without harming the environment. Therefore, the active role of governments is essential to ensure CS in the coal industry.

For example, in recent years, Chinese regulators have forced Chinese companies to switch to CS systems to become more competitive internationally [63]. In emerging economies, the manufacturing sector is highly energy-intensive. Therefore, it is important to pay attention to CS issues related to the use of energy sources [64], primarily coal. Industrial growth in China has led to a huge amount of carbon dioxide emissions. According to researchers, the influence of the government can solve global environmental problems caused by this pollution through a respectful attitude to the environment [65–67].

In order to motivate businesses to adopt green technologies, the government needs to use reasonable levers to strengthen and expand the links between companies' environmental performance and long-term competitiveness [68]. These levers should aim to develop markets that systematically encourage environmentally responsible corporate practices. A. V. Khoroshavin formulated three main types of government CS strategies [69]:

- Implementation of regulatory measures (taxes, levies, etc.) that promote environmental innovation [70];
- Information disclosure initiatives (in the form of corresponding legislation or banning public funds from investing in companies that do not disclose their information);

- Assisting businesses in the development and use of SD tools and instruments (preferential tax policies, co-financing, and other incentives for the design and implementation of new technologies) aimed at gaining environmental and financial benefits.

Gardner and Sinclair argue that the role of the government is crucial in eradicating pollution problems [71]. Fairbrass has concluded that governments need to hold discussions with various stakeholders in the development of CS policies [72]. The subsidiarity approach advocates addressing and solving environmental problems at the local level in EU countries, preferably with the participation of local authorities and citizens [73]. When striving for sustainability, businesses can solve social problems and become part of society. However, the latter is not guaranteed, and it is largely based on self-regulation and self-reflection [73]. If CS issues are understood, companies can avoid ESG risks and become highly competitive [74,75].

The experience of two fast-growing economies of the Asia–Pacific region (APR)—China and Vietnam—proves that coal companies need government support to be sustainable.

Despite the global trend toward achieving carbon neutrality by 2060, the coal markets of the Asia–Pacific region continue to grow. The key reasons are as follows: relatively low prices compared to other energy sources; the depletion of coal reserves is not expected in the long term; advancements in coal-fired power generation technologies [76].

Between 2015 and 2019, China annually consumed from 3.95 to 4.12 billion tons of coal. At the beginning of 2020, the country's coal industry started moving towards decarbonization while increasing production, which necessitated higher environmental standards. The share of coal in the structure of China's fuel and energy balance today exceeds 60%; in recent years, the government of the country has been increasing the construction of thermal power stations (TPS) with overcritical and super-overcritical steam parameters in order to increase the efficiency of electricity generation and to decrease the emission reduction into the atmosphere [77].

From 2016 to 2020, China decommissioned more than 4300 old coal mines with a total output of 850 million tons due to their becoming less profitable. The end of 2020 saw a drop in production as a consequence of the crisis caused by the COVID-19 pandemic. This was particularly noticeable in the production of building materials and chemicals, which heavily relies on coal [77].

Coal supply disruptions and production lagging behind consumption led to an energy crisis in the fall of 2021. More than twenty Chinese regions experienced problems with electricity supply, which, according to estimates by Goldman Sachs, had an impact on about 44% of Chinese industrial facilities.

In fighting the crisis, the Chinese government aimed to increase coal production while reducing prices and raising energy tariffs. The following measures were taken: production was resumed at previously closed mines; coal production increased by 5.7% compared to 2020; electricity prices were increased; and tax benefits were provided to coal-fired power plants [78].

China has more than half of the world's coal-fired power plant capacity. In 2021, the Chinese government announced it would stop developing new coal power projects abroad as part of the transition to carbon neutrality by 2060 [79]. In the same year, the National Development and Reform Commission of China (NDRC) published the fourteenth energy Five-Year Plan (FYP) for the period from 2021 to 2025, which focuses on two main topics in the energy sector: improving energy security by increasing domestic production, as well as peaking carbon emissions by 2030 and reaching carbon neutrality by 2060, which implies the gradual phase-out of coal generation [80].

Under the new energy policy, China will peak carbon emissions from 2021 to 2026. In order to facilitate the energy transition process in the context of the country's high dependence on coal generation, the energy sector needs government regulation mechanisms. China has taken financial and regulatory support measures for the coal mining sector, such as a CNY 200-billion yuan (USD 31.3 billion) loan program to support the clean and efficient use of coal, and financing coal-bed methane recovery projects [79].

In the first half of 2022, coal consumption in China decreased by 3% due to slower economic growth and an increase in hydropower generation. From March to April 2022, coal imports from Russia doubled, amounting to 19% of the total coal supplies to China, which was facilitated by a period of zero duty on imported coal.

The gradual displacement of coal from China's energy sector is a complex and multi-stage process. For example, in the summer of 2022, electricity consumption in China skyrocketed, necessitating an increase in coal production to meet the demand and prevent massive power outages. It is predicted that global coal consumption in 2023 will remain practically unchanged compared to 2022, while coal consumption in China will increase by 1%, or by 43 million tons, which will require an increase in imports [81].

According to Rhodium Group, China accounts for about 26.1% of global carbon emissions, 97% of which comes from coal combustion. Due to this, China's strategy to achieve net zero emissions involves not only replacing fossil fuels with renewable energy sources but also making coal combustion less carbon-intensive, which necessitates the use of carbon capture, utilization, and storage (CCUS) technologies [82]. By the end of 2021, there was a positive trend in reducing the carbon footprint, with the country actively using green bonds and an emissions trading system. According to the Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy by the NDRC, there are three major carbon milestones [83]:

1. In 2025: A decrease in energy consumption of 13.5% and carbon emissions of 18% from the 2020 level; the share of non-fossil energy consumption reaching 20%; the forest stock volume growing to 18 billion cubic meters;
2. In 2030: A 65% reduction in carbon emissions from the 2005 level; the share of non-fossil energy consumption reaching 25%; the forest stock volume growing to 19 billion cubic meters;
3. In 2060: With the share of non-fossil energy consumption exceeding 80%; the country will have become carbon-neutral.

Achieving these strategic goals requires that the government fosters infrastructure upgrading in such areas as information technologies, digital technologies, and cutting-edge research. The introduction of digital technologies in all economic and social sectors in China can improve energy efficiency and promote a sustainable energy transition through system innovation [84].

Vietnam is one of the twenty largest consumers of coal in the world. Coal-fired power plants generate about 28% of the country's energy. According to the Program for the Development of the Coal Industry of the Socialist Republic of Vietnam until 2035, the demand for coal will increase by a factor of 2.5 in 2030 compared to 2019, when consumption amounted to 43.35 million tons, reaching almost three-fold growth by 2035. The country is becoming industrialized and it has been relying on coal imports to meet the growing demand for energy since 2015. The major challenges for the national coal industry are the depletion of open-pit mine reserves, outdated technologies, difficult working conditions, and a high level of industrial hazards (rock explosions, methane emissions).

As more than 80% of coal production is controlled by Vinacomin, a state-owned enterprise, the upgrading of the coal industry requires government support, including effective management measures that factor in the geographical, geological, and technological requirements associated with the development of coal deposits [68].

However, the global trend toward achieving carbon neutrality by 2060 has made changes to the national program for the development of the coal industry. Its key goals now are a gradual transition to renewable energy sources and limiting coal production growth rates [85]. According to the Power Development Plan for the period 2021–2030 with a vision until 2045 (PDP VIII), Vietnam plans to abandon the construction of new coal-fired power plants and reduce the share of coal in the energy mix to 9.5% [86]. Demand for primary energy, including coal, will continue to increase, peaking in the period from 2030 to 2035 due to growth in demand from such sectors as electricity generation, cement manufacturing, metallurgy, and chemical technology. To ensure the sustainable development of the coal industry, the Vietnamese government encourages the use of coal for non-energy purposes, such as the production of nitrogen fertilizers and chemicals. After 2040, the demand for coal will gradually decrease due to the transition to renewable energy sources [87].

One of the reasons why Vietnam does not plan to build new coal-fired power plants is the fact that China has stopped investing in international coal power projects. After 2030, Vietnam will actively commission coal-fired power plants using clean technologies. Despite the diversification of energy sources, Vietnam will continue to use coal in the short and medium term to avoid an energy crisis and energy supply disruptions [88]. As of today, Vietnam is the leading renewable energy market in Southeast Asia. During the 27th Conference of the Parties to the UN Framework Convention on Climate Change (COP27) in November 2022, it was agreed to provide Vietnam with USD 15 billion to ensure its low-carbon transition [89].

3.2.2. Corporate Sustainability Factors: Group 2

To provide businesses with better practices, researchers have identified several management factors hindering CS. For example, a study on China's metal manufacturing sector revealed twelve CS barriers, eleven of which are within the management domain [90]. They include poor planning, inefficient waste management, low supplier selection criteria, lack of finances, inefficient technology, lack of senior management commitment to CS principles, communication problems, lack of employee training, lack of awareness among stakeholders (including owners), insufficient environmental compliance, and lack of effective employee welfare plans. Other authors have also identified barriers of this kind [91–94]. For example, according to Nykvist and Nilsson, the management barrier is created by a lack of time, experience, resources, or data sufficient for decision-making. It is also connected with structural barriers, including the behavior of policy makers [92].

By tackling management barriers, connections can be made between corporate and national levels to achieve CS results. Regulation (for all levels, including corporate) creates conditions for the selection and application of the best solutions for CS purposes.

Clarke and Roome emphasize the stakeholders' role in the adaptation of environmental practices and demonstrate why inviting experts or consultants is beneficial for selecting more effective CS strategies [95]. Morgan shows that it is necessary to develop more planning in the field of CS policy development and implementation, which results in moving to a higher level of management, including minimizing risks and bridging the gap between business and society [96].

Mathis demonstrates that a higher level of stakeholder management through the implementation of CS strategies helps to develop closer ties with public authorities. He proves that stakeholders influence the CS policy development process and emphasizes that a proactive approach to CS policy in the private sector leads to self-regulation [97].

3.3. Trends in Russia's Coal Industry

The global coal industry is under the growing influence of economic, environmental, and social trends, which include decarbonization efforts, reactivation of coal-fired power plants, the growing share of renewable energy sources in the energy mix, and the increasing adoption of green technologies.

At present, the key factor influencing Russia's coal industry at the macro level is the impact of sanctions and embargoes imposed by some countries (mainly European) on the products of Russian manufacturers. For example, in August 2022, the EU stopped importing Russian coal. Reduced supplies to Europe are offset by growing exports to Africa, the Middle East, and South Asia. There is a shortage of supply in these regions as major coal producers seek to satisfy the demand on the European market first [98]. There are also obstacles to transportation in the eastern and southern directions. For example, India is willing to buy cheap, low-quality coal but shipping and insurance costs are very high [99].

Exports are limited by the capacity of the railway connecting Russia and the Asia–Pacific region [100]. Increasing supplies to the Asia–Pacific region, which is now the main importer, is impossible, so the sector cannot compensate for the loss of other markets. This creates obstacles to CS at the level of the industry. National demand for coal can hardly be boosted as many power plants have been converted, with most CHP power plants using gas as fuel. Due to the obstacles to international trade and the limited domestic market, a surplus of coal has accumulated. The IEA expects the export of thermal coal from Russia to fall by 10% in 2022 to 157 million tons. The decline, according to the agency's prediction, will proceed in the next three years. The export of thermal coal from Russia will fall in 2022 by 10% to the level of 2021 to 157 million tons, as the International Energy Agency (IEA) predicted in its Coal 2022 review [101].

A well-known alternative application for coal is the production of coal-derived chemicals. Over the past 25 years, the chemical sector has been steadily growing in advanced economies, with about 200,000 products manufactured [102]. The main reason why the coal chemistry industry should be boosted is the forecast of a steady decline in demand for coal in Europe and the countries of Northeast Asia (China, South Korea, and Japan), which account for 75% of Russian coal exports. This decline is primarily due to environmental requirements becoming more stringent.

While market factors are beneficial for coal chemistry, the profitability of many projects in this sector is insufficient. Building a coal-based chemical factory with a capacity of 400,000 tons of low-density polyethylene costs USD 4.7 billion (CAPEX), which is 2.7 times more expensive than building a traditional petrochemical facility running on naphtha. Operational expenses depend on the price of raw materials. Even when buying 2.6 million tons of coal at USD 50 per ton versus 1.1 million tons of naphtha at USD 700 per ton, traditional petrochemistry remains more profitable, with the internal rate of return (IRR) of the project being 10% versus 7% for coal chemistry [103].

Based on the foregoing, we can conclude that there are prospects for coal chemistry in Russia but the industry needs government support. This may improve CS in the medium or long term but will not solve the problem with current production volumes and accumulated coal reserves.

All coal companies in Russia can be divided into three categories:

Type I. Metal manufacturers and their suppliers. They mainly focus on producing coking coals. These include SDS, Mechel, EVRAZ, UMMC, and the South Siberian Trading House (New Mining Management Company). In the context of a coal surplus in the Russian market, such companies depend on the metallurgical sector in which there is an opportunity to boost domestic demand by increasing the volume of metal production for railway and civil construction purposes.

Type II. Energy companies. They produce coal and generate energy for their own use or sale to consumers. These include SUEK, Kuzbassrazrezugol, Stroyservis, Elgaugol, the Solntsevsky coal mine, Russian Coal, and Taltek. The development of such companies in the context of a coal surplus will be limited by the lack of opportunities to increase exports and the impossibility of increasing domestic demand for thermal coal since most power plants (for example, Surgutskaya, Kostromskaya, Permskaya, VAZ, Yuzhnaya, Severo-Zapadnaya, Krasnodarskaya, etc.) operate on gas [104].

Type III. Coal producers. They extract and sell coal. Examples include Mosbasugol, Arktikugol, Suntartseolit, and others. Due to a substantial surplus of coal in the domestic market and changes in international markets, such companies may experience significant problems.

Factors influencing the coal industry (changes in the structure of international markets, decarbonization trends, and the role of the primary employer) affect different types of companies to varying degrees, so each type should be assessed by different sets of CS indicators.

For example, type I and type II companies are mostly non-public, which makes their assessment using core ESG indicators not feasible. The coal surplus makes type II and III companies most vulnerable to factors negatively affecting the CS in the coal sector because the demand for coking coal has been relatively stable over the past few years [105], and it is impossible to increase national demand in the energy generation sector within the country in a short time frame.

In our opinion, the CS assessment of coal companies should simultaneously take into account two groups of factors:

(1) Factors affecting the resilience (sustainability) of the industry. This group of factors includes industry trends and the degree of state regulation and determines the ability of the industry to recover and adapt after the impact of external factors. Government regulation ensures the resilience of the industry, as the regulatory framework can create a "loop" of resilience. Taking into account the identified trends that negatively affect the coal industry in modern conditions (change in market structure, falling sales, demand and price volatility), a reasonable level of government support can become an industry recovery driver in various countries, including Russia;

(2) Factors affecting the CS of coal companies. This group of factors is determined by the peculiarities of conducting activities in accordance with the three-type classification of coal companies. These factors include organizational features, for example, the presence of organizational barriers, the level of business diversification, etc.

4. Conclusions

1. This literature review showed that corporate sustainability assessment methods differ in the number and composition of indicators, the degree of aggregation, the method of calculating the resulting value, weighting factors, and CS progress assessment, while not taking into account the specific features of the coal industry;
2. Due to significant differences between CS assessment methods, it is impossible to identify universal CS assessment indicators. The problem lies in choosing a limited set of indicators that will ensure a comprehensive and detailed CS assessment;
3. Twenty-seven CS assessment methods were analyzed that can be classified into traditional corporate sustainability assessment methods, circular economy assessment methods, ESG assessment methods, and non-financial performance indicators. None of the analyzed methods can be used to assess the CS of coal companies due to the lack of the coal companies' specific consideration;
4. Current CS assessment methods have a number of limitations. Most of them are based on ESG principles or TBL principles. The lack of methods for assessing CS without restrictions shows the shortage of corporate sustainability management tools. In our opinion, CS assessment should factor in the environment in which coal companies operate. ESG principles rather than indicators should serve as the core of the methodology as the latter have a large number of shortcomings;
5. Most researchers identify five major factors that can affect the process of implementing a CS policy: government regulation, imperfect management, interaction with stakeholders, corporate self-regulation and self-reflection, and the regulatory framework. In our opinion, these factors can be consolidated into two groups, with one focused on government regulation and the other connected with management barriers. Our literature review shows that government regulation is the most influential factor;
6. Factors affecting CS can be considered in the CS assessment. For the mining industry (coal industry), the main factors are industry factors and government regulation factors. Both groups of factors affect the resilience of the coal industry, which can ensure the CS of a particular coal company, depending on their strength and degree of influence;
7. Russian coal companies can be divided into three types depending on their business models: metal manufacturers, energy companies, and companies engaged in the extraction and sale of coal. Factors influencing the coal industry (changes in the supply structure, decarbonization trends, the role of the primary local employer)

affect different types of companies to varying degrees, so companies of each type should be assessed using different sets of CS indicators;

8. CS assessment in the coal sector should include two stages: the assessment of an individual coal company depending on its type and the assessment of trends in the industry, as they largely affect the functioning of companies.

Limitations of this study: the proposed principles for CS assessment can be used in Russian coal companies based on the analysis of trends and development factors of the Russian coal industry. For coal companies in other countries, sectoral analysis, analysis of macroeconomic trends, and development factors of individual coal companies depending on their type, should be applied. Additionally, the unique factors for each country and the government regulatory framework of the coal industry should be analyzed.

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