REVISTA AMBIENTE CONTÁBIL
Universidade Federal do Rio Grande do Norte
ISSN 2176-9036
Vol. 17, n. 2, Jul./Dez., 2025
Sítios: https://periodicos.ufrn.br/index.php/ambiente
http://www.atena.org.br/revista/ojs-2.2.3-06/index.php/Ambiente
Article received in: June, 01th, 2024. Reviewed by pairs in: November, 21th, 2024. Reformulated in: December, 20th, 2024. Evaluated by the system double blind review.

DOI: 10.21680/2176-9036.2025v17n2ID40760

Disclosure of socio-environmental risk management: the case of Samarco Mineração

Divulgación de la gestión de riesgos socioambientales: el caso de Samarco Mineração

Divulgação do gerenciamento de risco socioambiental: o caso da Samarco Mineração

Authors

Schleiden Pinheiro Nascimento
PhD in Accounting Sciences (PPGCON/UFES) and Master in Administration (UFES). Professor at FAESA University Center (UGN). Address: Vitória Avenue, Campus 2220 - Monte Belo. Vitória (ES). Phone (27) 2122-4100. Identifiers (ID):
ORCID: https://orcid.org/0000-0002-4658-5636
Lattes: http://lattes.cnpq.br/2542494473887889
E-mail: schleidenn@gmail.com

Audiceia Lima Silva Andrade
Master in Accounting Sciences (PPGCON UFES). Federal University of Espírito Santo – UFES. Address: Fernando Ferrari Avenue, 514, Goiabeiras - Vitória - ES – ZIP CODE: 29.075-910. Identifiers (ID):
ORCID: https://orcid.org/0009-0002-9350-8796
Lattes: http://lattes.cnpq.br/8942694747942001
E-mail: audiceia@gmail.com

Joelma Coelho Machado
Master's Student in Accounting Sciences (PPGCON/UFES), Federal University of Espírito Santo – UFES. Address: Fernando Ferrari Avenue, 514, Goiabeiras - Vitória - ES – ZIP CODE: 29.075-910. Phone: (27) 99945-7676. Identifiers (ID):
ORCID: https://orcid.org/0009-0003-3026-5034
E-mail: jo_cmachado@gmail.com

Michele Monteiro Lirio Maria
PhD in Accounting Sciences (PPGCON UFES). Federal University of Espírito Santo – UFES. Address: Fernando Ferrari Avenue, 514, Goiabeiras - Vitória - ES – ZIP CODE: 29.075-910. Identifiers (ID):
ORCID: https://orcid.org/0000-0003-4522-5812
Lattes: http://lattes.cnpq.br/1112281163736734
Email: michelemlirio@yahoo.com.br

Gabriel Moreira Campos
PhD in Accounting Sciences from FEA/USP. Federal University of Espírito Santo – UFES. Address: Fernando Ferrari Avenue, 514, Goiabeiras - Vitória - ES – ZIP CODE: 29.075-910. CCJE - Building ED6 - Room 655 - Phone: (27) 99224-0753. Indetifiers (ID):
ORCID: https://orcid.org/0000-0002-1140-6570
Lattes: http://lattes.cnpq.br/7357907494421042
E-mail: gabriel.campos@ufes.br

Abstract

Purpose: To compare the changes in the disclosure of socio-environmental risk by Samarco, before and after the accident in Mariana (MG), which occurred in 2015.

Methodology: Content analysis through documentary analysis of Samarco's financial and sustainability statements available for the period from 2014 to 2022.

Results: It was found that before the disaster there was a Risk Subcommittee, responsible for evaluating the company's ability to respond to crises and operations discontinuity events. However, these actions were not enough to predict, much less mitigate, the high impacts of the Mariana dam collapse. After the disaster, the disclosures focused on highlighting repair actions and preparing the company to resume activities in a safer manner.

Contributions of the Study: Contribute with a vision of the socio-environmental risk construct, specifically in its dissemination to other interested parties, such as: society, investors and employees.

Keywords: socio-environmental risk; disclosure; socio-environmental report; mining.

Resumen

Objetivo: Comparar los cambios en la divulgación de riesgo socioambiental por parte de Samarco, antes y después del accidente de Mariana (MG), ocurrido en 2015.

Metodología: Análisis de contenido mediante análisis documental de los estados financieros y de sostenibilidad de Samarco disponibles para el periodo 2014 a 2022.

Resultados: Se encontró que antes del desastre existía un Subcomité de Riesgos, responsable de evaluar la capacidad de respuesta de la empresa ante crisis y eventos de discontinuidad de operaciones. Sin embargo, estas acciones no fueron suficientes para predecir, y mucho menos mitigar, los altos impactos del colapso de la presa Mariana. Después del desastre, las divulgaciones se centraron en resaltar las acciones de reparación y preparar a la empresa para reanudar las actividades de manera más segura.

Contribuciones del Estudio: Contribuir con una visión del constructo riesgo socioambiental, específicamente en su difusión a otros interesados, tales como: sociedad, inversionistas y empleados.

Palabras clave: riesgo socioambiental; divulgación; informe socioambiental; minería.

Resumo

Objetivo: Comparar as mudanças na divulgação do risco socioambiental pela Samarco, antes e após o acidente de Mariana (MG), ocorrido em 2015.

Metodologia: Análise de conteúdo por meio da análise documental das demonstrações financeiras e de sustentabilidade da Samarco disponíveis no período de 2014 a 2022.

Resultados: Constatou-se que antes do desastre havia um Subcomitê de Riscos, responsável por avaliar a capacidade de resposta da empresa a crises e eventos de descontinuidade das operações. Porém, essas ações não foram suficientes para prever e, muito menos, mitigar os altos impactos do rompimento da barragem de Mariana. Após o desastre, as divulgações tinham como foco evidenciar as ações de reparo e preparar a empresa para a retomada das atividades de forma mais segura.

Contribuições do Estudo: Contribuir com uma visão do construto do risco socioambiental, especificamente em sua divulgação às demais partes interessadas, tais como: sociedade, investidores e colaboradores.

Palavras-chave: risco socioambiental; divulgação; relatório socioambiental; mineração.

1 Introduction

The world has been experiencing strong technological, political, economic and socio-environmental mutations/transformations. Those changes have been influencing the role of the companies in their relationship with society (Lopes & Demajorovic, 2020). The 20th century economic expansion brought modernity, but, at the same time, brought social and environmental impacts. Having business decisions as a cause, the themes concerning socio-environmental reality have been gaining more relevance in the news, mainly due to the impacts in climate and more directly to the risks from business decisions that do not consider the environmental impacts. (Sousa et al., 2021)

As a result, the debates and actions about sustainability became the center of the discussions, because talking about sustainability is extremely important, especially when we take into consideration the concept of sustainable development, which is defined as the development that is capable of fulfilling the needs of the current generation, without compromising the capacity of fulfilling the needs of the future generations.

The companies socio-environmental responsibility (RSA) takes into account the governance structure that acts in the relationship between the company and the environment and the stakeholders. Therefore, environmental management is very relevant to environmental preservation and, consequently, ends up adding value to the company's image. Responsible management, in the social area, must be known not only for the adoption of responsible and conscious policies in the environmental area, but also in the engagement for the benefits of sustainability which, besides reducing costs and avoiding wastes, contributes to reduce the environmental impact.

In the Brazilian business context, the mining sector is one that stands out, with 2,4% of participation in the GDP, 846,6 thousands of jobs created and trade balance of US$ 7,9 billions in 2022 (Brasil, 2022), developing productive activities that can pollute the environment or that

can have a negative social impact (Oliveira & Cintra, 2019). In November of 2015 the event of greater socio-environmental impact in Brazil was registered, the rupture of Mariana dam (MG) under the responsibility of Samarco (Samarco, 2015). The relevance of this event suggests a research to evaluate the existence of a disclosure of a socio-environmental management structure before the event happens. It is also understood, even after the event, the company kept announcing its socio-environmental management structure to interested parties.

Given the above, the following research problem is presented: **How did Samarco deal with the disclosure of the socio-environmental risk before and after the accident in city of Mariana (MG)?** Therefore, this research is aimed at comparing the changes in the disclosure of the socio-environmental risk by Samarco, before and after the accident in the city of Marina (MG), which occurred in 2015.

Having said that, the specific objectives are: a) identify the demands of disclosure related to the socio-environmental risk; b) present concepts and characteristics concerning the socio-environmental risk; c) provide a description of the disclosure of the governance structure, specifically in a mining company; d) present the evolution of socio-environmental risk management actions developed by Samarco; e) compare the information on the socio-environmental risk management structure before and after the Mariana (MG) disaster.

The choice for Samarco S/A case is justified because this company is responsible for the occurrence of the biggest environmental disaster of this country, according to Freitas et al research. Samarco Mineração S/A, founded in 1977, is a private held company which operates in the mining sector, being one of the biggest exporters in Brazil, controlled by a joint venture between Vale S/A and BHO Billiton (Samarco, 2014a). It is, therefore, an organization with public disclosure related to an event of socio-environmental impact at a national level.

The interest in the theme of this research is based on four guiding premises, which are: importance, viability, originality and opportunity. Concerning the importance, this research is justified by the relevance of the event of socio-environmental event occurred in 2015 at Mariana dam, under the responsibility of Samarco. The viability of the research is due to the availability of the reports disclosured by Samarco in the period before and after the event.

Regarding originality, this research is justified insofar as the governance structure aimed at socio-environmental risk management in the context of the Mariana (MG) disaster represents an in-depth study of this structure in both pre- and post-accident periods. In other words, it is original in its relation to an analysis of disclosure of the risk of the management risk structure which has specific time breaks, besides a detailed analysis of Samarco reports, comparing to the information disclosured before and after the accident of Mariana, aligning with the studies developed by Dobler, Lajili and Zéghal (2012).

As for the opportunity, it aims at contributing to a vision of socio-environmental risk construct, specifically in its disclosure to the interested parties, such as: society, investors and employees. In other words, it provides both the academic and business communities with an overview of the disclosure of the governance structure focused on socio-environmental risk management, specifically within a mining company.

2 Literary review

2.1 Risk management and the mining sector

We can consider that risk management begins at the time the first tribal chiefs decided to build walls, ally with other tribes or store food for times of drought. Practices related to risks

mitigation have existed since old Babylon, such as compensation in case of losses caused by thefts and floods, or the selection, done by the first bankers, of debtors with more capacity of paying their loans (Lopes et al., 2020). In order to accomplish this objective, they used the event occurrence probability, which on 17th century paved the way to quantitative methods in risk management. The theme was limited to specific sectors, such as insurance, financial market and public health (Bernstein, 1997). In the academic field, the book "Risk, Uncertainty and Profit", published in 1921 for Frank Knight, have become a world reference in the risk management field, specially for establishing concepts, defining principles and introducing some systematization to the topic. (Lopes et al., 2020).

Only in 1992 the concept of enterprise risk management regained focus, when the *Committee of Sponsoring Organizations of the Treadway Commission* (COSO) publishes the "Internal Control – Integrated Framework" guide, aiming at guiding the companies concerning principles and best practices of intern control, what includes risk management practices (COSO, 1992). In the same year, the Cadbury Comitte, from United Kingdom, released a report on the subject, identifying senior management as responsible for defining the risk management policy, ensuring the organization understands all the risks it is exposed to, and overseeing the risk management process. (Sousa et al., 2021)

In 2009 the ISO 31.000 standard "*Risk management – Principles and guidelines"*, is published providing principles and best practices for an enterprise risk management process, applicable to organizations of any sectors, activity or size (ABNT, 2009).

In this approach, risk management involves 5 stages, which are: a) Risk identification; b) Risk analysis; c) Risk evaluation; d) Risk treatment; e) Risk monitoring (Baraldi, 2005).

Baraldi points out that the purpose of risk identification is finding, recognizing and describing risks that can help or avoid the objectives of an organization. Relevant, appropriate and up-to-date information is important in risk identification. On the other hand, risk analysis aims at understanding the risk nature and its characteristics, detailing the uncertainties, risk sources, consequences, probabilities, events, scenarios, control and its effectiveness. An event can have multiple causes and consequences and can affect multiple objectives (Sirli, 2023). Risk evaluation aims at supporting decisions by comparing the risk analysis results using the risk criteria established to determine where is necessary an additional action (Tubis, Werbińska-Wojciechowska & Wroblewski, 2020).

Sirli (2023) carried a study aiming at examining the effect of Enterprise Risk Management (ERM) and of environmental performance in Corporate Social Responsibility disclosure (CRS Discolsure). Enterprise risk management used the framework COSO ERM, which evaluates 108 items as a measure; environmental performance was assessed by the PROPER rating, represented by 5 different colors rankings; and CSR disclosure was measured by GRI G4 Corporate Social Responsibility Disclosure Index, consisting of 91 items and 3 categories. The results of this study showed that the enterprise risk management has a positive and significant effect on Corporate Social Responsibility disclosure, whereas environmental performance does not show a significant effect on this disclosure.

The mining industrial activity consists of researching, exploring, mining (extraction) and processing transportation of minerals found underground. Mineral prospecting involves the preliminary choice of areas with geological potential for mining production. It is the cheapest and riskiest stage of the entire mining process, but it can also be, in many cases, the most important stage as well, depending on the way it is conducted. (Souza et al., 2019).

The kinds of mineral resources exploration can be classified in two big groups: underground mining and open-pit mining. This classification arises from the different ore

extraction techniques employed, known as mining methods. The performance of these activities generates environmental and social impacts as consequences which have been considered an object of monitoring and regulation by government agencies (Bortolon et al., 2021).

Tubis, Werbińska-Wojciechowska and Wroblewski (2020) developed a systematic literary review about risk evaluation methods in the mining sector. The authors highlight that studies on risk management in the mining sector have emphasized the general, humans, machines and environmental aspects. The numbers of publications for each search term analyzed was: two publications in the risk decision area, five publications in the risk analysis area, fifteen publications in risk management, seventy-two publications in the area of risk evaluation. Regarding the analysis of the authors' origins and scientific centers, it can be stated that most publications in the studied area come from China (32 articles), Australia (10 articles), and both the United States and Canada (7 articles each). Brazil is represented by 3 articles.

2.2 Social-environmental risk disclosure

This research uses the term risk as employed by Linsley and Shrives (2006), that is, as any opportunity or perspective, or any danger or threat, which has already impacted the company or can cause an impact in the future. More broadly, the risk concept involves quantifying and qualifying the uncertainty linked to the risk, as well the losses and the gains regarding the course of events previously planned, whether by individuals or organizations. In general, all companies are vulnerable to risk, which may be materialized in finances, in the structure of the organization or in other events associated with the environment.

In this aspect, Souza et al. (2019) signalize that the information disclosure in linked to society's governance structure, for it is the governance structure itself that encourages managers to adopt the best disclosure policies. Thus, internal or external mechanisms can be determinants of the disclosure of the company risks. The socio-environmental risks correspond to potential damages that an economical activity can cause to society and the environment.

Amorim e Souza (2022) alert for situations where disclosure is manipulated to repair the corporate image after an environmental disaster. With the aim of working with principles of socio-environmental responsibility, the organizations must conduct their business according to the high ethical standards, valuing the human being. They must act in order to disseminate, raise awareness and support socio-environmental responsibility through effective actions with both internal and external communities.

Researches about socio-environmental risk disclosure in the mining sector have been developed for: i) analyze detailed data provision of environmental risk at a company level (Dobler, Lajili and Zéghal, 2012); ii) investigate how the environmental incentives influence the disclosure of risk information (Elshandidy and Shrives, 2016); iii) analyze the relationship between environmental risk and the cost of equity capital (Eriandani, Narsa and Irwanto, 2019); iv) assess the importance of regulators' roles in the definition of disclosure standards (Carattini, Hertwich, Melkadze and Shrader, 2022); and v) the relationship between social and environmental disclosures and earnings persistance (Meliyanti & Hendriyeni, 2020).

Elshandidy and Shrives (2016) investigated to what extent environmental incentives influence German non-financial companies to disclosure risk information in their of annual reports narratives. The study concluded that German companies are significantly influenced by its underlying risks, rather than other factors, including property structure, capital structure, external equity financing and loans. The decision to disclose is influenced by company size and the length of annual reports. The results also suggest that the impact of the aggregated economy

on risk reporting levels was not observable until a distinction was made between bad and good news about risk. Specifically, it was discovered that the German market tends to price news about risk, worsening market liquidity, increasing the risk perceived by the investor.

Eriandani, Narsa and Irwanto (2019) empirically tested the relationship between environmental risk and the cost of equity capital. The empirical results showed that the socio-environmental risk disclosure has a positive effect on equity capital cost. The results of this study contributed to confirming the disclosure theory by empirically proving that investors use socio-environmental risk as a basis of decision making. However, this research did not relate aspects of environmental and social risk disclosure regulation, nor did it highlight this impact on cost of equity capital. Furthermore, it disregarded other management components, such as audit structure and systems, in assessing the cost of equity capital. It is also noteworthy that the results were contradictory regarding voluntary disclosure theory.

Carattini, Hertwich, Melkadze and Shrader (2022) conducted research about the importance of the regulator's role in setting disclosure standards aimed at clarifying climate risks. However, their study does not consider the use of non-formal data by investors. In other words, it does not consider that they use information beyond the official reports.

Meliyanti and Hendriyeni (2020) analyzed the relationship between social and environmental disclosure and profit persistence. The research focused on the Indonesian mining sector, due to its direct effect on social and environmental aspects. The result shows that, in the mining sector in Indonesia, social and environmental disclosures have a significant effect on earnings persistence. In other words, managers tend to manage earnings as a result of social and environmental disclosures.

2.3. ESG and Samarco case

ESG is the English abbreviation for Environmental, Social and Governance, which refers to the adoption of environmental, social and governance criteria. The term has increasingly become part of the strategic agenda of companies in different sectors as a basis for making financial and investment decisions. It has its origins in a 2004 publication by the UN Global Compact in partnership with the World Bank, entitled "Who Cares Wins", where the term ESG was presented for the first time, and arose from a challenge by the then UN Secretary-General, Kofi Annan, to 50 CEOs of large financial organizations (ESG Manual, 2022).

Funds with socio-environmental premises reached the US$1 trillion milestone in 2020, at which point ESG funds grew almost twice as fast as the rest of the market, as interest in low-impact and more resilient investments increased (Sampaio et al., 2012). Furthermore, according to Sampaio et al. (2012) the wave that first hits Europe and the United States is also present in Brazil, albeit on a smaller scale. According to data from the Brazilian Association of Financial and Capital Market Entities (Anbima), Brazilian funds that follow sustainability and governance standards have doubled in size in the past year, reaching 1 billion reais.

Fikru, Brodmann and Grant (2024) highlight that while previous research explores the relationship between ESG (environmental, social and governance) ratings, company size and financial outcomes, there is a lack of comprehensive analyses comparing multiple ESG ratings within the mining industry. This gap is crucial given the increasing focus on ESG in mining operations and its potential impact on company performance. The results reveal that ESG-rated mining companies are generally larger than non-rated ones, but are neither more profitable nor face lower debt costs. The results also show that no correlation was found between ESG ratings

and financial performance. This research contributed to understanding how ESG ratings can impact investment decisions and risk management strategies in the mining sector.

In the Brazilian context, Ceni and Rese (2020) analyzed how the sensegiving process occurred in Samarco's narratives, as a strategic practice, after the collapse of the Fundão dam. The authors were based on secondary data, having collected 307 files (893 pages) on the Samarco website, 297 files (647 pages) on the Renova Foundation website and 52 videos (191 minutes) on the Samarco Mineração YouTube channel. In this work, they concluded that, based on narrative analysis, the company adopted a discursive strategy since the breakup that presents a sensegiving directed to resume its operations.

Pires et al. (2020) investigated whether social identification with Samarco, which arises due to economic benefits, reduces punitive intention and the attribution of blame. In the research, scales with psychometric indicators were applied to 1,616 individuals, finding that the benefits for the local economy reduced punitive intentions in the cities of Anchieta-ES, Guarapari-ES and Mariana-MG, which did not occur in the cities of Colatina-ES and Linhares-ES, which do not receive economic benefits, but were affected by the disaster. In other words, where the company generated benefits, people were less likely to punish it.

Theiss et al. (2021) analyzed the interface of the elements of attribution and the semantic-functional textual strategies of legitimacy through the narratives of Samarco Mineração S.A. from periods before and after the collapse of the Fundão tailings dam. The results show that before the event, the company's priority was to increase production and increase profits and dividends. After the event, internal attributions refer to authorization and normalization, using control, causal stability, valence of positive effects, relationships of pride and intentionality.

Carvalho et al. (2022) analyzed social legitimacy actions, according to Suchman's typology, evidenced by the companies Samarco S.A. and Vale S.A., after the disasters of Mariana in 2015 and Brumadinho in 2019. The authors applied a content analysis to the Management Report (RA) and Explanatory Notes (NE) of the Financial Statements (DF). Samarco S.A.'s analysis period was from 2015 to 2020; the analysis of Vale S.A. covered the years 2019 and 2020. The main findings suggest that the analyzed companies aimed to achieve overall legitimacy during the examined period.

3 Methodological Procedures

3.1 Research Strategy and Method

This research adopts a qualitative approach with a descriptive character. Regarding the procedures, it is delimited as a case study through documentary analysis of Samarco's financial and sustainability reports, specifically using content analysis based on the Management Report (RA), Explanatory Notes (NE) of the Financial Statements (DF), and Sustainability Reports (RS) available from 2014 to 2022, except for 2016 and 2019, which were not available on the company's website. Attempts were made to contact the Investor Relations department to obtain the missing documents, but no response was received. A total of 1,003 pages of documents were analyzed.

In order to define the scope of the research, a case study was chosen. The case study is a comprehensive research method applied to a specific subject, allowing for in-depth knowledge and providing a foundation for further investigations on the same topic.

Therefore, the case study constitutes an empirical investigation of a contemporary phenomenon within its real-life context, particularly when the boundaries between the phenomenon and the context are not clearly defined (Yin, 2010).

3.2 Data collection and analysis techniques

The research was divided into three phases: (I) Pre-Analysis (Organization Phase), (II) Analytical Description (Coding), and (III) Interpretation (Analytical Generalization). In Phase (I) Pre-Analysis (Organization Phase), after a preliminary review, it was identified that the most suitable reports for achieving the proposed objective were the Notes to the Financial Statements, Management Reports, and Sustainability Reports, as they contained the necessary information regarding the socio-environmental risk management structure. During this phase, the reports were entirely evaluated.

In phase (II) Analytical Description (coding), during reading, the words that most represented what was intended to be captured were chosen based on their frequency. We chose the words based in the work of Linsley and Shrives (2006) for it is a reference in risk management disclosure, limited to socio-environmental risk. In phase (III) Interpretation (Analytical Generalization), the words were classified into the defined analysis categories, observing the proposed theme and according to details that follows.

After downloading the files, a preliminary analysis of the material was conducted, followed by a keyword search for the following terms: ‘Structure,’ ‘Management,’ ‘Risk,’ ‘Social,’ ‘Environmental,’ and ‘Sustainable,’ to facilitate the identification of environmental risk disclosure related to the research subject. These terms were selected due to their relevance to the research topic. The data collected from company documents were analyzed in both quantitative and qualitative terms, applying the content analysis method. No statistical software was used; only a Microsoft Excel spreadsheet was utilized for data tabulation.

According to Bardin (1977), content analysis is a set of techniques for analyzing communications, employing systematic and objective procedures to describe the content of messages. The focus of content analysis is to examine the data semantics, meaning that the research aims to understand the true meaning of a text. This method utilizes systematic and objective procedures to describe the content of the analyzed documents, extracting information and categorizing it into analysis categories to enable inferences about the reported content, provided they are based on theoretical assumptions.

For content analysis, analysis categories were developed as suggested by Linsley and Shrives (2006), focusing on the following topics: third-party complaints, sudden unavailability of resources and/or issues in the supply of raw materials, risks in the production process and product development, risk of social and environmental damages, health and safety risks in the workplace, risk of unfavorable judicial decisions (significant lawsuits), and negative impact on the company's reputation or image.

The selection of these categories was based on the research construct, which focuses on socio-environmental risk management, with the work of Linsley and Shrives (2006) being considered the primary reference regarding risk disclosure. This study addressed only the highlighted categories, considering the research's scope and limitations.

4 Results and Analysis

4.1 Analysis of Reports Before the Dam Collapse Event

This section describes the information presented in the Financial Statements Report, in the Management Report, and in the Sustainability Report, published in 2014.

In order to monitor compliance with policies and manage the Code of Conduct, Samarco had an Ombudsman Office responsible for receiving complaints and inquiries from employees and the community. In 2014, the Conduct Committee included the CEO, the Human Resources Manager, the Legal Manager, and the Internal Controls area, in addition to the Ombudsman. That year, 146 complaints were received, of which 119 were investigated and concluded. Among these, 40% were considered fully or partially substantiated (Samarco, 2014b). It is noteworthy that the Risk Subcommittee was only established in 2014 (Samarco, 2014b).

According to Samarco (2014b), the risk management model, as outlined in the Risk Management Policy, followed market and shareholder guidelines. Risks were classified based on their nature and level of criticality into five categories: Strategic, Operational, Project, Financial and Compliance, and Health and Safety. Also regarding 2014, annual review processes were conducted, allowing for the identification of material risks those considered the most critical within these categories—and their evaluation based on severity and likelihood, involving different areas and leadership in the analysis.

Throughout 2014, more than 30 risk assessment seminars were conducted, with the participation of over 300 employees. In total, 24 risks were identified as material, while 48 were classified as non-material, and more than 500 initiatives were listed for their mitigation (Samarco, 2014b). Additionally, during 2014, six joint drills were carried out to assess the company's crisis response capability and the effectiveness of event management procedures that could lead to operational disruptions (Samarco, 2014b).

The 2014 Management Report also states that there were many lessons learned and challenges faced throughout the year, further emphasizing the company's intention to deepen control evaluations, incorporate new topics, and strengthen the crisis prevention and management system in 2015—the year of the Dam collapse (Samarco, 2014a).

The 2014 Sustainability Report was the fourteenth produced by Samarco and the first to adopt the new G4 version of the Global Reporting Initiative (GRI) guidelines, which had a direct impact on the format and content addressed (Samarco, 2014b). Regarding the 2014 Annual Sustainability Report, it was highlighted that there was progress in implementing the Crisis Prevention and Management System, which establishes business continuity plans for the most material risks and proposes both theoretical and practical drills addressing each plan (Samarco, 2014b).

Samarco’s risk management model, as outlined in the Risk Management Policy and the Corporate Risk Management Manual, aims to monitor, analyze, and control the impacts of key external facts that may affect the company's future operations (Samarco, 2014b).

The data collected from Samarco’s reports prior to the event align with Sirli (2023), as they establish a connection between Enterprise Risk Management (ERM) and environmental performance in the disclosure of corporate social and environmental responsibility (CSR Disclosure). In this context, Samarco approached corporate risk management through a framework that linked it to its socio-environmental risk disclosure.

4.2 Analysis of Reports after the Dam Break event

The material that leaked from the Fundão dam affected approximately 680 km of water bodies within the Rio Doce watershed, causing water supply interruptions in nine cities, an increase in turbidity levels, flooding of rural properties, and loss of homes and equipment (Samarco, 2019a). In addition to the environmental impacts and the hardships endured by thousands of people, the Fundão dam collapse tragically resulted in 19 deaths: one company employee, 13 workers from Samarco's contracted companies, four residents of the local community, and one visitor (Samarco, 2019a).

In 2015, only the Financial Statements were published. As expected, this report places special emphasis on the collapse of the Fundão tailings dam in November 2015 and the temporary suspension of operations in the Germano/Alegria areas. Immediately, it is evident that various provisions totaling R$ 8.5 billion were recorded in 2015, compared to R$ 367 million in the previous year. This amount is attributed to expected losses from compensations and potential fines (Samarco, 2015). This disclosure aims to meet the expectations of market agents while also aligning with regulatory disclosure standards, as highlighted by Carattini, Hertwich, Melkadze, and Shrader (2022).

The 2015 Financial Statements Report (DF) highlighted that the company was involved in various administrative and judicial proceedings of civil, environmental, and labor nature, for which it was still not possible to safely estimate the outcomes and consequences. A reasonable outcome of these uncertainties, especially the success of any negotiations with its creditors, as well as the resumption of its operations, were considered essential for the company to maintain operational continuity (Samarco, 2015).

In the 2015 DF Report, it was highlighted that Samarco, Vale and BHP should establish a Foundation for the development and execution of environmental and socioeconomic programs with the purpose of repairing and/or compensating for the damage caused by the collapse of the Fundão dam, with Samarco being responsible for providing resources to the Foundation. If Samarco failed to meet its financial contribution obligations to the Foundation, Vale and BHP would be responsible for providing such resources (Samarco, 2015).

Samarco was fined by environmental agencies such as IBAMA (Brazilian Institute of Environment and Renewable Natural Resources) due to the environmental impacts related to the discharge of solid and liquid waste (mining tailings) into the waters of the Doce River. Additionally, it was fined by SEMAD (State Secretariat for Environment and Sustainable Development) and SUCFIS (Secretariat for Integrated Environmental Control and Inspection) for causing pollution and environmental degradation, resulting in damage to water resources. A defense was timely submitted, and Samarco is awaiting the response from the authorities. The total fines amounted to R$432 million, and the expected loss was considered possible (Samarco, 2015).

In 2014, Samarco conducted a review of the conceptual closure plan for its operational units with the objective of diagnosing the environmental situation of the mining exploration areas, supporting the assessment of environmental impacts and risks during closure, establishing measures to reduce potential risks from contamination sources, stabilizing possible environmental liabilities, and estimating closure costs according to the plan's phase. Samarco’s policy mandates a review of this plan every three years. However, due to the Fundão tailings dam collapse, the Administration, with the assistance of external consultants, revised the closure plan for the operational units in December 2015 (Samarco, 2015). There is no mention of the Risk Subcommittee or the company's risk management structure in the 2015, 2017, and 2018 Financial Statements Reports. The files for the year 2016 are not available on the website.

On December 31, 2017, Samarco provisioned an aggregate amount of R$11.3 billion for future disbursements related to its obligations arising from the dam collapse. According to the 2017 Financial Statements Report, the magnitude, full scope, timeline, and future costs of the remediation programs were subject to significant uncertainties, as they depended on the completion of expert studies, the development of action plans, the renegotiation of programs outlined in the Conduct Adjustment Term (TAC GOV), and the outcome of pending legal proceedings (Samarco, 2017).

An important aspect of the management's message in the 2017 Financial Statements Report concerns the information that senior management's provisioning expectations constitute forward-looking statements that are merely predictions, with no guarantees of any future performance. Any forward-looking statements are and will be, in any case, subject to numerous risks, uncertainties, and factors related to the Fundão dam collapse, as well as Samarco's operations and business environment, which may cause actual results to be materially different from any future results, whether expressed or implied (Samarco, 2017). This statement reflects the uncertainty associated with the difficulty of measurement, mainly due to the impacts and magnitude of the dam collapse event, aligning with the study by Elshandidy and Shrives (2016), particularly regarding the environmental incentives that influence the disclosure of risk-related information. In other words, at that time, Samarco had an incentive to emphasize the uncertainty regarding the difficulty of measuring the damages.

In the 2017 Financial Statements Report, it was stated that the company's management was facing challenges in its liquidity risk management due to the suspension of its production operations following the Fundão tailings dam collapse. These challenges included, for example, the failure to meet certain obligations under its loan and financing agreements. The company's liquidity in 2017 was supported by its shareholders through the issuance of non-convertible private debentures (Samarco, 2017).

The 2018 Financial Statements Report provides information regarding the efforts for remediation and compensation, which were undertaken by Renova Foundation, a private, autonomous, and independent institution that began its activities in August 2016. This was part of the Transaction and Conduct Adjustment Term (TTAC), signed in March 2016 between Samarco, its shareholders Vale S.A. ("Vale") and BHP Billiton Brasil Ltda. ("BHP Billiton Brasil"), the Federal Government, the governments of the states of Minas Gerais and Espírito Santo, and other governmental entities. The TTAC established 42 socio-environmental and socio-economic programs to be implemented by Renova Foundation under the supervision of regulatory agencies and authorities grouped within an Inter-Federative Committee. Under the terms of the TTAC, Samarco is responsible for funding Renova Foundation for the duration of the agreement (Samarco, 2018).

The 2018 Samarco Financial Statements Report emphasizes the resumption of activities, as highlighted in the following excerpt: "Based on its experience and the lessons learned, Samarco is currently focusing its efforts on the future resumption of its activities in a responsible manner, with maximum safety and with the support of the communities." (Samarco, 2018, p. 3).

The 2018-2019 Biennial Sustainability Report (RS) of Samarco was also published in alignment with the methodology of the Global Reporting Initiative (GRI), an international reference for results communication. In January 2019, the Brumadinho dam collapse occurred, considered the largest occupational accident in Brazil in terms of loss of human lives and the second-largest industrial disaster of the century. It was one of the most severe environmental disasters in the country's mining sector, second only to the Mariana dam collapse. As described

in the 2018-2019 Biennial Sustainability Report, this event required Samarco to reassess its operational resumption plans, emphasizing the tailings disposal model and the timeline set for returning to activity (Samarco, 2019).

Regarding the governance structure, the 2018-2019 Biennial Sustainability Report of Samarco states the existence of a Risk, Legal, and Compliance Directorate, created in 2019, as well as a Risk Management Committee. Furthermore, according to the 2018-2019 Sustainability Report, risk management is addressed in the Risk Management Policy and the Corporate Risk Manual. The Policy outlines the objectives and general rules of Samarco's risk management, defining leadership responsibilities to ensure that risks are identified and their controls are properly recognized and managed. The Manual, in turn, describes Samarco's risk governance, its methodology with the stages of the risk management process, and the roles and responsibilities included therein (Samarco, 2019).

The pursuit of environmental compliance has, in recent years, resulted in a legal requirements management system for all operations and units. Additionally, the same standards are applied in daily routines, field inspections, environmental incident reports, training for all employees (both direct and contracted), and periodic refresher sessions (Samarco, 2019, p. 71).

Still referring to the 2018-2019 Sustainability Report, Samarco highlights that its Mission, Vision, and Values reflect a systemic approach to sustainability, aligned with the company's current circumstances. This includes a commitment to the responsible transformation of capital and resources, the fulfillment of all assumed responsibilities, and the generation of value for society through a win-win relationship, supported by a robust, efficient management model that is attentive to risks and impacts (Samarco, 2019).

Here are the Mission and Vision statements from 2014, before the event, and the Mission and Vision statements from 2019.

- Mission in 2014 – "To produce and supply iron ore pellets, applying technology intensively to optimize the use of natural resources and generating economic and social development while respecting the environment" (p. 12).
- Mission from 2019 onwards – "To optimize the transformation of mineral resources into value for society in a safe, efficient, and innovative way, today and in the future" (p. 27).
- Vision in 2014 – "To double the Company's value and be recognized by employees, customers, and society as the best in the industry" (p. 12).
- Vision in 2019 – "To be recognized for overcoming challenges and rebuilding social, environmental, and economic relationships" (p. 27).

The 2020 Financial Statements Report highlights the challenges presented by the Covid-19 pandemic. The new scenario, both from a health and economic perspective, required the adoption of a series of preventive measures across all units to safeguard the health and safety of direct and indirect employees and to help prevent the spread of Covid-19 in the communities where Samarco operates, while complying with all protocols established by health authorities (Samarco, 2020a).

Samarco resumed operations in December 2020, implementing new technologies to ensure greater safety and minimize the impact on the areas where it operates. The operational restart is being carried out gradually. The initial production capacity through a concentrator is expected to be around 7-8 million tons of iron ore per year (Mtpa), which represents approximately 26% of the total production capacity (Samarco, 2020a).

The 2020 Financial Statements Report emphasizes financial risk management, maintaining information regarding the challenges faced in managing Samarco's liquidity risk due to the suspension of its operations (Samarco, 2020a).

On December 31, 2020, a provision of R$ 17 billion was recognized for future disbursements related to the present obligation arising from the Fundão dam collapse. This represents an increase of R$ 5 billion compared to the previous year's balance (Samarco, 2020a). The 2020 Sustainability Report states that the Risk Management Committee is composed of nine members and held 12 meetings in 2020 (Samarco, 2020b).

Regarding ESG Risk, the 2020 Sustainability Report (SR) highlights that, in recent years, environmental, social, and governance risks have taken a leading role in the Company's analysis routines, assuming a role similar to other corporate risks. This means they have the potential to impact the Company's objectives and require transparent management (Samarco, 2020b).

The 2020 sustainability report (RS) highlights that Samarco is periodically audited based on a survey of requirements and conditions that must be met. Environmental teams also conduct field inspections and meetings to report environmental incidents. Training on environmental issues currently covers 100% of the company's own and contracted employees (Samarco, 2020b).

The 2020 RS highlights that Samarco is periodically audited based on a survey of requirements and conditions that must be met. Environmental teams also conduct field inspections and meetings to report environmental incidents. Training on environmental issues currently covers 100% of the company's own and contracted employees (Samarco, 2020b).

Samarco's 2021 Financial Statements Report (DF) was the first of its kind to present a description of Samarco's risk management structure. This report highlights the Risk Management Policy and the Corporate Risk Manual, which were already described in previous years' Sustainability Reports. These documents guide actions to prevent, monitor, and detect the factors to which the company is exposed. Issues such as the judicial recovery process announced in 2021, the fight against the COVID-19 pandemic, environmental licensing processes, relations with communities, and the company's image and reputation at the current moment are directly addressed by this management (Samarco, 2021a).

This document also presents, for the first time, the three-lines-of-defense model, aiming to ensure independence and encourage leadership involvement in risk monitoring, maintain structured policies and processes, and strengthen a culture of ownership in managing the matter across all areas. The 1st line of defense is formed by managers and those directly responsible for the processes that they manage and are responsible for the risks, the second line of defense comprises the risk management team, which provides the methodology and monitors an integrated view of risks. Finally, the third line of defense offers independent assessments through the audit process (Samarco, 2021a).

In 2021, the Sustainability Committee was established as a means of elevating environmental, social, and governance (ESG) topics related to Samarco’s operations and its commitments to reparation to the leadership level (Samarco, 2021b). The committee is responsible for presenting strategic recommendations on sustainability matters to the Board of Directors and for analyzing Samarco’s sustainability, health, and safety strategies. Additionally, it oversees risk monitoring, which supports the business strategy and the Life of Mine (LOM)—the productive lifespan of the mine—providing feedback and strategic guidance to the Board (Samarco, 2021b).

The Risk Management Policy and the Corporate Risk Manual are the primary guiding documents on this subject. These documents underwent a review during the preparation for the resumption of operations and were updated again in 2021, along with training sessions for all individuals responsible for or involved in critical controls of material risks. They provide a comprehensive perspective on the relationship between safety—including personnel, process, operational, asset, and infrastructure security—and integrity (Samarco, 2021b).

In 2022, a total of 116 committee meetings were held, covering topics such as sustainability, risk management, geotechnics, and legal affairs. Governance over risk management is cross-functional and includes key processes such as Workplace Safety, Environmental Management, Legal, Socio-Institutional Relations, Communication, Procurement, Sustainability, Engineering and Geotechnics, Projects, and Compliance. The Corporate Risk Management Policy and the Risk Manual were revised in 2022 (Samarco, 2022b).

Samarco has 70 professionals responsible for risk management activities and an additional 214 employees involved in internal controls. In 2022, 74 risk assessments were conducted, evaluating 57 risks and identifying 14 new risks, with criticality assessments carried out based on the prioritization established by Samarco's Risk Committee (Samarco, 2022b).

In 2022, Samarco revised its values and mission, shaping an organizational identity aligned with the company's new trajectory. As part of this process, a new corporate positioning was introduced to the public: "Learn to Evolve and Transform" (Samarco, 2022b). This new mission moves away from the discourse of institutional relations and reintroduces the focus on productivity and efficiency, combined with safety. It is very similar to the mission the company had before the Brumadinho (MG) disaster.

Finally, this study aligns with the findings of Theiss et al. (2021) and Carvalho et al. (2022), as it identifies semantic-functional textual strategies of social legitimacy within the narratives of Samarco Mineração S.A. These narratives reinforce the authorization for the resumption of operations and normalization, employing arguments based on control, community stability, positive effects, and intentionality.

5 Final considerations

This article aimed to compare the changes in the disclosure of socio-environmental risk by Samarco, analyzing the Financial Statement Reports and Sustainability Reports published between 2014 and 2022—that is, before and after the Mariana (MG) accident in 2015. The reports for the year 2016 were unavailable.

In the 2014 Financial Statement Report, the creation of the Risk Subcommittee was mentioned, but this information was neglected in subsequent years, only reappearing in 2020, the year Samarco resumed its activities. The 2014 report also noted the implementation of over 30 risk assessment seminars, with the participation of more than 300 employees. Additionally, 24 material risks and 48 non-material risks were identified, and over 500 initiatives were listed for their management. The company also carried out six joint simulations to assess its crisis response capacity and event management procedures that could lead to operational disruptions. However, despite these efforts, it is concluded that such actions were insufficient to anticipate—and even less so, mitigate—the severe impacts of the Mariana Dam collapse.

The 2014 Sustainability Report had already adopted the new version (G4) of the Global Reporting Initiative (GRI) guidelines, which directly impacted both the format and the content addressed. The 2017 to 2019 reports emphasized the resumption of activities and the provisions

for recovery from socio-environmental and socio-economic losses, shaping a narrative that sought to transfer the responsibility for reparations to Renova Foundation.

The 2018 Financial Statement Report highlights progress in risk management, particularly through investments in the Samarco Integrated Safety System and the Monitoring and Inspection Center (CMI). The CMI operates 24 hours a day, seven days a week, equipped with more than 600 state-of-the-art devices for the control and monitoring of geotechnical structures. This demonstrates Samarco's increased concern with identifying structural movements in the dams—a measure that could have delayed or even prevented the accident, or, at the very least, mitigated its socio-environmental impact.

The 2018-2019 Biennial Sustainability Report from Samarco highlights the establishment of a Risk, Legal, and Compliance Directorate, created in 2019, as well as the existence of a Risk Management Committee. At this point, Samarco demonstrates an increased focus on risk management, emphasizing the Risk Management Policy and the Corporate Risk Manual. These disclosures suggest initiatives aimed at preparing the company for the resumption of operations.

Finally, notable changes in the company's mission and vision stand out. In 2014, Samarco's mission was strongly aligned with its productive and logistical processes, whereas the redefined mission in 2019 presented a perspective of optimization through transformation, with a greater emphasis on safety—reflecting the adoption of risk management practices. In summary, Samarco's vision in 2014 was focused on doubling the company's value, while in 2019, it shifted toward overcoming challenges and rebuilding social, environmental, and economic relationships.

In 2022, with the resumption of activities, Samarco revised its mission, focusing on optimizing the transformation of mineral resources into value for society in a safe, efficient, and innovative manner, both today and in the future. This revision reintroduced a concept centered on productivity and efficiency, moving away from the previous discourse focused on institutional relationships.

It is concluded that the study aligns with the findings of Theiss et al. (2021) and Carvalho et al. (2022), considering the semantic-functional textual strategies of social legitimacy found in Samarco Mineração S.A.'s narratives. The discourse emphasizes authorization for the resumption of operations and normalization, employing arguments based on control, community stability, positive effects, and intentionality.

As limitations of this study, it can be stated that content analysis contains subjective components, which may influence and complicate the interpretation and analysis of textual elements. For future research, it is suggested to employ a triangulation of methods, combining the analyzed documents with interviews with parties involved in the process, such as: former employees, suppliers, affected communities, government officials, among others.

References

Amorim, F. C. B., & Souza, M. T. S. (2022). Manipulação do disclosure para reparação da imagem corporativa após um desastre ambiental: um estudo do impacto do rompimento da barrage/m nos relatórios de sustentabilidade da Samarco. *Brazilian Business Review*, 19(4), 396-413. Recuperado em 05 fevereiro, 2024, de https://www.scielo.br/j/bbr/a/5Yw38Zpvstpm9Sk5vYbbzHw/abstract/?lang=pt

Baraldi, P. (2005). *Gerenciamento de riscos empresariais.* Rio de Janeiro: Campus.

Bardin L. (1977). *Análise de conteúdo*. Lisboa: Edições 70.

Brasil (2022). *Boletim do Setor Mineral (2022)*. Ministério de Minas e Energia. Recuperado em 02 fevereiro, 2024, de https://www.gov.br/mme/pt-br/assuntos/secretarias/geologia-mineracao-e-transformacao-mineral/publicacoes-1/boletim-do-setor-mineral/boletim-do-setor-mineral-2013-1-sem2022.pdf/view

Bernstein, P. L. (1997). *Desafio aos deuses:* a fascinante história do risco. Gulf Professional Publishing.

Bortolon, P., Martins-silva, P. O., & Fantinel, L. D. (2021). A Empresa Negligente e o Evento Acidental: Representações Sociais para um Grupo de Ex-Funcionários da Samarco. *REAd. Revista Eletrônica de Administração*, 27(1), 153-181. Recuperado em 05 fevereiro, 2024, de https://www.scielo.br/j/read/a/KqKx4DHNPpFsPscGmFcnFhn/

Carattini, S., Hertwich, E., Melkadze, G., & Shrader, J. G. (2022). Mandatory disclosure is key to address climate risks. *Science*, 378(6618), 352-354. doi: 10.1126/science.add0206

Carvalho, J. F., Silva, L. J., & Soares, J. L. (2022). Ações de legitimidade e evidenciação contábil: os casos Samarco e Vale pós-tragédias socioambientais. *Revista Catarinense da Ciência Contábil,* 21(1), 1-19. Recuperado em 05 fevereiro, 2024, de https://revista.crcsc.org.br/index.php/CRCSC/article/view/3257

Ceni, J. C., & Rese, N. (2020). Samarco e o Rompimento na Barragem de Fundão: A Narrativa como um Recurso Performativo da Prática Estratégica de Sensegiving Inerente ao 'Strategizing' Pós-Desastre. *Organizações & Sociedade*, 27(93), 268-291. Recuperado em 05 fevereiro, 2024, de https://periodicos.ufba.br/index.php/revistaoes/article/view/25416

Dobler, M., Lajili, K., & Zéghal, D. (2012). Environmental Performance, Environmental Risk and Risk Management. *Business Strategy and the Environment*, 23(1), 1–17. doi:10.1002/bse.1754

Elshandidy, T., & Shrives, P. J. (2016). Environmental Incentives for and Usefulness of Textual Risk Reporting: Evidence from Germany. *The International Journal of Accounting*, 51(4), 464–486. doi:10.1016/j.intacc.2016.10.001

Eriandani, R., Narsa, I., & Irwanto, A. (2019). Environmental risk disclosure and cost of equity. *Polish Journal of Management Studies*, 19(2), 124-131. doi: 10.17512/pjms.2019.19.2.10

Fikru, M. G., Brodmann, J., Eng, L. L., & Grant, J. A. (2024). ESG ratings in the mining industry: Factors and implications. *The Extractive Industries and Society*, 20, 101521. https://www.sciencedirect.com/science/article/pii/S2214790X24001175

Freitas, C. M. D., Barcellos, C., Asmus, C. I. R. F., Silva, M. A. D., & Xavier, D. R. (2019). Da Samarco em Mariana à Vale em Brumadinho: desastres em barragens de mineração e Saúde Coletiva. *Cadernos de Saúde Pública*, 35. doi: https://doi.org/10.1590/0102-311x00052519

Linsley, P. M.; Shrives, P. J. (2006). Risk reporting: a study of risk disclosures in the annual reports of UK companies. *British Accounting Review*, v. 38, n. 4, p. 387-404, 2006. doi: https://doi.org/10.1016/j.bar.2006.05.002.

Lopes, J. C., & Demajorovic, J. (2020). Responsabilidade Social Corporativa: Uma Visão Crítica a partir do Estudo de Caso da Tragédia Socioambiental da Samarco. *Cadernos EBAPE.BR*, 18(2), 308-322. Recuperado em 05 fevereiro, 2024, de https://www.scielo.br/j/cebape/a/fNb9W5ZJMSKcKYVw3ptgzfb/

Lopes, G. L., Rocha Júnior, S. K., Figueira, P.H., Nascimento, S. P. (2020). A complexidade da implantação da estrutura de gestão de risco: O Caso de uma Seguradora. *Revista de Auditoria Governança e Contabilidade (RAGC)*, v. 8 n. 33. Recuperado em 05 fevereiro, 2024, de https://revistas.fucamp.edu.br/index.php/ragc/article/view/2015

Manual ESG. (2022). *Manual ESG: Gestão Sustentável.* Porto Alegre: SENAC-RS.

Meliyanti, M., & Hendriyeni, N. S. (2020). *Social and Environmental Disclosure and Earning Persistence*. In 3rd Asia Pacific Management Research Conference (APMRC 2019) (pp. 213-218). Atlantis Press.

Oliveira, J. A. N., & Cintra, Y. C. (2019). Gerenciamento de Riscos à Reputação no Discurso dos Relatórios Corporativos da Samarco. *Revista de Contabilidade e Organizações*, 13(1), 1-13. doi: https://doi.org/10.11606/issn.1982-6486.rco.2019.158709

Pires, M. A., Mourão, L., Oliveira, F. B., & Oliveira, J. A. P. (2020). (Ir)Responsabilidade Social Empresarial: Uma Avaliação do Desastre de Mariana-MG. *Revista de Administração Pública*, 54(5), 1188-1206. Recuperado em 05 fevereiro, 2024, de https://periodicos.fgv.br/rap/article/view/82208

Samarco. (2014a). *Relatório das Demonstrações Financeiras do ano de 2014*. Recuperado em 05 fevereiro, 2024, de https://www.samarco.com/wp-content/uploads/2020/12/2014-Relatorio-da-Administra-o-e-Demonstra-es-Financeiras.pdf

Samarco. (2014b). *Relatório de Sustentabilidade do ano de 2014*. Recuperado em 05 fevereiro, 2024, de https://www.samarco.com/wp-content/uploads/2020/12/2014-Relatorio-Anual-de-Sustentabilidade.pdf

Samarco. (2015). *Relatório das Demonstrações Financeiras do ano de 2015*. Recuperado em 05 fevereiro, 2024, de https://www.samarco.com/wp-content/uploads/2020/12/2015-DFs_portugues_final_07062016-1.pdf

Samarco. (2017). *Relatório das Demonstrações Financeiras do ano de 2017*. Recuperado em 05 fevereiro, 2024, de https://www.samarco.com/wp-content/uploads/2020/12/Demonstracoes-Financeiras.pdf

Samarco. (2018). *Relatório das Demonstrações Financeiras do ano de 2018*. Recuperado em 05 fevereiro, 2024, de https://www.samarco.com/wp-content/uploads/2020/12/Samarco_Demonstracoes-Financeiras-2018-vf.pdf

Samarco. (2019). *Relatório de Sustentabilidade Bianual 2018-2019*. Recuperado em 05 fevereiro, 2024, de https://www.samarco.com/wp-content/uploads/2020/12/Samarco_Relatorio-Bienal-2018_2019-3.pdf

Samarco. (2020a). *Relatório das Demonstrações Financeiras do ano de 2020*. Recuperado em 05 fevereiro, 2024, de https://www.samarco.com/relatorios/.

Samarco. (2020b). *Relatório de Sustentabilidade do ano de 2020*. Recuperado em 05 fevereiro, 2024, de https://www.samarco.com/wp-content/uploads/2021/10/Samarco_Relato%CC%81rio-Sustentabilidade-2020.pdf

Samarco. (2021a). *Relatório das Demonstrações Financeiras do ano de 2021*. Recuperado em 05 fevereiro, 2024, de https://www.samarco.com/wp-content/uploads/2022/04/Samarco-Relatorio-Admin-e-Demonstracoes-Financeiras_2021.pdf

Samarco. (2021b). *Relatório de Sustentabilidade do ano de 2021*. Recuperado em 05 fevereiro, 2024, de https://www.samarco.com/wp-content/uploads/2022/09/samarco_relatorio_sustentabilidade_2021_1-1.pdf

Samarco. (2022a). *Relatório das Demonstrações Financeiras do ano de 2022.* Recuperado em 05 fevereiro, 2024, de https://www.samarco.com/wp-content/uploads/2023/04/Samarco_Relatorio-da-Administracao-2022.pdf

Samarco. (2022b). *Relatório de Sustentabilidade do ano de 2022.* Recuperado em 05 fevereiro, 2024, de https://www.samarco.com/wpcontent/uploads/2023/07/Samarco_Relatoriode_Sustentabilidade_2022.pdf

Sampaio, M. S., da Silva Gomes, S. M., Bruni, A. L., & Dias Filho, J. M. (2012). Evidenciação de informações socioambientais e isomorfismo: um estudo com mineradoras brasileiras. *Revista Universo Contábil*, 8(1), 105-122. doi:10.4270/ruc.2012107

Sirli, A. (2023). *The effect of enterprise risk management and environmental performance toward corporate social responsibility disclosure* (Csrd) (Empirical Studies on The Mining Companies Listed in IDX and Following The PROPER Program by Ministry of Environment RI Before Pandemic). Recuperado de http://digilib.unila.ac.id/71508/

Sousa, R. M., Costa, A. J. B., & Nunes, D. M. S. (2021). Gestão de riscos em organizações sociais vinculadas ao governo federal. *Revista de Administração da Unimep*, 19(5), 220-249. Recuperado em 05 fevereiro, 2024, de https://openurl.ebsco.com/EPDB%3Agcd%3A10%3A18878266/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A154875468&crl=c

Souza, F. M., Tarifa, M. R., & Panhoca, L. (2019). O Rompimento da Barragem de Mariana (MG): Mudanças no 'Disclosure' Ambiental do Setor de Mineração. *Revista de Gestão Ambiental e Sustentabilidade*, 8(1), 172-187. doi: https://doi.org/10.5585/geas.v8i1.13769

Souza, F. M., Colauto, R. D., & Panhoca, L. (2020). Hipocrisia Organizada e Fachada Organizacional nos Relatórios de Sustentabilidade Corporativa. *Enfoque Reflexão Contábil*, 39(2), 117-131. doi: https://doi.org/10.4025/enfoque.v39i2.44339

Theiss, V., Beuren, I. M., & Niyama, J. K. (2021). Interface dos elementos da atribuição e das estratégias de legitimidade das narrativas contábeis. *Revista Universo Contábil*, 17(1), 7-26. Recuperado em 05 fevereiro, 2024, de https://www.proquest.com/openview/b8a0eb5e553a8eb65042f266773a9921/1?pq-origsite=gscholar&cbl=616639

Tubis, A., Werbińska-Wojciechowska, S., & Wroblewski, A. (2020). Risk assessment methods in mining industry—a systematic review. *Applied Sciences*, 10(15), 5172. https://www.mdpi.com/2076-3417/10/15/5172

Yin, R. K. (2010). *Estudo de caso: planejamento e métodos.* 4. ed. Porto Alegre: Bookman.