Revista Jurídica vol. 02, n°. 74, Curitiba, 2023. e-6371 Abril-Junho
pp. 01 – 19 ISSN: 2316-753X

DEVELOPING THE ESG RATING METHODOLOGY FOR RUSSIAN COMPANIES

Dmitry Anikin
Plekhanov Russian University of Economics, Moscow, Russia
https://orcid.org/0009-0001-9715-0616
anikin_dmitry02@mail.ru

Yulia Finogenova
Plekhanov Russian University of Economics, Moscow, Russia
https://orcid.org/0000-0003-3336-927X
finogenova.yy@rea.ru

Kristina Subbota
Plekhanov Russian University of Economics, Moscow, Russia
https://orcid.org/0009-0000-5451-3731
kristinasubbotakristina@mail.ru

Aleksandra Ermakova
Plekhanov Russian University of Economics, Moscow, Russia
https://orcid.org/0009-0000-0460-4811
aleksandra.v.ermakova@gmail.com

ABSTRACT

Objective: This article discusses the assessment model used to evaluate the ESG (Environmental, Social, and Governance) performance of companies. The purpose of this article is to present a new ESG (Environmental, Social, and Governance) rating methodology developed in accordance with the recommendations of the Bank of Russia and explain its benefits for sustainable investment in the context of the Russian market.

Methods: The data structure, preprocessing, and scoring methodology have been elaborated. The scoring algorithm considers the intrinsic value of each criterion and evaluates the relative performance of a company within an industry. The methodology discussed here can provide a basis for investors to select companies based on ESG performance.

Results: The authors accomplished several tasks in this study, including introducing the concept of ESG and discussing its importance, describing sources of data and criteria used to evaluate sustainable development, and developing a methodology for assessing ESG scores. They also discussed the benefits of this methodology for the Russian market and created a consolidated rating of companies based on ESG factors.

Conclusion: The authors have developed a comprehensive and objective assessment model for evaluating the Environmental, Social and Governance (ESG) factors of companies in Russia. The model's approach to data collection, preprocessing, and scoring provides investors with reliable and informative data for making responsible investment decisions.

Keywords: ESG performance, assessment model, scoring methodology, qualitative and quantitative data, industry rank.

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Março 11 2023]

DESENVOLVIMENTO DA METODOLOGIA DE RATING ESG PARA EMPRESAS RUSSAS

RESUMO

Objetivo: Este artigo discute o modelo de avaliação utilizado para avaliar o desempenho ESG (Ambiental, Social e Governança) das empresas. O objetivo deste artigo é apresentar uma nova metodologia de classificação ESG (Ambiental, Social e Governança) desenvolvida de acordo com as recomendações do Banco da Rússia e explicar seus benefícios para o investimento sustentável no contexto do mercado russo.

Métodos: A estrutura de dados, pré-processamento e metodologia de pontuação foram elaborados. O algoritmo de pontuação considera o valor intrínseco de cada critério e avalia o desempenho relativo de uma empresa dentro de um setor. A metodologia discutida aqui pode fornecer uma base para os investidores selecionarem empresas com base no desempenho ESG.

Resultados: Os autores realizaram várias tarefas neste estudo, incluindo introduzir o conceito de ESG e discutir sua importância, descrever fontes de dados e critérios usados para avaliar o desenvolvimento sustentável e desenvolver uma metodologia para avaliar as pontuações ESG. Eles também discutiram os benefícios dessa metodologia para o mercado russo e criaram uma classificação consolidada de empresas com base em fatores ASG.

Conclusão: Os autores desenvolveram um modelo de avaliação abrangente e objetivo para avaliar os fatores ambientais, sociais e de governança (ESG) de empresas na Rússia. A abordagem do modelo para coleta, pré-processamento e pontuação de dados fornece aos investidores dados confiáveis e informativos para a tomada de decisões de investimento responsáveis.

Palavras-chave: desempenho ESG, modelo de avaliação, metodologia de pontuação, dados qualitativos e quantitativos, ranking da indústria.

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Março 11 2023]

DESARROLLO DE LA METODOLOGÍA DE CALIFICACIÓN ESG PARA EMPRESAS RUSAS

RESUMEN

Objetivo: Este artículo analiza el modelo de evaluación utilizado para evaluar el desempeño ESG (ambiental, social y de gobierno) de las empresas. El propósito de este artículo es presentar una nueva metodología de calificación ESG (Environmental, Social, and Governance) desarrollada de acuerdo con las recomendaciones del Banco de Rusia y explicar sus beneficios para la inversión sostenible en el contexto del mercado ruso.

Métodos: Se han elaborado la estructura de datos, el preprocesamiento y la metodología de puntuación. El algoritmo de puntuación considera el valor intrínseco de cada criterio y evalúa el desempeño relativo de una empresa dentro de una industria. La metodología discutida aquí puede proporcionar una base para que los inversores seleccionen empresas en función del desempeño ESG.

Resultados: los autores realizaron varias tareas en este estudio, incluida la introducción del concepto de ESG y la discusión de su importancia, la descripción de las fuentes de datos y los criterios utilizados para evaluar el desarrollo sostenible y el desarrollo de una metodología para evaluar las puntuaciones de ESG. También discutieron los beneficios de esta metodología para el mercado ruso y crearon una calificación consolidada de empresas basada en factores ESG.

Conclusión: Los autores han desarrollado un modelo de evaluación completo y objetivo para evaluar los factores ambientales, sociales y de gobierno (ESG) de las empresas en Rusia. El enfoque del modelo para la recopilación, el preprocesamiento y la puntuación de datos proporciona a los inversores datos fiables e informativos para tomar decisiones de inversión responsables.

Palabras clave: Desempeño ESG, modelo de evaluación, metodología de calificación, datos cualitativos y cuantitativos, clasificación de la industria.

INTRODUCTION

Environmental, Social, and Governance assessment is a critical process for companies, investors, and stakeholders to evaluate a company's sustainability performance. In recent years, ESG assessment methods have gained more attention and importance, especially in emerging markets as a Russian one.

Russia has experienced several environmental disasters in the past, including oil spills, nuclear accidents, and air pollution. These incidents have led to increased awareness and concern for ESG issues among companies and investors in Russia. As a

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]

result, the development and implementation of ESG assessment methods have become a vital tool to evaluate the sustainability performance of companies in Russia.

One of the key ESG assessment methods used in Russia is the Global Reporting Initiative (GRI) framework. The GRI framework is a comprehensive reporting system that provides guidelines for companies to report on their sustainability performance. This method helps companies to identify and disclose their ESG risks and opportunities, which helps investors and stakeholders to make informed decisions.

Another ESG assessment method used in Russia is the Carbon Disclosure Project (CDP). The CDP is a global platform that encourages companies to disclose their greenhouse gas emissions and climate-related risks and opportunities. This assessment method helps companies to measure their carbon footprint and provides investors with valuable information on the company's climate risks and opportunities.

Furthermore, the United Nations Sustainable Development Goals (SDGs) have also gained traction in Russia. The SDGs provide a comprehensive framework for sustainable development, and many Russian companies have started to align their ESG performance with the SDGs. This approach helps companies to measure and report their sustainability performance in a standardized and comprehensive manner.

The Russian government has also implemented several initiatives to improve ESG assessment and reporting. In 2020, the Ministry of Economic Development of the Russian Federation launched the ESG Disclosure Guidelines, which provide recommendations for companies to report on their sustainability performance. The guidelines cover a range of ESG issues, including climate change, human rights, and corporate governance.

ESG implementation as a crucial part of large corporations'non-financial reporting nowadays, but there is still no unified methodology of ESG-rating in the Russian market exist, in spite of the recently published by the Bank of Russia consultation paper, concerning the modal methodology of ESG-ratings (The Bank of Russia, 2023).

LITERATURE REVIEW

Assessing the environmental, social, and governance (ESG) performance of companies has gained significant attention in recent years as investors, stakeholders, and regulators recognize the importance of sustainability and responsible corporate behavior. A range of assessment models and methods have been developed to evaluate ESG performance, including self-assessment, third-party ratings, and integrated reporting. This

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]

literature review examines these assessment models and methods and their strengths and weaknesses.

Self-assessment is a common approach used by companies to evaluate their ESG performance. This method involves the company assessing its own ESG performance, typically using a standardized framework such as the Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB). Self-assessment provides companies with flexibility, as they can choose which ESG issues to prioritize and report on, and it allows for a detailed analysis of a company's operations (Fernández-Feijóo et al., 2014). However, self-assessment is subject to bias, as companies may overestimate their ESG performance or selectively report on positive outcomes (Perego et al., 2017).

Third-party ratings are another approach used to evaluate ESG performance. These ratings are conducted by independent organizations that specialize in ESG analysis, such as MSCI, Sustainalytics, and Vigeo Eiris. Third-party ratings provide investors and stakeholders with a standardized and objective assessment of a company's ESG performance and can be used for benchmarking and comparison purposes (Grewal et al., 2021). However, third-party ratings are subject to criticism, as they are based on publicly available information, which may be incomplete or inaccurate, and they often use different rating methodologies, making it difficult to compare ratings across companies (Eccles et al., 2019).

Integrated reporting is a more recent approach that combines financial and non-financial information in a single report to provide a more comprehensive picture of a company's performance. The International Integrated Reporting Council (IIRC) developed a framework for integrated reporting that encourages companies to report on their ESG performance in conjunction with their financial performance. Integrated reporting provides investors and stakeholders with a holistic view of a company's value creation and can help to integrate ESG considerations into decision-making (Bebbington et al., 2017). However, integrated reporting is a voluntary approach, and companies may choose not to report on certain ESG issues, making it difficult to compare performance across companies.

Another approach to assessing ESG performance is through the use of key performance indicators (KPIs). KPIs are a set of quantitative measures used to track progress towards specific goals. One of the most well-known assessment models is the Dow Jones Sustainability Indices (DJSI), which evaluates companies' sustainability performance based on economic, environmental, and social criteria (Brammer & Pavelin, 2006). The DJSI assesses companies' performance in areas such as climate strategy, human rights, labor practices, and supply chain management, among others. Companies

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]

are evaluated based on a range of indicators, including disclosure practices, policies, and performance. The DJSI is widely recognized as a comprehensive assessment model for evaluating ESG performance, and many companies use it as a benchmark for their own sustainability initiatives.

Widely used assessment model is the Global Reporting Initiative (GRI), which provides guidelines for sustainability reporting (Schaltegger & Wagner, 2011). The GRI framework includes indicators for economic, environmental, and social issues, and companies can use these guidelines to report on their ESG performance. The GRI also provides a reporting system that allows companies to track their progress over time and benchmark their performance against peers.

The Sustainability Accounting Standards Board (SASB) is another ESG assessment model that focuses on materiality, or the most important issues facing companies in their industry (Eccles & Serafeim, 2013). The SASB framework includes standards for over 70 industries and covers issues such as greenhouse gas emissions, labor practices, and supply chain management. The SASB's materiality focus helps ensure that companies are focusing on the most important ESG issues facing their industry.

The Carbon Disclosure Project (CDP) is a global initiative that assesses companies' environmental performance based on their greenhouse gas emissions and climate change strategies (Mackenzie, 2007). The CDP collects data from companies on their emissions, risks, and opportunities related to climate change, and then ranks companies based on their performance. The CDP is widely recognized as a leading assessment model for evaluating companies' climate change strategies.

One more important assessment model is the United Nations Global Compact (UNGC), which is a voluntary initiative that aims to promote corporate sustainability and responsible business practices (Kolk & Pinkse, 2008). Companies that join the UNGC commit to 10 principles related to human rights, labor, the environment, and anti-corruption. The UNGC provides a framework for companies to integrate ESG issues into their business strategies and operations.

In addition to these assessment models, various methods are used to evaluate companies' ESG performance. One common method is benchmarking, where companies are compared to their peers in terms of ESG performance (Hawn & Ioannou, 2016). Benchmarking can help companies identify areas where they need to improve and can also provide insights into best practices in their industry.

Another method is scoring, where companies are assigned a numerical score based on their ESG performance (Miozzo & Soana, 2017). Scoring can provide a more

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]

quantitative assessment of ESG performance and can help investors and stakeholders compare companies' performance across industries.

Thus, various assessment models and methods are used to evaluate companies' ESG performance, each with their own strengths and weaknesses. Companies can use these models and methods to benchmark their performance, track progress over time, and identify areas for improvement. Investors and stakeholders can also use these models and methods to evaluate companies' sustainability initiatives and make informed decisions about where to invest their resources.

MATERIALS AND METHODS

As part of the research, the survey "Information on ESG factors of Russian companies" was developed, which is designed to collect data on the commitment of Russian companies to the principles of sustainable development. It reflects structured information based on the specified criteria in relation to: (1) general information about companies (2) the exposure of companies to ESG risks, the degree of implementation of ESG activities; (3) company policies and reporting regarding ESG factors. As part of the survey, data were obtained on 118 Russian companies – members of the public organization "Business Russia", as well as on companies whose non-financial statements are presented on the RSPP website. It is possible to regularly update the data and adjust the name of the requested information.

Within the methodology preparing framework, there were identified the most significant elements for each of the components E,S and G. These components, also known as "pillars" or factors, form the first (highest) level in the data structure. Then, they aredivided into subfactors (also called categories) as follows:

1. Environment:

1.1. Climate change (CO_2 emissions; Renewable energy; Adaptation to climate change);

1.2. Consumption of natural resources (level of water consumption; Biodiversity; Energy efficiency);

1.3. Environmental pollution (Waste management and recycling; Pollutants; Extended Producer Responsibility);

2. Social:

2.1. Human Capital (Diversity of work practices; Occupational health and safety; Attracting and retaining talent; Diversity and inclusiveness);

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]

2.2. Local communities (Provision of social benefits; Corporate social responsibility; Level of observance of human rights);

2.3. Information security of the company's product (the impact of the product on the confidential data of product users);

3. *Governance*:

3.1. Corporate governance (Accessible and transparent board structure, ownership structure, risk management);

3.2. Corporate structure (Business ethics; Antitrust practices; Tax payment and transparency).Further, each of the sub factors contains a set of criteria, which represent the lowest level of the data structure. Criteria assess the performance of an individual company in terms of compliance with the standards described in brackets next to each sub factor.

Information from the companies' results is collected via questionnaires and is either qualitative (e.g. presence of a responsible investment policy in a company) or quantitative (e.g. volumes of CO_2 emissions). For each of the studied industries, the data was aggregated in a table by the rows (criterions) and the columns (name of a company). Illustration of the data is given at pic.1.

Row No.	Questions	Company A	Company B	Company C
1	**Category 1**	-	-	-
2	criterion 1x1			
3	criterion 1x2			
4	criterion 1x3			
5	criterion 1x4			
6	criterion 1x5			
7	...	...	...	...
8	**Category 2**	-	-	-
9	criterion 2x1			
10	criterion 2x2			
11	**Category 3**	-	-	-
12	criterion 3x1			
13	criterion 3x2			
14	criterion 3x3			
15	criterion 3x4			
16	criterion 3x5			

Figure 1. Template of the table used to analyze the information from the companies.

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]

During assessment, the elements contained in each level of the structure will receive a score in the range from 0 to 1. These scores eventually will be entered in a table with the same markup as the one mentioned above.

Data preprocessing

For further proceeding the data, it is necessary to split it into the 4 categories:

–Category 0: implies that the data is irrelevant and can be discarded before calculating the score (for example, the data may not be significant for the given industry).

–Category 1: includes questions that are answered with TRUE or FALSE. This data type must be replaced by 1 and 0 respectively.

–Category 2: contains absolute values with a positive connotation (e.g. donations tot social organizations, in USD)

–Category 3: contains absolute values as well, however, the meaning of the corresponding question is negative (e.g. CO2 emissions). Such data must be raised to the -1 power.

For lines containing negative values, one must subtract the minimum value from each observation. Since the assessment takes into account the distance of values relative to the maximum, this approach preserves the proportions that affect the assessment.

Empty cellsin the data tablemust be filled with zeros. Thus, no response equates to the smallest possible result (zero for both quantitative and qualitative values). However, if more than 50% of the observations for the criterion in the industry are empty cells (companies did not provide such information), for lack of data, such criterion can be classified as category 0 and not considered.At this stage, for each industry, we have a table with non-negative values, where higher values indicate the best practice.

Scoring:

Now let's consider a way to evaluate the performance of each company on compliance with the criteria relative to all observations in the industry.

It is needed to get ratings for company responses to all questions.Any answer to the above questions is going to be scored relative to the industry performance from 0 to 1.

Depending on the type of data, one of two evaluation formulas is applied:

Equation [1] illustrates the qualitative values scoring algorithm.

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]

$$Score = \frac{0.25}{1+\left(\frac{m}{n-m+\xi}\right)^{\lambda}} + 0.75x \tag{1}$$

Where:

λ = (-1)^(1-x)

x – the answer to the question in the format 0 or 1

n is the total number of answers to this question

m – the number of observations x in the total number of answers n

ξ is an infinitesimal number (it is necessary, since the denominator of a fraction can turn to 0 when n is equal to m. After adding an infinitesimal value, the denominator is guaranteed to be different from zero, but approximately equal to it)

So, 0 ≤ Score ≤ 0.25 for x=0. Thus, this helps to achieve a compromise between the intrinsic value of 0 (unsatisfactory answer, non-compliance with the criterion) and its relative assessment within the industry. So, the more common 0 is in the industry (the closer this observation is to the norm), the closer the Score will be to 0.25. Intuitively, a value that is normal should have a value of 0.5, however, since 0 (as an unsatisfactory result) has a negative connotation and cannot become a "norm" in an absolute sense, we limit its maximum value.

In the same vein, 0.75 ≤ Score ≤ 1 for x=1. The principle described above also applies to x=1: with a higher frequency of occurrence of this observation in the industry, it will lose its intrinsic value, thereby approaching the norm. Similarly, full compliance with criterion (value of 1) should not lower the score to "average", so we limit its minimum value to 0.75.

For quantitative values

Here it's less complicated and misleading as quantitative evaluation of ESG factors involves the use of numerical data to assess a company's performance in terms of ESG criteria. This type of evaluation is based on the collection of objective data related to a company's impact on the environment, society, and governance. Quantitative evaluation of ESG factors involves the use of various metrics and indicators to assess a company's performance in each of these areas.

For example, in the environmental pillar, quantitative metrics could include a company's carbon emissions, water usage, or waste management practices. In the social pillar, quantitative metrics could include employee diversity, health and safety, or community engagement. In the governance pillar, quantitative metrics could include board independence, executive compensation, or shareholder rights. All data may be taken from company's financials or non-financial reports.

Quantitative evaluation of ESG factors often involves comparing a company's performance to industry benchmarks or standards. This allows investors and stakeholders to assess how well a company is performing relative to its peers in terms of ESG criteria.

Before calculating the score, we need to sort the sample values in descending order and assign them the appropriate rank (where 1 is the maximum value, n is the sample size, the minimum value), and also find the average. The Score will be calculated based on two components: the company's relative position in the industry and the absolute value of the answer it provided. Thus, the quotient of dividing the average of all observations by the maximum (rank 1) will become a measure that determines the relative importance of the described components.

First, the gamma parameter is calculatedby the following way (2):

$$\gamma = 0.5 * (1 - \frac{\tilde{x}}{x_{rank(1)}}) \quad (2)$$

where:

$\tilde{x}$- sample mean

$x_{rank(1)}$- maximum sample value (has rank = 1)

Thus, 0 < γ ≤ 0.5. The quotient is a measure of the distance between the average value and the maximum. This means that γ will tend to 0 if the variance is low (mean differs little from the maximum) and to 0.5 if the maximum value is an outlier relative to the entire sample (significantly exceeds the average).

Knowing the gamma value for the given sample, we are able to calculate the Score for quantitative values using the formula below (3):

$$Score = \begin{cases} (1-\gamma) * \frac{x_i - x_{rank(n)}}{x_{rank(1)} - x_{rank(n)}} + \gamma * \frac{n+1-rank(x_i)}{n}, & if\ x_{rank(1)} > x_{rank(n)} \\ 0.5, \quad if\ x_{rank(1)} = x_{rank(n)} \end{cases} \quad (3)$$

Where:

x_i – answer of the given company

n – sample size (total number of answers to this question, criterion)

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]

$x_{\text{rank(n)}}$- minimum sample value (has rank = n)

$rank(x_i)$- rank of a given answer

At a high variance, the parameter γ takes the value 0.5, which implies the same significance of both components. In such a case, the relative position of the company takes its maximum weight. In cases where the sample maximum (benchmark) is an outlier compared to all other observations, this helps to avoid overly lowering the Score for smaller values, which at the same time may be a significant part of all responses.

If the scores were formed only depending on the proximity to the largest observation (its score is always equal to one), we would not be able to consider the general situation in the industry. However, the adaptive parameter gamma makes it possible to take into account not only the proportions of values relative to each other, but also the linearity of the increasing value of observations with decreasing rank (improving relative position).

On the other hand, if the variance is low, then the average value will be much closer to the maximum, which reduces the value of γ and, accordingly, the weight of the relative component. So, in such a case, the minimum and maximum values will be at an extremely small distance from each other. And since γ will be close to zero, to a greater extent, to form a score, we will carry out the classical minimax normalization operation, as if stretching the scores in the sample from 0 to 1.

In the extreme case, when all sample values are equal (i.e., the mean is equal to the maximum), due to division by 0, we will not be able to perform a normalization operation, so in this case we give all companies a score of 0.5, reflecting that each of these observations is considered "average".

RESULT AND DISCUSSION

Summarizing the results, deriving a score for the category (subfactor).

Since we believe that the criteria within one category are equivalent and independent, to calculate the company's performance score in this category, we simply find the average of all scores of the company's responses to the relevant questions. As all answers are in the range from 0 to 1, the category score is also included in this interval and reflects the degree of compliance with the specified ESG standard.

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]

Due to the fact that the categories (subfactors) within the factors E, S, G have different significance, it is necessary to assign appropriate weights to them. To calculate the weights, questionnaires are used that assess the exposure of companies to the influence of these subfactors on a ten-point scale.

The calculation of weights algorithm is presented in the equation (4).

$$Weight_{ij} = \frac{x_{ij}}{\sum_{j=1}^{n} x_{ij}} \tag{4}$$

Where:

x_{ij}- assessment of the influence of the subfactor according to the questionnaire

I – label, factor number

j – label, subfactor number

n – number of subfactors j within factor i

Thus, we find the weight (significance) of each subfactor j for factor i. We carry out this operation for each company for all subfactors j, factors i. Then, to find uniform weights for the entire industry, we consider the average weight among all companies in the industry.

Further, the assessment of factor *I* (E, S or G) for each company is given in the equation (5).

$$S_i = \sum_{j=1}^{n} Score_{ij} * Weight_{ij} \tag{5}$$

Where:

I – label, factor number

j – label, subfactor number

n – number of subfactors in the given component

As a result, we get three scores from 0 to 1 each for all three factors (E, S, G). From the point of view of the Central Bank of the Russian Federation, the most effective method for calculating the composite rating within the framework of the ESG is the Data Envelopment Analysis (DEA). By applying this method, we will be able to obtain the most effective combination of weights for factors, which will represent the industry benchmark for a particular data structure.

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]

DEA analysis is a non-parametric method for assessing the relative effectiveness of objects called decision-making units (DMUs). The basic idea is to compare each DMU with others in order to check how optimally a particular DMU uses its input data compared to other objects in the sample. The main performance criterion (called θ) within the method is the ratio of the sum of the weighted outputs and the weighted input values – this operation is performed for each DMU. The initial weights, reflecting the relative importance of a particular value, are chosen randomly, because then they will be optimized.

Thus, DEA is reduced to solving a linear programming problem with a number of restrictions. In the general form the problem is the following (6):

$$\text{Maximize:}\Theta = \frac{\sum_{r=1}^{m} v_r * y_{i*r}}{\sum_{j=1}^{n} u_j * x_{i*j}} \tag{6}$$

Subject to:

$$\sum_{j=1}^{n} u_j * x_{i*j} - \sum_{r=1}^{m} v_r * y_{i*r} \geq 0$$

u_j ,v_r≥0

Where:

1- the number of the given object in the sample

n- the number of input indicators

m – number of output indicators

x_{i*j} , y_{i*r} – input and output indicators for object (DMU) *i*

u_j- weights for corresponding x_{i*j}

v_r- weights for the corresponding y_{i*r}

The solution of the problem is such a set of weights for which the desired θ maximizes its value. Θ will vary from 0 to 1, where all values below 1 are considered ineffective. This means that there are DMUs in the sample, for which the result for a similar input data structure exceeds the parameters of the analyzed object. Θ=1, in turn, symbolizes that the object makes the most efficient use of its input values.

In our case, the task is output oriented, which means that only output values are significant for the calculation. As inputs, we create a dummy input equal to 1 for all DMUs. Thus, for each 14ompany*:* x_i = 1 and y_{i*r} equals to factor score, where r represents the label of the given component E, S or G.

The relevance of the method of assessment is underlined by taking into account specific characteristics of the Russian market and including criteria related to local

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]

communities, information security, and corporate structure that are important for this market. Additionally, the method allows for both qualitative and quantitative data collection and processing, which makes it applicable to different industries and types of companies operating in Russia. The scoring system used in the method provides a fair evaluation of the companies' compliance with ESG standards relative to the industry performance and allows for a comparison of the companies' results within and across industries.

CONCLUSION

To assess the Environmental, Social and Governance (ESG) factors of companies in Russia, a comprehensive assessment model has been developed and implemented. The assessment model is structured in a hierarchical format, where the top level includes the E, S, and G factors or "pillars" that are further divided into subfactors (or categories), each containing a set of criteria. The assessment is done through collecting qualitative and quantitative data via questionnaires and is entered into a table of the format: row – criterion, column – name of the company. The data is then preprocessed, including handling empty cells, negative values, and irrelevant data. A score is then given to each criterion based on its relevance to the industry and its compliance with standards. The company's performance score for a category is then calculated by finding the average of all scores of the company's responses to the relevant questions. This assessment model provides a systematic and objective approach to evaluating the ESG factors of companies in Russia, which can help investors make informed decisions about their investments.

Acknowledgement

This article was prepared with the support of the grant on the topic "Development of ESG-rating methodologies for large non-financial businesses and SMEs" funded by Plekhanov Russian University of Economics (Moscow, Russia), order #279 from February 14, 2023.

REFERENCES

Bebbington, J., Unerman, J., & O'Dwyer, B. (2017). Sustainability accounting and accountability. Routledge.

Brammer, S., & Pavelin, S. (2006). Corporate reputation and social performance: The importance of fit. Journal of Management Studies, 43(3), 435-455.

Cheng, B., Ioannou, I., & Serafeim, G. (2021). The Impact of Corporate Sustainability on Organizational Processes and Performance. Management Science, 67(5), 2255-2278.

Eccles, R. G., & Serafeim, G. (2018). The Performance Frontier: Innovating for a Sustainable Strategy. Harvard Business Review, 96(1), 50-60.

Eccles, R. G., Serafeim, G., & Krzus, M. P. (2019). Market interest in nonfinancial information. Journal of Applied Corporate Finance, 31(2), 33-42.

Fernández-Feijóo, B., Romero, S., &Ruiz-Blanco, S. (2014). Women on boards: Do they affect sustainability reporting? Corporate Social Responsibility and Environmental Management, 21(6), 351-364.

Ferrero-Ferrero, I., Fernández-Izquierdo, M. Á., & Muñoz-Torres, M. J. (2021). The impact of ESG performance on stock price: Evidence from the COVID-19 crisis. FinanceResearchLetters, 40, 101738.

Flammer, C.; Kacperczyk, A. Corporate social responsibility as a defense against knowledge spillovers: Evidence from the inevitable disclosure doctrine. Strateg. Manag. J. 2019, 40, 1243–1267.

Florian B., Kölbel J. and Rigobon R. (2022). Aggregate Confusion: The Divergence of ESG Ratings. Review of Finance, May: 1–30.

Fornarelli, A., & Trotta, G. (2020). Environmental, social and governance performance and company financial performance: a literature review. Journal of Cleaner Production, 259, 120892.

Gillan, S. L., Koch, A., & Starks, L. T. (2021). Firms and social responsibility: A review of ESG and CSR research in corporate finance. Journal of Corporate Finance, 66, 101889.
Grewal, J. S., Jabbour, C. J., & de Sousa Jabbour, A. B. (2019). ESG and financial performance: Mapping the intellectual origins and theoretical foundations of the field. Business Strategy and the Environment, 28(8), 1559-1574.

Grewal, J., Lee, N., & Kim, J. (2021). The impact of third-party ESG rating on firm performance. Journal of Business Research, 134, 19-28.

Hoepner, A. G., & McMillan, D. G. (2020). ESG rating disagreement and stock returns: an empirical investigation. Journal of Business Finance & Accounting, 47(3-4), 369-406.

Klettner, A., Clarke, T., & Boersma, M. (2018). The effectiveness of ESG rating agencies: a literature review. Journal of Business Ethics, 151(1), 111-133.

Kuosmanen T. and Post T. (2002). Quadratic Data Envelopment Analysis. Journal of the Operational Research Society, 53 (11): 1204–1214.

Linda-Eling L., Giese G. and Nagy Z. (2020). Combining E, S, and G Scores: An Exploration of Alternative Weighting Schemes. The Journal of Impact and ESG Investing. 1 (1): 94–103.

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]

Matos, Pedro, ESG and Responsible Institutional Investing Around the World: A Critical Review (August 7, 2020). CFA Institute Research Foundation Literature Reviews, May 2020, ISBN 978-1-944960-97-1.

Perego, P., Kennedy, S., & Whiteman, G. (2017). A lot of icing but little cake? Taking integrated reporting forward. Journal of Cleaner Production, 143, 942-950.

Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: categories and interactions. Business Strategy and the Environment, 20(4), 222-237.

Scholtens, B., & Sievänen, R. (2019). Assessing the reliability of ESG data: a survey of ESG raters. Journal of Sustainable Finance & Investment, 9(2), 151-169.

The Bank of Russia (2023). Model methodology of ESG ratings, Report for public consultations, 44.

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]

Appendix 1.

In this example, we have an industry consisting of 5 companies: A, B, C, D and E. The initial data for their answers after preprocessing looks the following way:

	questions	question_type	pillars	A	B	C	D	E
0	Consumption of natural resources	cat	E	NaN	NaN	NaN	NaN	NaN
1	Resource Reduction Policy	1	E	1.000000	1.000000	1.000000	1.000000	1.000000
2	Water Efficiency Reports	1	E	1.000000	1.000000	0.000000	1.000000	1.000000
3	Eco Efficiency policy	1	E	1.000000	1.000000	1.000000	1.000000	1.000000
4	Policy Sustainable Packaging	1	E	0.000000	0.000000	1.000000	0.000000	0.000000
...	...	...	...	...	...	...	...	...
292	Fair Price Provision	1	G	0.000000	0.000000	0.000000	1.000000	1.000000
293	Poison pill	1	G	0.000000	0.000000	0.000000	0.000000	0.000000
294	Business ethics training	1	G	0.000000	1.000000	1.000000	1.000000	1.000000
295	Tax overdue, days	3	G	0.000000	0.142857	0.142857	0.100000	0.000000
299	Auditor Tenure	3	G	0.361111	0.444444	0.277778	0.236111	0.611111

297 rows × 8 columns

After the calculation of scores for each of the criteria using the formulas described above, the score values take the following form:

	question	pillar	type	A	B	C	D	E
0	Consumption of natural resources	E	cat	0.450485	0.496697	0.289860	0.434719	0.596548
1	Resource Reduction Policy	E	1	0.750000	0.750000	0.750000	0.750000	0.750000
2	Water Efficiency Reports	E	1	0.800000	0.800000	0.050000	0.800000	0.800000
3	Eco Efficiency policy	E	1	0.750000	0.750000	0.750000	0.750000	0.750000
4	Policy Sustainable Packaging	E	1	0.200000	0.200000	0.950000	0.200000	0.200000
...	...	...	...	...	...	...	...	...
292	Fair Price Provision	G	1	0.150000	0.150000	0.150000	0.900000	0.900000
293	Poison pill	G	1	0.250000	0.250000	0.250000	0.250000	0.250000
294	Business ethics training	G	1	0.050000	0.800000	0.800000	0.800000	0.800000
295	Tax overdue, days	G	3	0.092000	1.000000	1.000000	0.677000	0.092000
296	Auditor Tenure	G	3	0.382424	0.600556	0.164293	0.036818	1.000000

297 rows × 8 columns

Next, we obtain scores for subfactors by finding the arithmetic mean for all scores of the criteria included in the given subfactor:

	question	pillar	A	B	C	D	E
0	Consumption of natural resources	E	0.450485	0.496697	0.289860	0.434719	0.596548
1	Environmental pollution	E	0.483663	0.459014	0.320918	0.501783	0.456444
2	Climate change	E	0.330556	0.372222	0.330556	0.330556	0.330556
3	Human capital	S	0.598474	0.474703	0.404099	0.476059	0.528670
4	Local communities	S	0.488611	0.453125	0.358153	0.353186	0.430152
5	Information security of a product	S	0.496199	0.489511	0.355574	0.308699	0.453125
6	Corporate governance	G	0.557720	0.485520	0.557075	0.495410	0.522958
7	Corporate structure	G	0.448530	0.450663	0.293687	0.552059	0.564258

Then, by finding the weighted sum of the subfactors (in this example, all subfactors are equally significant for the given factors), we calculate the final score for the three pillars.

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]

	E	S	G
A	0.421568	0.527761	0.503125
B	0.442644	0.472447	0.468091
C	0.313778	0.372608	0.425381
D	0.422352	0.379314	0.523734
E	0.461182	0.470649	0.543608

In order to obtain values on the basis of which a composite rating can be compiled, we perform the operation of Data Envelopment Analysis described above, which gives the following efficiency values for companies:

	DEA_Score
A	1.0000
B	0.9780
C	0.7860
D	0.9634
E	1.0000

Then we just have to rank the received values in order to compose a rating.

[Received/Recebido: Dezembro 09, 2022; Accepted/Aceito: Marrço 11 2023]