





Environmental sustainability disclosure in sustainability reports: Mining, oil, and gas companies on the Indonesia stock exchange

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ABSTRACT

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This paper examines how mining, oil, and gas companies address environmental issues and communicate their actions to stakeholders through sustainability reports. Using market capitalization as a size metric, 50 mining, oil, and gas companies listed on the Indonesia Stock Exchange (IDX) were included in the research sample. Sustainability reports were subjected to quantitative and qualitative content analysis to identify keyword occurrences that were pertinent to the investigation. The findings revealed that environmental protection, emissions, carbon footprint, climate change, biodiversity, nature, planet, effluent, and conservation were addressed in the companies' sustainability reports. This study confirmed, in line with research on other industries, that the intensity of communication on these topics varies with company size. It was also found that, although some companies discuss many keywords that correspond to the Global Reporting Initiative, they are irrelevant because the reports do not show the companies' commitment and efforts to achieve the concepts. The practical implication of this research is that companies should show more commitment in their efforts to address environmental issues – sustainability disclosure is not just about words.

Contribution/Originality: This study uses NVivo to analyze the data and uses more keywords to cover Global Reporting Initiative (GRI) issues. Furthermore, this is the first study to use and analyze GRI keywords to measure the environmental coverage and commitment of companies listed on the Indonesia Stock Exchange (IDX).

1. INTRODUCTION

The operations of mining, oil, and gas companies are often associated with environmental damage. The environmental damage includes floods, landslides, global warming, decreased water quality, and loss of biodiversity (Ali, Sloane, & Strezov, 2018; Bebbington & Williams, 2008; Ossa-Moreno et al., 2018). This problem is also apparent in Indonesia. If a natural disaster occurs, the industrial sectors, especially the mining, oil, and gas industry, will be seen as the cause of the disaster. Environmental damage is not only a domestic issue in specific countries but has become a global problem (Borghesi, Cainelli, & Mazzanti, 2015; De Marchi, 2012). For companies with social and environmental exposure, strategic steps and good corporate governance are needed for companies to address the issue of corporate sustainability, both from a social and an environmental perspective. Companies must also pay attention to the need to comply with efforts to achieve the Sustainable Development Goals (UNDP, 2021).

In today's social and business climate, the mining, oil, and gas industry faces several challenges. First, the public exerts pressure to carry out business transformation and reduce the impact of the company's business operations on the environment (Carvalho, 2017). Increasingly alarming environmental conditions and various global initiatives urge companies to carry out business transformation immediately. In Indonesia, some companies have already abandoned their old businesses that are considered “dirty energy” and have set up new businesses that are considered cleaner. Second, corporations that are under significant public and regulatory pressure are more likely to employ sustainability disclosure to express their legitimacy to operate to stakeholders (Franks et al., 2014; Lodhia, Kaur, & Stone, 2020; Michelon, 2011). The general public's perception of mining, oil, and gas companies is usually negative. Therefore, sustainability reporting is considered a way to increase communication between companies and the community. Initiatives in sustainability reporting also illustrate the quality of the directors. Thus, quality disclosures result from the thoughts, efforts, and commitment of qualified directors. If the community considers the initiatives carried out to be good, then a social license to operate (SLO) can be built and maintained (Karakaya & Nuur, 2018).

Sustainability reporting is now common for large companies. One of the reasons for the rapid development of sustainability reporting around the world is the need for companies to increase their business legitimacy, as well as pressures from stakeholders outside the company. In addition, there are regulatory factors that bind companies (O'Dwyer, Owen, & Unerman, 2011). While many have questioned the impact of sustainability reporting, the development of sustainability reporting shows a positive trend (Craig, 2002; Gilbert & Rasche, 2008). Globally, and recently, the environmental, social, and governance (ESG) framework has undergone rapid development. This framework is increasingly evident in how businesses operate. Moreover, the concept of ESG investing is also on the rise. Financial institutions are expected to no longer provide loans to companies with low ESG scores. This further reinforces the fact that companies must be serious in communicating the steps they take to maintain their sustainability. In Indonesia, sustainability reporting has been required by the Indonesian Financial Service Authority for public companies and financial service institutions since 2017.

According to the Global Reporting Initiative (GRI), a sustainability report is the disclosure of information that represents the economic, environmental, and social performance of a company. It can be utilized as a medium for corporations to notify all stakeholders of their organizational performance. The sustainability report is a measure of the achievement of triple bottom line work objectives. It serves as a tool for achieving business performance and as a resource for investors when allocating capital. Sustainability reports serve as a yardstick for other stakeholders, such as the media, government, consumers, and academia, to evaluate the company's commitment to sustainable development. The company's commitment can not only be assessed based on whether disclosures are made; stakeholders must ensure that what is disclosed is not just a sweetener. Sustainability reports can also be part of efforts to manage reputational risk due to company operations.

Sustainability reports are used to communicate with stakeholders (Plotnikova, Shilovskaya, Strubalin, & Muravleva, 2020). In countries that separate their annual reports and sustainability reports, sustainability reports typically contain more significant social and environmental information than annual reports. In the context of this research, mining, oil, and gas companies also use their sustainability reports to communicate their awareness of the environment and the efforts they have made to protect the environment (Ahmad & Hossain, 2015). Businesses are adopting the best practice of either devoting a portion of their website to describing their sustainability initiatives or using their sustainability reports or annual reports for this purpose (Omoloso, Wise, Mortimer, Jraisat, & Omoloso, 2020). Annual reports or sustainability reports are preferred to the company's website as a way of communicating the company's operations (Sobhani, Amran, & Zainuddin, 2012). Although a website is more accessible, it is more difficult for the corporation to disclose information about its sustainability on this platform.

In Indonesia, sustainability report research into economic, environmental, and social transparency continues to expand and has become a fascinating field of study, given that information governance continues to increase across

Asia. This attempts to determine whether sustainability report disclosure through information sustainability, termed ESG disclosure, has an effect on companies in the mining, energy, and even manufacturing sectors, based on the responses of stakeholders (Hardiningsih, Januarti, Yuyetta, Srimindarti, & Udin, 2020).

Five study questions were developed to examine how mining, oil, and gas companies use their sustainability reports to inform their stakeholders about their environmental protection actions.

RQ1: How frequently are environment-related terms cited in the sustainability reports of mining, oil, and gas businesses, and what is the density of these mentions?

RQ2: What distinctions exist across corporations' environmental reporting in their sustainability reports?

RQ3: What are the most relevant terms used by businesses in their sustainability reports? Are there additional terms besides those on the GRI keyword list?

RQ4: How does company size affect the degree of environmental reporting by mining, oil, and gas companies listed on the Indonesia Stock Exchange (IDX)?

RQ5: How does company size affect the length of sustainability reports (number of pages) for mining, oil, and gas companies listed on the Indonesia Stock Exchange (IDX)?

The formulation of RQ4 and RQ5 was influenced by prior research indicating the favorable effect of corporate size on the disclosure of information pertaining to sustainability (Karaman, Kilic, & Uyar, 2018; Legendre & Coderre, 2013; Liu & Anbumozhi, 2009; Miklosik & Evans, 2021; Welbeck, 2017).

The following null and alternative hypotheses were defined to answer RQ4:

H0: The level of environmental communication in the sustainability reports of IDX-listed mining, oil, and gas businesses is unaffected by the size of the company.

H1: The level of environmental communication in the sustainability reports of IDX-listed mining, oil, and gas companies varies significantly by company size.

To answer RQ5, the following null and alternative hypotheses were formulated:

H0: The length of sustainability reports (number of pages) of IDX-listed mining, oil, and gas companies is unaffected by company size.

H1: There is significant variance in the length of sustainability reports (number of pages) of mining, oil, and gas businesses listed on the IDX, according to their size.

2. LITERATURE REVIEW

2.1. Legitimacy Theory

According to legitimacy theory, established businesses maintain their compliance with preexisting social and legal standards (Deegan, 2019). It is the responsibility of businesses to act responsibly within the confines of the society in which they are situated, even if those confines are subject to change. O'Donovan (2002) identified legitimacy theory as a factor in explaining environmental disclosures. In addition, studies about the likelihood of micro-legitimation methods being utilized in response to legitimacy-threatening environmental issues/events have been conducted, depending on whether the response was intended to gain, retain, or repair legitimacy. Legitimacy theory is very relevant to the mining, oil, and gas industries because environmental issues are not associated with only one or two events; on the contrary, the company's entire business is inherently related to the environment.

When a business gives back to its local community and the world at large, people take notice of the firm and its actions. When there is a discrepancy between corporate and social ideals that threatens the company's viability and prevents it from identifying a politically active public willing to lend credibility to the organization, a legitimacy gap will result. When a company's credibility is called into question, it must employ resistance strategies such as (1) informing and educating stakeholders about the changes, (2) shifting the perspective of stakeholders without altering company behavior, (3) shifting the focus of stakeholders' attention to other, related issues, and (4) altering and influencing the expectations of external parties regarding the company's performance (Guthrie & Parker, 1989).

Moreover, companies can strategically legitimize a new manufacturing process by manipulating social views, and this approach can be implicitly and explicitly backed by the State's ideological alignment (Archel, Husillos, Larrinaga, & Spence, 2009). This suggests that legitimacy theory also has a lot to do with existing regulation and how social views accept it.

Several academic studies have explored the concept of legitimacy and its role in organizational behavior and performance. For example, Edelman and Suchman (1997) found that organizations that are perceived as legitimate by their stakeholders are more likely to be successful and enjoy a competitive advantage. Similarly, Scott (2013) found that institutions that are perceived as legitimate are more likely to be effective and to enjoy a high level of support from their stakeholders.

The social dimension of the sustainability report addresses the community's reaction to the company's activities and details the dangers posed by the company's relationships with other organizations serving the public good. Human rights, product responsibility, labor, and decent employment are the four pillars that make up the social dimension. As a result, to bring about change, businesses should include information about social performance in their sustainability reports. Businesses must fulfill the terms of the social contracts with their local communities if they want to continue operating and expanding. Company value is anticipated to rise due to a positive corporate image, which affects sales and earnings as a direct result of the community's acceptance (legitimacy) of the business.

2.2. Social License to Operate (SLO)

Companies seek legitimacy by disclosing information related to their sustainability initiatives to stakeholders (Lodhia et al., 2020). Academic notions such as legitimacy and stakeholder management tend to provide the intellectual foundation for the business case for achieving an SLO (Demuijnck & Fasterling, 2016). In the literature on communication, corporate social responsibility (CSR), marketing, and management, the role of long-term connections with each stakeholder group has been frequently studied (Lock, 2019). There are two perspectives on stakeholder theory. First, the moral perspective asserts that stakeholders affected by a company's operations have the right to information and to require certain performance criteria. Second, the strategic perspective means that stakeholders can give an organization legitimacy or a social license to operate (Brower & Mahajan, 2013; Herremans, Nazari, & Mahmoudian, 2016). Thus, the communication between company and stakeholders must go both ways because the two are interrelated and need each other.

As mining, oil, and gas companies face a wide variety of challenges in their operations, the emphasis on the importance of maintaining relationships between companies and communities further strengthens the concept of SLO (Moffat, Lacey, Zhang, & Leipold, 2016). The concept of SLO has developed due to the imbalance of regulatory results obtained by regulators and the wishes of the community in general (Prno & Slocombe, 2012). This inequality has led to the emergence of the fact that it is insufficient for companies to follow applicable regulations; the affected communities must also give the "green light" for the company to continue to operate. Today, SLO is often used to indicate the level of public acceptance of mining, oil, and gas companies (Cheshire, 2010; Lincoln, 2015; Owen & Kemp, 2017; Prno & Slocombe, 2012), although it is often considered ambiguous as well (Owen & Kemp, 2013; Parsons & Moffat, 2014).

Worldview sets the tone for SLO (Lytle & Hitch, 2017) because it covers "inescapable, overarching systems of meaning and meaning-making that significantly influence how humans understand, enact, and co-create reality" (Hedlund-de Witt, 2013). Thus, worldview influences the perception of resource distribution, the formation of pathways, and the roles of actors in their social and cultural context (Hulme, 2009). SLO is crucial for businesses to consider when conducting operations.

Understanding the many perspectives on SLO in the European Union (EU), specifically regarding the government's role and responsibilities, necessitates a recognition of the various worldviews and the significance of people's faith in a government's ability to successfully control and protect them from mining operations. Examining

mining operations in Finland, Canada, and Brazil, two variables were assessed: stakeholders' level of trust in the legal licensing process and their collective perception that they can influence industry regulation (Lyra, Boutilier, Sairinen, & Thomson, 2014). When public trust is low and views on regulating ability are low, the need for SLO is high. Conversely, when public trust is high and the perception of regulating ability is high, the SLO needs of other stakeholders are low (Miklosik & Evans, 2021). This corroborates the SLO theory that SLO arose due to differences in expectations between the public and regulators.

Mining, oil, and gas companies clearly require a legal license to operate (Moffat & Zhang, 2014; Owen & Kemp, 2013). This is in accordance with the regulations in force in the country where the company operates. However, social licenses to operate cannot be underestimated. This is because the attitudes of external stakeholders can incur costs for the company, for example, due to legal, political, and social issues (Franks et al., 2014). The concept of SLO is currently accepted by industries such as mining, oil, and gas, as well as other industries that are subject to similar levels of exposure and pressure. The industry also makes SLO a means to communicate with stakeholders both domestically and globally (Franks et al., 2014; Lacey, Carr-Cornish, Zhang, Eglinton, & Moffat, 2017; Lacey, Malakar, McCrea, & Moffat, 2019; Matlaba, Mota, Maneschy, & dos Santos, 2017). The company-community conversation promotes connection-building and leads to the social acceptability of mining activities (Mercer-Mapstone, Rifkin, Louis, & Moffat, 2018).

2.3. Environmental Sustainability Reporting

Organizations have an obligation to notify their stakeholders of their environmental impacts through thorough and useful environmental reporting (Deegan, 2017). This is similar to the definition proposed by Buhr and Freedman (2001), who described environmental disclosure as the dissemination of any information concerning an organization's influence on the environment, whether monetary, quantitative, non-monetary, or narrative in nature.

Given these definitions, it is clear that environmental disclosure is about holding companies accountable. A company's responsibility to its stakeholders is reduced, according to Gray, Malpas, and Brennan (2014). Deegan (2017) reviewed the literature on environmental disclosure over the last 25 years and found a discrepancy between what stakeholders want and what firms provide in terms of accountability. He argued that there is a disconnect between companies' desire to expand and their responsibility to protect the environment. Since businesses are consistently harming the environment in pursuit of profit (Gaveau et al., 2014), their management would rather offer symbolic disclosures than go into detail. The poor quality of environmental disclosure around the world has been documented in several studies.

Reporting on environmental and operational sustainability (also known as "sustainability reporting") can give the impression that the SLO is being met (Franks et al., 2014). Economies, societies, and ecosystems are the three pillars upon which sustainability reporting rests (MacGregor Pelikánová, 2019). This research focuses on the latter pillar. Corporate environmental disclosure has been directly linked to the SLO as a response to stakeholders' demands that businesses do their part to lessen their environmental effects (Cerin, 2002; Havierníková & Kordoš, 2019). According to legitimacy and stakeholder theories, businesses are less likely to experience systemic risk when they make environmental performance data available to the public (Matsumura, Prakash, & Vera-Munoz, 2014).

Accounting from a social perspective seeks to understand how various parts of a society show their social and environmental efforts (or lack thereof) – making them understandable and comprehensible to others. Consequently, social accounting provides a method through which the intangible can be conceived of, recorded, articulated, and expressed. Understanding how interactions, currently dominated by economic factors (Ulrich, 2000), might be renegotiated to accept or even prioritize the social and environmental factors within these relationships can be achieved through an examination of such accounts or the lack thereof.

Sustainability disclosures are a type of consultation with stakeholders that can help further conversation and interaction with those stakeholders (Manetti, 2011; Scherer & Palazzo, 2012). Evidence suggests that trust plays a

significant role in SLO (Moffat & Zhang, 2014). It is the public's faith and confidence in a firm or industry's ability to "do the right thing" that ultimately determines whether or not the public will support the company or industry in its development efforts (Morrison, 2014). How people view mining is susceptible to what the media says about it. This confirms that the media have a mediating role in the natural resource sector's trustworthiness at the nexus of government, industry, and community (Edwards et al., 2019). Another recognized factor in the SLO's legitimacy (and fragility) is the role played by the media and public discourse (Lyytimäki & Peltonen, 2016). Sustainability reporting is also used on the web (Provasnek, Schmid, & Steiner, 2018) and in social media (Lodhia et al., 2020), which helps to engage stakeholders and confirms a company's credibility.

2.4. The Indonesian Mining, Oil, and Gas Industry

The energy sector in Indonesia, which consists of mining, oil, and gas, produces many goods and services that are the backbone of modern industry. The existence of these products has become a necessity, and the level of dependence on the products of this sector continues to be high. In fact, although the world is trying to transition to more renewable energy, the products offered are still mining products; only the commodities are changing. Indonesia is also a fairly large country in the world's mining, oil, and gas sectors. During the current world energy crisis, Indonesia is one of the countries benefiting from the increase in prices of world energy commodities.

Indonesia's exports in August 2022 grew positively with a value of USD27.91 billion or grew strongly by 30.15% (year-over-year (yoy)) and 9.17% month to month (mtm). This export was recorded as the highest export of all time. Cumulatively, the export value and trade balance from January to August 2022 were recorded at USD194.6 billion and USD34.9 billion, respectively, both of which were the highest in Indonesia's economic history. Oil and gas exports, which are still growing, reached 64.46% (yoy) and non-oil and gas exports reached 28.39% (yoy). From a sectoral perspective, the mining sector recorded the highest growth of 63.17% (yoy). The mining, oil, and gas sectors contribute around 8-10% to Indonesia's GDP annually. Although the role of this sector in the economy is very large, environmental issues and news controversies often arise and are discussed in society.

Moreover, in the past few years, Indonesia has been hit by many disasters such as floods, landslides, extreme weather, and droughts. This has led to the need for responsibility from mining, oil, and gas sector companies to carry out their operations in accordance with sustainability rules. As a result, mining, oil, and gas corporations are required to establish sustainable development strategies to demonstrate their commitment to ethics and the environment. Without ethics, businesses cannot thrive; studies have shown a negative association between ethics and profit-making.

3. METHODS

3.1. Research Approach

To analyze the environmental sustainability reporting of mining, oil, and gas corporations through their sustainability reports, an interpretive research paradigm was utilized. Although interpretive research has the propensity to rely primarily on qualitative data, quantitative data are frequently acquired to add precision and provide a greater knowledge of the area that is being researched. Documentation is an option for collecting interpretive data. There is the potential for both external and internal papers (such as annual reports and sustainability reports) to be used to shed light on the phenomenon of interest. Sustainability reports were utilized for this research project. In Indonesia, publicly traded corporations are typically required to file not one but two separate reports: an annual report and a sustainability report.

Utilizing content analysis, the researchers investigated the aims, meanings, and effects of communication content. This was accomplished by estimating the frequency of particular words, phrases, subjects, and ideas within physical or digital texts. One of the goals of content analysis is to identify relationships and patterns in the presentation of concepts. Other objectives of content analysis include understanding the intentions of an individual,

group, or institution, identifying propaganda and bias in communication, revealing variations in communication when applied to different contexts, and analyzing the outcomes of communication content, such as information flow or audience responses. This research used qualitative and quantitative data. Qualitative data were processed using NVivo software. The qualitative data in this study were taken from the sustainability reports. NVivo was used to find relevant keywords using the text search feature. In addition, a search for other keywords that are relevant but not widely discussed in GRI was also carried out. NVivo was also used to search for themes related to the keywords being searched for using the software's cluster feature. Data from the text search were also used as quantitative data for later analysis. In addition to data taken from the NVivo process, quantitative data were also taken from Thomson Reuters Datastream (Eikon). The data used was the market capitalization of the sampled public companies. These quantitative data were then analyzed using Stata 17 to answer the research questions.

Regarding content analysis, according to Bowen (2009), text analysis of company-issued papers is not just employed to examine CSR procedures, but also business practices in general. Du and Vieira (2012) utilized content analysis to discover CSR initiatives and CSR communication approaches by analyzing company web pages and sites. Content analysis allows disclosures to be quantified (Jeffrey, 2000). It is possible to utilize content analysis to better grasp text-based data (Elo & Kyngäs, 2008). Frequently, disclosures consist of text that is challenging to quantify using normal approaches. This method can be used to measure the disclosure's content based on characters, words, phrases, pages, the proportion of its contents, and other criteria.

The following steps were taken in the content analysis of this study. First, we determined the medium of disclosure, the type of disclosure, and the disclosure criteria to be analyzed. Second, we determined the unit of analysis used for coding. Third, we recorded all keywords that appeared. Fourth, we performed a relevant keyword analysis for each occurrence in the sample documents. Fifth, we conducted a statistical analysis to prove the correlation between the size of the company and the intensity of environmental sustainability communication. Sixth, we conducted a word frequency analysis to discover relevant themes that are not discussed in the GRI.

3.2. Relevant Topics

Environment- and sustainability-related content was identified by searching for pertinent keywords. The selected subjects were strongly connected with the environmental features in the SLO-related literature. The selection of themes began with an evaluation of the GRI G3 disclosure checklist's environmental information indicator terms (Miklosik & Evans, 2021; Welbeck, 2017). Details of the keywords with the reasoning for their inclusion or exclusion are listed in Table 1.

3.3. Research Sample

The sample in this study was taken from the IDX energy sector website. This sector includes the mining, oil, and gas sectors. However, not all companies in the energy sector were sampled. A purposive sampling method was employed. Of the 75 companies in the energy sector, not all were actively traded. The study also used market capitalization to ensure that stocks that were not actively traded were excluded from the sample. Companies with negative equity were also excluded, as well as companies with a core business not exactly related to mining, oil, or gas. A total of 50 mining, oil, and gas companies were sampled.

3.4. Data Collection and Analysis

The research used the latest sustainability report issued by each company. In this study, the latest sustainability reports were for the 2021 financial year. Sustainability reports were obtained from each company's website. Sustainability reports were not available on regulator websites, only annual reports.

The total number of occurrences of each topic/keyword was recorded. When searching for specific terms, NVivo can search for connected words. NVivo can thus find not only the word "environment" but also other forms

of the word, such as “environmental.” Another example is “nature” when searching for “natural” and “conservation” when searching for “conserve.” After each keyword/topic was recorded, an in-depth analysis was performed to assess the relevance of each occurrence. Descriptive analysis was also used to describe the status quo of the data. Finally, correlation analysis was used to answer the research questions.

Table 1. Keywords for content analysis and reasoning for inclusion/exclusion.

Topics/Keywords	Status	Reasoning
Emission	Included	Included in the analysis as it relates to carbon emissions.
Environment	Included	It is included in the analysis because it is contextually related to environmental sustainability efforts. In terms of the number of occurrences, it is quite high, so it is necessary to carefully evaluate related topics.
Climate	Included	It is included in the analysis because it is contextually related to issues that are relevant today, such as climate change.
Footprint	Included	It is included in the analysis because the issue of carbon footprint is quite relevant.
Biodiversity	Included	It is included in the analysis because although there are not many occurrences, the context is closely related to the company's sustainability efforts.
Sustainability	Excluded	Based on the initial analysis, the number of words related to sustainability is the highest. However, many of those words are outside the context of environmental sustainability. There is also the repeated detection of the word sustainability because it is the format of the company's sustainability report.
Protection	Included	It is included in the analysis because, based on the initial analysis, much of the protection context concerns the environment.
Nature	Included	Included in the analysis because it is relevant to environmental sustainability.
Resources	Excluded	Based on initial analysis, most of the occurrences were related to human resources. The topic “resources” is also captured in other keywords.
Planet	Included	Although it does not appear often, it is interesting to further analyze the topics that are communicated.
Conservation	Included	Included in the analysis because the context corresponds to environmental sustainability.
Effluent	Included	Included in the analysis due to its association with the environment.

4. RESULTS

4.1. Sustainability Report Length

Some of the sustainability reports analyzed were quite long and extensive while others were short and concise. The length of the reports ranged from 42 to 328 pages. The average number of pages in each sustainability report was 140. The details are depicted in Table 2.

Table 2. Length of sustainability reports in pages.

Pages length	Number of pages
Total number of pages	7022
Maximum number of pages per report	328
Minimum number of pages per report	42
Average number of pages (Mean) per report	140
Median	132

4.2. Relevant Keyword Mentions

Table 3 shows the relevance of each keyword to the total occurrence. The highest relevance was for the word "environment" with 89.49%, and the lowest relevance was for the word "footprint" with 25.49%. The average relevance overall was 69.26%.

Table 3. Overall keyword mentions.

Keyword	Relevant mentions	Total mentions	Average relevance
Emission	1308	1749	74.79%
Environment	1822	2036	89.49%
Climate	307	541	56.75%
Footprint	26	102	25.49%
Biodiversity	413	521	79.27%
Protection	314	837	37.51%
Nature	246	805	30.56%
Planet	80	124	64.52%
Conservation	394	454	86.78%
Effluent	271	311	87.14%
Total	5181	7480	69.26%

4.3. Differences in Sustainability Reporting Based on Keyword Mentions

Table 4 shows the data on keyword mentions per sustainability report. The highest number of relevant mentions was 462, while the lowest was 1. The mean number of relevant mentions was 103.62, while the median was 81.5.

Table 4. Data per sustainability report.

Mentions per sustainability reports	Relevant mentions	Total mentions
Maximum	462	540
Minimum	1	3
Mean	103.62	149.6
Median	81.5	110
Standard deviation	93.412	121.012

Table 5 shows the density of each keyword relative to the number of pages in the sustainability report. This shows whether the content of the sustainability report focuses on matters relevant to sustainability issues. The highest density is 3.5 words/page and the lowest is 0.011 words/page. The average density is 0.81 words/page.

Table 5. Density of relevant mentions.

Density characteristic	Value
Maximum	3.500
Minimum	0.011
Mean	0.815
Median	0.805
Standard deviation	0.635

4.4. Company Size, Sustainability Report Length, and Intensity of Sustainability Communications

Table 6 shows the relationship between report length, market cap, and total mentions. Market capitalization and total mentions have a moderate positive correlation ($r = 0.5910$) with $p < 0.01$, which is statistically significant. Market capitalization also has a positive correlation with report length, although this correlation is weaker ($p < 0.01$).

Table 6. Pearson correlation between report length, market capitalization, and total mentions.

Variables	Pages	Market capitalization	Relevant mentions
Pages (R)	1	0.408	0.389
p	0.000	0.003	0.005
Market capitalization (R)	0.408	1	0.591
p	0.003	0.000	0.000
Relevant mentions (R)	0.389	0.591	1
p	0.005	0.000	0.000

5. DISCUSSION

The study reveals that mining, oil, and gas companies use their sustainability reports to notify their stakeholders about environmental issues. The analysis of 7,022 pages from the sustainability reports of 50 mining, oil, and gas companies listed on the Indonesia Stock Exchange (IDX) revealed 5,181 relevant mentions of the ten studied topics, which were environment, climate, emissions, footprint, biodiversity, protection, nature, planet, conservation, and effluent. "Environment" and "effluent" each had average relevance. This shows that disclosures related to these two words were followed by commitments and initiatives carried out by the company. "Nature," "protection," and "footprint" had the lowest average relevance. A qualitative analysis of the theme of each mention showed that disclosures related to these matters were only "sweeteners" to meet the requirements of the regulator's checklist. The word "climate" did not provide a high enough level of relevance either. Companies did not demonstrate a genuine commitment to minimizing negative environmental and climate change impacts, which is central to the Sustainable Development Goals agenda.

The average keyword density was 0.815, meaning that relevant keywords appeared an average of 81.5 times per 100 pages in the sustainability reports (RQ1). On a communication level, the density reflects how seriously IDX-listed mining, oil, and gas corporations take environmental protection efforts. Six keywords had an average relevance greater than 60%, while the average relevance of all mentions was 69.26%. The companies appear to be proactive in minimizing their negative environmental impact and take environmental preservation activities seriously. This data could be used to establish trends by comparing the current and future average keyword density.

As the length of the companies' sustainability reports varied widely, from 42 to 328 pages, so did the number of study-relevant references. Calculating the standard deviation ($\sigma = 93.41$) quantified the extent of the variability. This figure implies that the measured values are widely distributed, with the average number of keywords cited by a single mining business exceeding the mean value by 93 mentions. An examination of the keyword density value distribution showed comparable differences, with values ranging from 0.01 to 3.5. The company with the lowest keyword density had less than two relevant keyword mentions per 100 pages of its annual report, while the company with the most mentions had about 350 relevant words per 100 pages (RQ2).

Based on the list of keywords analyzed, the most relevant mentions were "environment" and "emission." These two words were mentioned frequently, showing the focus of the companies' management. Aside from the list of words based on the word frequency analysis in NVivo, other words might be interesting to analyze in future. For RQ3, these include "community," "risk," and "water." Water was mentioned quite frequently in the reports and more often than the word "nature." These themes could be of concern in GRI research.

Finally, we also investigated whether firm size affected the level of environmental sustainability communications. The results revealed the existence of a moderate positive association between the market capitalization of a company and the total number of relevant mentions. The extremely low p-value allowed the null hypothesis for RQ4 to be rejected. Instead, the alternative hypothesis H1 was accepted, demonstrating that there was a significant correlation between the level of environmental disclosure in the sustainability reports of IDX-listed mining, oil, and gas companies and their size. This result is consistent with prior studies conducted in many areas and businesses (Legendre & Coderre, 2013; Liu & Anbumozhi, 2009; Reverte, 2009; Welbeck, 2017). For RQ5, while the p-value was also low, the correlation between company size and the length of the sustainability report was weak. This result implies that sustainability reports are more about management awareness than the size of the business.

6. CONCLUSIONS

It has been established that mining, oil, and gas companies listed on the Indonesia Stock Exchange (IDX) use their annual reports to tell their stakeholders about their commitment to environmental protection through environmental sustainability-related programs and projects. However, the level of this communication varies

significantly, with some businesses stressing their environmental preservation initiatives more than others. The level of communication is closely proportional to the size of the company, with larger corporations addressing the investigated themes with far greater frequency than smaller ones.

This research also proves that there are still companies that see sustainability reports solely as an obligation to be fulfilled. The promised actions are not necessarily carried out by the company. In some sampled companies, the sustainability reports include claims that are not proven to be real activities and sustainability commitments. In other words, the company views the sustainability report and GRI merely as a checklist that must be completed every year.

The frequent use of keywords relating to environmental concerns demonstrates that these companies are aware of the significance of environmental sustainability reporting in obtaining and keeping an SLO. There is a strong connection between environmental sustainability reporting and environmental sustainability management, and it is of the utmost importance that companies communicate about environmental protection measures. Although environmental sustainability reporting and environmental sustainability management are not identical, there is a strong connection between the two.

This research developed and put into practice a technique that makes it possible for academics, as well as practitioners, to quantify the level of a company's communications regarding its environmental activities. This examination of the mining, oil, and gas companies listed on the IDX has given insight into their level of dedication to the preservation of natural resources and their implementation of environmentally sustainable practices. This is consistent with the integrated thinking on resilience, sustainability management and governance, and reporting techniques, as well as their interrelationships, which has been demonstrated to be vital for resolving issues pertaining to environmental sustainability (Dahmann & Bullock, 2020).

6.1. Theoretical Contributions

This study's methodology facilitates the measurement of the extent to which environmental activities and sustainability-related themes are conveyed to key stakeholders via sustainability reports. By addressing the concerns of the restricted applicability of GRI rules, the findings contribute to the advancement of the knowledge of corporate environmental sustainability reporting (Deegan, 2017). This adds a new layer to the SLO theory, allowing mining, oil, and gas companies' communication endeavors to be determined and evaluated. This study's findings supplement stakeholder theory by shedding light on the usage of sustainability reports to disclose environmental issues to firm stakeholders.

6.2. Limitations

This study has some limitations. Firstly, only sustainability reports from 2021 were analyzed. Therefore, the analysis did not include trend analysis. Secondly, the media used only included sustainability reports. Other types of media, such as company websites, press releases, etc., were not considered. Thirdly, content analysis has limitations. The analysis only focused on specific words and the phrases around their occurrence. The analysis did not extensively search for context, nuance, or further meaning.

6.3. Future Research Directions

There are several interesting opportunities for future research. Firstly, subsequent studies could include sustainability reports from other years. Trend analysis could be conducted using three to five years of data. Secondly, the use of company websites and social media could also be interesting objects of research. Thirdly, comparing listed companies from different countries may also be an interesting approach. This would identify how countries differ from one another in the area of sustainability reporting.

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