ASTEEC Conference Proceeding: Social Science
1st International Conference on Social Sciences and Economics (IConSE)
"Contribution of Social Sciences and Economics for Sustainable Future"
Yogyakarta, September 21, 2024

Sustainability in Accounting: Disclosure of Accounting Information Related to Climate Change

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Abstract There has been progress toward policy and implementation in Indonesia's development of climate change accounting disclosure. Accounting professionals in Indonesia are prepared to take the lead in climate change mitigation sustainable reporting[1]. One of the initiatives to achieve the SDGs is sustainable governance, which includes climate disclosure. The Chair of B20 Indonesia, Shinta W. Kamdani, claims that businesses have benefited greatly from the adoption of sustainable governance. A 19% gain in earnings has been reported by about 33% of companies that use sustainable techniques to reduce costs and boost operational efficiency [1]. This raises the question of how Indonesian businesses reveal corporate information on climate change in their sustainability reports. In order to help businesses achieve their sustainability goals, this research will examine how they disclose information on climate change. The study population is companies in the forestry, energy and transportation sectors in Indonesia. This selection is based on the main priority of reducing Indonesia's GHG emissions in the forestry, energy and transportation sectors which cover 97% of Indonesia's total nationally determined contribution (NDC) emission reduction targets [2]. Governance, strategy, risk management, and TCFD Metrics and Targets comprise the climate disclosure data that was evaluated using a descriptive qualitative research methodology [3].

Keywords: Accounting, Sustainability, Climate Change, Information Disclosure

INTRODUCTION

Climate change has become a concern for the world community and has driven various movements to save the earth. The greatest impact of climate change is not only seen in some areas of the earth but has covered the planet's entire surface. Starting from global warming, rising sea levels and natural disasters of devastating magnitude have occurred as a result of climate change. If we think about the cause, we will not doubt that humans are the main contributors to this phenomenon. Humans have explored nature, and this is the main cause of the lack of environmental risk calculations that do not pay attention to the sustainability of nature. The risk of climate change will greatly affect the sustainability of nature, especially in countries with diverse ecosystems, for example, Indonesia. Indonesia, which has a tropical climate, an archipelagic topography, and abundant biodiversity, faces all the impacts of climate change. Climate change has become a major driver of environmental conflict in Indonesia, caused by rising temperatures, changes in rainfall patterns, and other impacts. This then puts significant pressure on the ecosystem and the use of natural resources, which then creates integration that triggers competition and conflict so that immediate action is needed to implement climate change mitigation policies and local adaptation that focus on environmental displacement and community

welfare. *[4]*. Collaboration between government, communities, and the private sector is key to designing holistic and practical solutions.

Environmental sustainability has received attention from the Indonesian government and society. The ongoing commitment to mitigate climate change must continue to be upheld by stakeholders at several scales, including individual, collective, communal, and government levels.[5]. Cooperation from the government, private sector, and community in the triple helix scheme for environmental sustainability is the hope for achieving environmental sustainability. The government plays its role in creating and implementing regulations and policies that are oriented towards environmental, economic, and social sustainability and are related to efforts to prevent the impacts of climate change. The industrial sector seeks to enforce regulations by transforming into a sustainable business by implementing the Environmental, Governance, and Social (ESG) concept. The community is the main supporter of government and industry efforts to oversee the implementation of policies while contributing to independent programs.

The industrial sector, in this case, companies, has an important role in creating sustainable businesses. Companies around the world include statements in their annual reports about their views and efforts related to the challenges of climate change because climate change will have a broad impact on human life in various fields[3]. Companies have begun to disclose the impact of climate change on company performance, both in the form of climate change risks and opportunities faced by the company. Information that describes the disclosure includes disclosure of greenhouse gases (GHG), emissions or exhaust gases, carbon footprints, or natural factors that affect the company's operations. Currently in Indonesia itself, companies that are the main priority for reducing Indonesia's GHG emissions are the forestry, energy, and transportation sectors, which cover 97% of Indonesia's total nationally determined contribution (NDC) emission reduction targets[2]. Several factors are driving this change, such as regulation, government policy, investor pressure, consumer action, and the increasing presence of Gen Z in companies[6]. Generation Z cares deeply about the impact of their actions or inaction on the climate.

The reference for companies in disclosing climate change impact information has been provided by the accounting organization, the Financial Stability Board (FSB). The FSB recognizes the economic risks and opportunities inherent in climate change, so, with encouragement from the G20, it formed the Task Force on Climate-related Financial Disclosures (TCFD) in 2015 [7]. The TCFD was developed by the SASB Foundation and CDP Worldwide on behalf of the Climate Disclosure Standards Board (CDSB). The TCFD recommendations serve as a global foundation for effective climate change disclosure. The CDSB framework helps organizations integrate and disclose financial material information related to climate change and natural capital into their annual reports. SASB standards help organizations collect, build, and effectively disclose performance data related to identified material climate change risks and opportunities [8].

A. Climate Change

The most frequently used environmental term today is “climate change," which refers to contemporary climate change largely caused by human actions. The impact of human actions on the global climate has reached alarming levels and poses major threats to physical and socio-economic systems [9]. Literally, ‘Climate Change’ refers to long-term changes in the statistical distribution of weather patterns (e.g., temperature, precipitation, etc.) over decades to millions of years [9]. The Intergovernmental Panel on Climate Change (IPPC), an intergovernmental organization focused on climate change, states that human activities, primarily through greenhouse gas emissions, have caused significant global warming, with global surface temperatures reaching 1.1°C above

1850–1900 levels in 2011–2020. Global greenhouse gas emissions continue to increase, with historical and ongoing uneven contributions arising from unsustainable energy use, land use and land use change, lifestyles and consumption, and production patterns across regions, between and within countries, and among individuals (high confidence) [10].

The IPCC further states that the atmosphere, ocean, cryosphere, and biosphere have undergone major and rapid transformations. Human-induced climate change has affected many weather and climate extremes in every region around the world, causing great loss and damage to people and nature, so vulnerable communities that have historically made the least contribution to climate change are now disproportionately affected [10]. The impacts of human-induced climate change are predicted to continue to increase, as illustrated below.

Figure 1 Related losses and damage caused by climate change

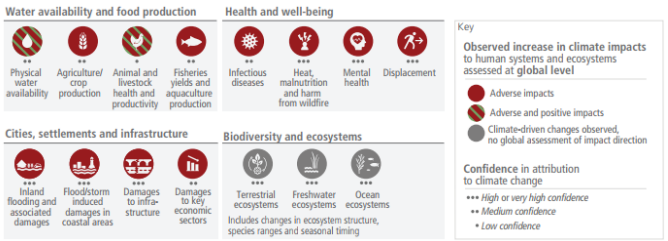
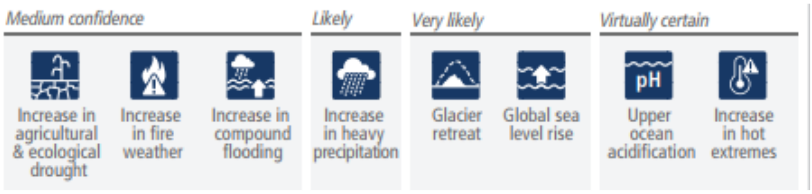


Figure 2 Attribution of observed physical climate change to human influences



Climate change losses and damage threaten water availability and food production, human health and well-being, urban life, settlements, and infrastructure. It also impacts the planet's biodiversity and ecosystems. Food security and water security have been reduced by climate change, undermining efforts to meet the Sustainable Development Goals. Although overall agricultural productivity has increased, climate change has slowed this growth worldwide over the past fifty years. Fish and shellfish production in some ocean regions has been disrupted by ocean warming and acidification. About half the world's population now experiences severe water scarcity, at least part of the year, due to a combination of climatic and non-climatic factors. In urban areas, climate change has negatively impacted livelihoods, human health, and key infrastructure.

In cities, extreme weather events have increased. Urban infrastructure, such as transport, water, sanitation, and energy, has been affected by these extreme events, which occur in stages and cause economic losses, service disruptions, and negative impacts on well-being. Economically and socially marginalized urban populations are particularly affected.

B. Task Force on Climate-related Finansial Disclosures (TCFD)

The TCFD was developed by the SASB Foundation ("SASB") and CDP Worldwide on behalf of the Climate Disclosure Standards Board (CDSB). The TCFD recommendations serve as a global foundation for effective climate change disclosures. The CDSB framework helps organizations integrate and disclose financial material information related to climate change and natural capital into their annual reports. SASB

standards help organizations collect, construct, and effectively disclose related performance data for identified material climate change risks and opportunities [7]. The following is the content of climate change accounting disclosures under the TCFD [8]. Governance, consisting of the following information disclosures a) Disclosing the role of the organization's board in overseeing climate change issues. b) Disclosing the role of management in assessing and managing climate change issues. Strategy, consisting of the following information disclosures: a) Disclosing the risks and opportunities related to climate change that have been identified by the organization in the short, medium, and long term b) Disclosing the impact of climate change risks and opportunities on the organization's business, strategy, and financial planning c) Disclosing the resilience of the organization's strategy by considering various climate change scenarios, including the 2°C scenario or below. Risk management, consisting of the following information disclosures: a) Explaining the organization's process for identifying climate change risks, b) Explaining the organization's process for managing climate change risks, c) Describe how the process of identifying, assessing, and managing climate change risks is integrated into the organization's overall risk management. Metrics and targets, consisting of the following disclosures: a) Disclose the metrics the organization uses to assess climate change risks and opportunities that are aligned with the company's strategy and risk management processes, b) Disclose Scope 1, Scope 2, and (where appropriate) Scope 3 GHG emissions and their associated risks, c) describe the targets the organization uses to manage climate change risks and opportunities and performance against these targets.

C. Research Questions

This study was conducted to obtain empirical evidence of the extent to which climate accounting disclosures are carried out by companies in Indonesia. The research period was set for three years, starting from 2021 to 2023. Given that the main priority for reducing Indonesia's GHG emissions is the forestry, energy, and transportation sectors, the companies used as research samples came from these sectors. The study limited the sample to companies that disclose climate change information in their sustainability reports. Sustainability reports or Sustainability Reports (SR) are a form of company performance reporting that is currently disclosed by companies in various countries, where companies disclose their performance consisting of economic performance, social performance, and environmental performance [11]. The criteria for climate accounting disclosure are adopted from the TCFD, which is then used as a research indicator. The indicators used consist of governance (TK), strategy (S), Risk Management (PR), and metrics and targets (MT). Some of the reference questions in this study are as follows:

a. How is the rating of the most disclosed information by companies based on the TCFD assessment criteria?
b. What is the trend of climate accounting disclosure in each research period (each year)?
c. Which sectors have the highest quantity of climate accounting information disclosure?
d. Which companies make the most climate accounting information disclosures?

METHODS

This study uses secondary data in the form of sustainability reports from forestry, energy, and transportation sector companies, obtained from the company's official website. The data analysis techniques used are content analysis and comparative methods,

which refer to scientific research methods that aim to understand the characteristics of the content of a communication material that is carried out in a structured manner to recognize communication content with consistent accuracy *[12]*. The data analysis technique provides a quantitative assessment using the J. Gunawan and Abadi (2017) scoring method as follows [13]:

Table 1. Scoring of research indicators

0 =	No information
1 =	1 sentence
2 =	1 paragraph
3 =	2 – 3 paragraphs
4 =	4-5 paragraphs
5 =	5 paragraphs

General guidelines, creating assessment guidelines, and drawing conclusions are steps in the content analysis research process. Researchers must understand and carefully carry out each step based on the agreed guidelines. If they encounter difficulties or ambiguity in understanding the guidelines, researchers must act independently. To categorize the types of information disclosed in the company's climate statement report, researchers must read it. The following guidelines are used to determine the score: a. Reading the text in the 2021–2023 climate report from the sample of research companies; b. Understanding all TCFD recommendation indicators and analyzing whether the information disclosed in the climate report is following the recommendations; c. Ignoring all information that is not in accordance and giving a score of 0 (zero) if the information disclosed does not comply with the TCFD indicators. The steps taken to carry out the scoring are as follows [13]:

a. Provide a score that corresponds to the quantitative and qualitative values that have been set if there is information disclosed that is relevant to the TCFD indicators.
b. Add up the scores to determine the level of disclosure of the company's climate disclosure. A higher score indicates that the company presents complete information following the TCFD indicators.
c. After all categories are added up, the total score of each category will be divided by the maximum score of each category. This will produce a quantitative result that is multiplied by the actual score of each principle, which will allow to provide a percentage of the quality of climate disclosure. The formula for calculating the improvement in the quality of climate disclosure is as follows:

$$\text{Score per principle:} \quad \frac{(a + b + c + d + \ldots n)}{\text{Maximum Score}} \times 100\%$$

Information:

$a + b + c + \cdots n$ = indicator score of each content
Maximum Score = maximum score obtained per content

To complete the content analysis research process, the researcher concludes the total score to determine the level of disclosure quality based on the principles of quality and content as a whole. Measurement means a collection of data in the form of numbers so that each number obtained can be used to define an object.

Table 1. Assessment Score Interval

Score Interval	Categories
0 % - 20 %	Very Low
21 % - 40 %	Low
41 % - 60 %	Medium
61 % - 80 %	High
81 % - 100 %	Very High

RESULTS AND DISCUSSION

The initial stage of data collection carried out was screening research samples that met the needs, namely companies that publish sustainability reports and disclose climate disclosure indicators by the TCFD reference. The indicators in question are the disclosure of greenhouse gases, emissions, carbon footprints, and their measurement matrices. Almost all companies do not specifically disclose information related to the impact of climate change in a separate section entitled Climate Change Information but disclose TCFD indicators. Overall, there are 10 forestry sector companies, 37 transportation sector companies, and 62 energy sector companies listed on the Indonesia Stock Exchange during the three observation periods. In the sample selection process, seventeen companies had the data needed for the study, consisting of two forestry sector companies, five transportation sector companies, and ten energy sector companies. Table 2 below shows the level of quality of climate change report disclosure.

Table 2. Level of quality of climate change report disclosure using quantitative methods

No	Companies Name	Year	Total Score TCFD	Average Score for 3 Years	Maximum Score TCFD	Conformity Percentage	Quality Level
1	Indonesia Fireboard Industry (IFII)	2021	26	30,33	55	55,15%	Medium
		2022	29				
		2023	36				
2	Toba Pulp Lestari (INRU)	2021	4	2	55	3,64%	Very Low
		2022	0				
		2023	2				
3	Jaya Trishindo Tbk (HELI)	2021	10	23	55	41,82%	Medium
		2022	26				
		2023	33				
4	Armada Bejaya Trans Tbk (JAYA)	2021	3	11,67	55	21,21%	Low
		2022	17				
		2023	15				
5	Mitra Investindo Tbk (MIRA)	2021	14	17	55	30,91%	Low
		2022	17				
		2023	20				
6	Putra Rajawali Kencana Tbk (PURA)	2021	5	10	55	18,18%	Very Low
		2022	12				
		2023	13				
7	Sidomulyo Selaras Tbk (SDMU)	2021	12	24	55	43,64%	Medium
		2022	30				
		2023	30				
8	PT. Baramulti Suksessarana Tbk (BSSR)	2021	29	30,67	55	55,76%	Medium
		2022	31				
		2023	32				
9		2021	30				

	PT Bumi Resource Tbk (BUMI)	2022	34				
		2023	40				
10	PT. Bayan Resources Tbk (BYAN)	2021	27	30,33	55	55%	Medium
		2022	30				
		2023	34				
11	PT. Golden Energy Mines Tbk (GEMS)	2021	31	32,33	55	59%	Medium
		2022	33				
		2023	33				
12	PT. Harum Energy Tbk (HRUM)	2021	37	41,33	55	75%	Medium
		2022	43				
		2023	44				
13	PT. Astrindo Nusantara Infrastruktur Tbk (BIPI)	2021	13	16,33	55	30%	Medium
		2022	16				
		2023	20				
14	PT. Energi Mega Persada Tbk (ENRG)	2021	10	18,33	55	33%	Medium
		2022	19				
		2023	26				
15	PT. Mitra Investindo Tbk (MITI)	2021	18	23,67	55	43%	Medium
		2022	25				
		2023	28				
16	PT. Citra Tubindo Tbk (CTBN)	2021	19	20,00	55	36%	Low
		2022	16				
		2023	25				
17	PT. Gunung Raja Paksi Tbk (GGRP)	2021	17	20	55	36%	Low
		2022	17				
		2023	26				

Based on Table 2. The following data was obtained:

1. Companies with High Climate Reporting Disclosure Quality
   PT. Harum Energy Tbk recorded the highest quality level with an average score of 75%, placing it in the High category. This shows that the company has consistent climate reporting disclosure quality and is close to the standards expected by the Task Force on Climate-Related Financial Disclosure (TCFD). The increase in scores from year to year shows the company's commitment to improving its climate reporting. PT. Bumi Resource Tbk is also in the high category with a score of 63.03%, indicating an increase in disclosure quality from 2021 to 2023.
2. Companies with Moderate Climate Reporting Disclosure Quality
   Several companies, such as Indonesia Fireboard Industry, Sidomulyo Selaras Tbk, PT. Baramulti Suksessarana Tbk, and PT. Bayan Resources Tbk, recorded scores in the range of 43-59%, placing them in the moderate category. These companies show a fairly good commitment to disclosing climate reports, but there is still room for improvement, especially in terms of consistency between years and meeting more detailed climate disclosure standards.
3. Companies with Low Climate Reporting Disclosure Quality
   Armada Bejaya Trans Tbk, Mitra Investindo Tbk, Putra Rajawali Kencana Tbk, and several other companies are in the low category with scores ranging from 18-36%. This shows that these companies need to significantly improve the quality of their climate reporting disclosure. This category shows that although there have been

efforts to report climate-related information, the disclosures made are not yet adequate to meet international standards.

4. Companies with Very Low Climate Reporting Disclosure Quality.
   Toba Pulp Lestari and Putra Rajawali Kencana Tbk recorded very low disclosure quality with scores below 20%. This shows that these companies are still very minimal in disclosing climate-related information. Inconsistency in reporting and lack of compliance with TCFD recommendations are major problems that need to be addressed immediately.

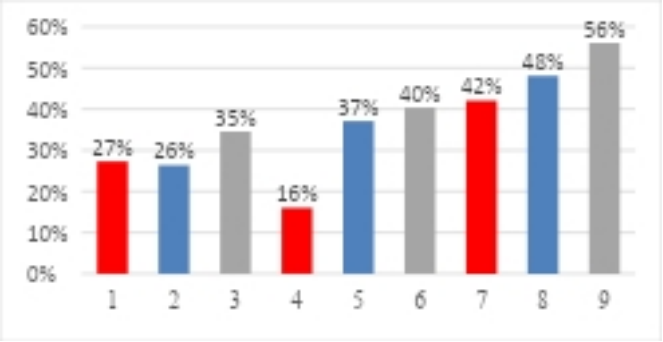


Figure 3 Quality Trends Based on Forestry, Transportation and Energy Sectors Quantitative Methods

Based on the climate disclosure trend chart from 2021 to 2023, it can be seen that the energy sector shows the most significant increase in the quality of disclosure. In 2021, disclosure in this sector started at 42% and continued to increase to 48% in 2022, before finally reaching 56% in 2023. This trend indicates that companies in the energy sector are increasingly striving to meet higher disclosure standards set by the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD). The consistent increase in this sector reflects the commitment to transparency regarding the climate risks and opportunities faced by companies in the energy sector.

The forestry sector, on the other hand, shows fluctuations in climate disclosure. In 2021, disclosure started at 27%, slightly decreased to 26% in 2022, but then increased to 35% in 2023. Despite the increase in the last year, this fluctuation indicates that companies in the forestry sector may face challenges in maintaining consistency in their climate disclosure. This may be due to a variety of factors such as looser regulations or policy changes that have not yet been fully implemented.

The transportation sector has varying levels of disclosure. In 2021, this sector had the lowest disclosure rate at 16%, indicating that companies in this sector tend to be late in adopting appropriate climate disclosure standards. However, a significant increase was seen in 2022, with 37% and 40% in 2023, indicating that the transportation sector is starting to better integrate climate risk and opportunity disclosure. Although still below the energy sector, this upward trend reflects a growing awareness among transportation companies of the importance of climate transparency.

Climate disclosure accounting is a relatively new development for businesses, although climate change has been a global focus for decades. Companies need to consider their ability to perform full disclosure by using the principle of materiality as a foundation. Information is considered material if it helps financial statementusers make economic decisions. Companies must identify significant climate issues for their business and present relevant information, so that staekholders such as investors can gain a better understanding of the opportunities and risk faced by the company in relation to climate change.

Good climate disclosure has a significant impact on investors. Transparent information about climate risks and opportunities can help them make better investment decisions. Companies with a good reputation in the eyes of investors tend to have better access to capital, which in turn can lower the cost of capital. Companies are also related to climate disclosure with the Sustainable Development Goals (SDGs), especially SDG 13, which is related to climate action. By disclosing information about greenhouse gas emissions, mitigation and adaptation strategies, and the social and environmental impacts of business operations, companies can demonstrate their contribution to achieving global goals in combating climate change. High-quality climate disclosure can be an effective tool to encourage policy change.

CONCLUSION

Analysis of the climate disclosure data of the companies studied shows significant disparities in the quality of reporting. Although there is a general upward trend, especially in the energy sector, the quality of disclosure still varies across companies and sectors. The energy sector recorded the most significant increase, while the forestry sector experienced fluctuations. The transportation sector, which initially had the lowest level of disclosure, has shown quite rapid improvement in recent years. Factors such as company size, industry sector, regulation, and stakeholder pressure affect the quality of disclosure. The main challenges in climate disclosure include the complexity of the issue, high costs, and the lack of uniform global standards. To improve the quality of climate disclosure, strengthening regulations, increasing company capacity, multi-stakeholder collaboration, and ongoing monitoring and evaluation are needed. The study also found that companies have not disclosed the opportunities for climate change impacts on the company, but only focus on the challenges faced.

Based on the results of this study, the suggestions that can be given to company stakeholders are as follows:

1. Company management, namely: a.) Companies need to strengthen internal capacity in managing and reporting climate data. This can be done through employee training, developing an integrated reporting system, and collaborating with climate experts; b.) Companies are advised to adopt an internationally recognized reporting framework, such as the TCFD (Task Force on Climate-related Financial Disclosures). This standard provides clear guidance on the types of climate information that need to be disclosed; c.) Companies need to identify, measure, and manage climate risks relevant to their business. This involves analyzing future climate scenarios and developing mitigation and adaptation strategies; d.) Companies must integrate climate considerations into all aspects of the business, from corporate strategy to day-to-day operations. This will ensure that companies are more resilient to climate change and can take advantage of new business opportunities.
2. Investors, namely supporting climate disclosure initiatives, such as Climate Action 100+ and Principles for Responsible Investment (PRI), and working with companies to develop joint solutions to address climate challenges.
3. Government, namely: a.) The government needs to create clear and consistent policies related to climate disclosure. These policies must provide incentives for companies to make quality disclosures and sanctions for companies that do not comply; b.) increase the capacity of regulators to oversee and enforce regulations related to climate disclosure; c.) build a robust data infrastructure to support the collection, analysis, and dissemination of climate data; d.) support research and development in the field of

climate to produce new knowledge and technologies that can help companies manage climate risks.

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