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Carbon Emissions Disclosure in Corporate Sustainability Reporting: A Content Analysis of Kalbe Farma

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Abstract

This study examines carbon emissions disclosure in PT Kalbe Farma Tbk's 2025 Sustainability Report. Using a descriptive qualitative approach and content analysis, it evaluates disclosures against 18 indicators derived from the Carbon Disclosure Project (CDP) checklist. The indicators cover climate change risks and opportunities, greenhouse gas emissions, energy consumption, emission reduction and costs, and carbon emissions accountability. A dichotomous scoring method assigns one point to each disclosed item and zero to items not disclosed. The assessment identifies 14 disclosed indicators out of 18, resulting in a disclosure score of 77.78%. Energy consumption, climate change risks and opportunities, and carbon emissions accountability achieve full disclosure. Greenhouse gas emissions reach 71.43%, while emission reduction and costs record the lowest score at 50%. The findings indicate that Kalbe reports substantial carbon-related information, although external verification, facility-level emissions, and carbon-related costs require further disclosure within its corporate sustainability reporting.

Keywords: Carbon Emissions Disclosure, Sustainability Reporting, Content Analysis, Carbon Disclosure Project, Legitimacy Theory.

INTRODUCTION

The pharmaceutical industry is dependent on energy, raw materials, water, and various resources used in production and distribution activities. These activities have the potential to produce greenhouse gas emissions, both from the manufacturing process and the use of energy and transportation in the supply chain. The large number of the company's operational activities makes the management of carbon emissions one of the important aspects of environmental responsibility. This condition requires companies to

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convey information about emission sources, measurement methods, and their reduction efforts in a transparent manner (Karim et al., 2021; Kasperzak et al., 2023; Dan et al., 2023).

The demand for environmental transparency is increasingly evident in the business practices of international companies facing pressure to control the impact of climate change. Companies are required not only to set emission reduction targets, but also to demonstrate measurement results and accountability for these achievements. This phenomenon shows that carbon disclosure has become part of the assessment of corporate responsibility and governance. Previous research has also shown that the characteristics of boards, environmental innovations, and corporate policies are related to the management and performance of carbon emissions (Konadu et al., 2022; Barroso et al., 2024; Goud, 2022).

In corporate reporting practices, information on carbon emissions has not always been presented with the same level of completeness and quality. Differences can be found in measurement methods, emission scope, energy consumption information, and explanations of reduction strategies. This condition causes stakeholders to face limitations in comparing environmental performance between companies. In addition, financial characteristics and ownership structures are also concerns in explaining differences in carbon disclosure practices. This shows the importance of evaluating the substance of the information presented in sustainability reports (Bilal et al., 2022; Desai, 2022; Fan et al., 2024).

Carbon emissions disclosure is also related to how companies carry out oversight functions and make strategic decisions through governance mechanisms. The composition of the board of directors, including women's representation, is one of the aspects studied in relation to transparency and environmental responsibility. A number of studies have shown that gender diversity may be related to corporate attention to carbon disclosure, although its influence may differ based on the characteristics and composition of the board. Therefore, corporate governance is an important part of understanding environmental transparency practices (Gonenc & Krasnikova, 2022; Rustiarini et al., 2026; Anyigbah et al., 2023).

The quality of sustainability reports is determined not only by the availability of information about environmental programs, but also by the accuracy of the indicators and the depth of disclosure presented. Information on greenhouse gas emissions needs to include measurement methods, amounts of emissions, emission sources, energy consumption, and the realization of emission reduction programs. The use of structured indicators can help assess the extent to which companies are accountable for their environmental impacts. Previous research has emphasized the importance of

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measurement, governance, and transparency systems in improving the quality of carbon information disclosure (Li et al., 2025; Alim & Mansour, 2026; Saha et al., 2026).

PT Kalbe Farma Tbk is a company engaged in the pharmaceutical and health industries with business activities involving the production process, energy use, raw material procurement, packaging, and product distribution. These various activities are related to the use of resources and the potential for carbon emissions that need to be managed responsibly. As a company that delivers sustainability information, openness regarding emissions management is important to provide stakeholders with an overview of the company's environmental responsibility. This transparency is also related to investor confidence and assessment of business sustainability (Wahyuningrum et al., 2025; Xu et al., 2024; Zarefar et al., 2022).

Based on this phenomenon, a qualitative research is needed to analyze the content of carbon emission disclosure in the sustainability report of PT Kalbe Farma Tbk. This study aims to evaluate the completeness of information based on 18 items of the Carbon Emission Disclosure Checklist which refers to the Carbon Disclosure Project (CDP) indicators, including climate change, greenhouse gas emissions, energy consumption, emission and cost reduction, and carbon emission accountability. The measurement was carried out using a dichotomous scale with a score of 1 if the item is disclosed and 0 if it is not disclosed. The assessment is expected to provide an overview of the quality and disclosure of the company's carbon information (Wardhani et al., 2026; Wahyuningrum et al., 2022; Dilling et al., 2024).

LITERATURE REVIEW

Legitimacy Theory

Legitimacy Theory explains the relationship between the company's existence and public acceptance of the business activities carried out. Companies strive to maintain the compatibility between operational actions and values that develop in their social environment. In the environmental context, the disclosure of carbon emissions is a form of corporate accountability for the impact of business activities on climate change. Such transparency can help maintain public trust and social acceptance of the company's existence (Lavin & Montecinos-Pearce, 2021; Bilal et al., 2022; Alim & Mansour, 2026).

In this study, Legitimacy Theory is used to explain the importance of PT Kalbe Farma Tbk's openness in conveying carbon emission information through sustainability reports. Companies need to demonstrate that their operational activities are accompanied by responsibility for environmental impacts, including emission measurement and reduction efforts. Adequate disclosure is a means to demonstrate the suitability between environmental commitments and the business practices carried out

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by the company (Karim et al., 2021; Gonenc & Krasnikova, 2022; Wahyuningrum et al., 2025).

Carbon Emissions Disclosure

Carbon Emissions Disclosure is the disclosure of information about the amount, source, measurement, and management of carbon emissions generated from the company's activities. This information includes greenhouse gas emissions, energy consumption, calculation methods, and emission reduction policies. This disclosure allows stakeholders to understand the company's contribution to the impact of climate change while evaluating the environmental responsibilities that have been implemented (Karim et al., 2021; Kasperzak et al., 2023; Li et al., 2025).

The completeness of carbon emission disclosure can differ between companies because it is influenced by operational characteristics, ownership structures, and governance mechanisms. The information submitted is not only related to the amount of emissions, but also the consistency of measurement and achievement of its reduction targets. Therefore, a disclosure assessment is necessary to know the extent to which companies present carbon information in a transparent and structured manner in sustainability reports (Desai, 2022; Fan et al., 2024; Rustiarini et al., 2026).

Corporate Sustainability Reporting

Corporate Sustainability Reporting is a company's communication medium to convey information about sustainability impacts, policies, and performance to stakeholders. The report covers environmental, social, and governance aspects, including information on greenhouse gas emissions and energy use. In relation to this study, sustainability reports are the main source for identifying and evaluating carbon emission disclosure information submitted by companies (Anyigbah et al., 2023; Dan et al., 2023; Zarefar et al., 2022).

The quality of Corporate Sustainability Reporting is not only determined by the availability of the report, but also by the completeness, consistency, and measurability of the information presented. Disclosures supported by indicators clearly allow users of the report to assess the development of the company's environmental performance over time. Thus, PT Kalbe Farma Tbk's sustainability report can be analyzed to find out the extent to which carbon emission information is delivered systematically and can be accounted for (Wahyuningrum et al., 2022; Dilling et al., 2024; Xu et al., 2024).

Carbon Disclosure Project (CDP) Framework

The Carbon Disclosure Project (CDP) Framework is a framework for disclosing environmental information used to identify and evaluate a company's transparency

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related to climate change and carbon emissions. It includes information on climate change risks and opportunities, greenhouse gas emissions, energy consumption, emission reduction strategies, and corporate accountability. The use of structured indicators helps the disclosure assessment process become more systematic and consistent (Kasperzak et al., 2023; Li et al., 2025; Wardhani et al., 2026).

In this study, the measurement of Carbon Emissions Disclosure uses 18 item disclosure checklists grouped into five categories, namely Climate Change: Risks and Opportunities, Greenhouse Gas Emissions, Energy Consumption, Reduction and Costs of GHG Emissions, and Accountability of Carbon Emissions. Each item is assessed using a dichotomous scale, namely a score of 1 if disclosed and a score of 0 if not disclosed. The total score shows the completeness of the company's carbon disclosure (Karim et al., 2021; Desai, 2022; Wardhani et al., 2026).

METHOD

This study uses a qualitative descriptive approach with a content analysis method at PT Kalbe Farma Tbk. The research aims to analyze the company's carbon emission disclosure through sustainability reports using the Carbon Emission Disclosure Checklist as an assessment instrument. The selection of this approach is based on the need to identify and evaluate the information submitted by the company regarding climate change, greenhouse gas emissions, energy consumption, emission reduction strategies, and accountability in carbon emission management.

The data used is secondary data obtained through sustainability report documentation, annual reports, official company publications, and supporting documents related to carbon emission management. Relevant scientific literature is also used as a foundation for understanding the concept of carbon disclosure and sustainability reporting practices. Data collection is carried out by browsing information related to 18 disclosure items, then identifying evidence of information submitted by the company along with the location of pages in the source document.

The disclosure evaluation is carried out by compiling an assessment instrument based on the Carbon Emission Disclosure Checklist which refers to the Carbon Disclosure Project (CDP) indicator. The instrument consists of five main categories, namely Climate Change: Risks and Opportunities, Greenhouse Gas Emissions, Energy Consumption, Reduction and Costs of GHG Emissions, and Accountability of Carbon Emissions. Each category has a number of indicators that are used to identify the completeness of carbon emission information. The use of this instrument aims to ensure that the assessment is carried out systematically based on the existence of information disclosed by the company.

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Table 1. Carbon Emission Disclosure Indicators

Code	Categories	Disclosure Indicators
CC.1	Climate Change: Risks and Opportunities	Disclosure of assessments of climate change risks, including regulations and company actions in dealing with these risks.
CC.2		Disclosure of assessments of current and future conditions, including business opportunities, finance, and strategies related to climate change.
GHG.1	Greenhouse Gas Emissions	An explanation of the methods used to measure greenhouse gas emissions, such as the GHG Protocol or ISO standard.
GHG.2		Disclosure of external verification of the amount of greenhouse gas emissions, including the party conducting the verification.
GHG.3		Disclosure of the total amount of greenhouse gas emissions produced by the company.
GHG.4		Disclosure of greenhouse gas emissions based on Scope 1, Scope 2, and Scope 3 coverage.
GHG.5		Disclosure of greenhouse gas emissions based on emission sources, such as the use of electricity, fuel, and other sources.
GHG.6		Disclosure of greenhouse gas emissions based on the company's facilities or operational units.
GHG.7		Comparison of the amount of greenhouse gas emissions with the previous reporting period.
EC.1	Energy Consumption	Disclosure of the company's total energy consumption in relevant units of measurement.
EC.2		Disclosure of energy consumption based on renewable and non-renewable energy sources.
EC.3		Disclosure of energy consumption by type, facility, or operational unit of the company.
RC.1		An explanation of the company's strategy and actions in reducing greenhouse gas emissions.

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Code	Categories	Disclosure Indicators
RC.2	Reduction and Costs of GHG Emissions	Disclosure of carbon emission reduction targets, including future emission reduction directions and targets.
RC.3		Disclosure of costs or investments allocated for greenhouse gas emission reduction activities.
RC.4		Disclosure of future carbon cost estimates as a consideration for the company's investment or expenditure planning.
ACC.1	Accountability of Carbon Emissions	Disclosure of the responsibility of the Board of Directors or the committee in overseeing activities related to climate change.
ACC.2		Explanation of the supervision and monitoring procedures by the Board of Directors on the development of climate change management.

Source: Data processed, 2026

Each indicator is then assessed using a dichotomous scale, namely a score of 1 if the company reveals information in accordance with the indicator and a score of 0 if the information is not found in the analyzed document. Thus, each item has the same value, so that the overall maximum score is 18 and the minimum score is 0. The assessment is carried out by paying attention to the suitability of the information to the substance of the indicator, as well as recording the document page as supporting evidence to maintain traceability of the analysis results.

The results of the assessment are then analyzed by calculating the total disclosure score and the percentage of carbon emission disclosure. The calculation is carried out using the following formula:

Carbon Emissions Disclosure (CED) Formula:

$$CED = (\Sigma di/N) \times 100\%$$

Description:

CED = Percentage of carbon emission disclosure.
Σdi = The number of disclosure item scores the company earned.
N = The total number of disclosure items (18).
A score of 1 is given if an item is disclosed and a score of 0 if the item is not disclosed.

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The results of the calculation are used to describe the completeness of the company's carbon emission disclosure. Furthermore, a qualitative descriptive analysis was carried out by describing the information found in each category, identifying the aspects of disclosure that had been submitted, and showing information that had not been disclosed. Thus, the research not only produced the percentage of disclosure, but also provided an overview of the environmental transparency and accountability practices of PT Kalbe Farma Tbk.

RESEARCH RESULTS

Disclosure Score Recapitulation

The results of the evaluation of PT Kalbe Farma Tbk's carbon emission disclosure are compiled based on 18 indicators divided into five categories, namely Climate Change: Risks and Opportunities (CC), Greenhouse Gas Emissions (GHG), Energy Consumption (EC), Reduction and Costs of GHG Emissions (RC), and Accountability of Carbon Emissions (ACC). The assessment is carried out on the information presented in the Sustainability Report for 2025. Each indicator is given a score of 1 if the information is disclosed and a score of 0 if the information is not found or does not meet the substance of the indicator. The results of the assessment are grouped based on the disclosure code and presented in Table 2.

Table 2. Carbon Emission Disclosure Score Recapitulation PT Kalbe Farma Tbk 2025

Code	Disclosure Categories	Disclosure Results	Score
CC.1	Climate Change: Risks and Opportunities	Revealed	1
CC.2		Revealed	1
GHG.1	Greenhouse Gas Emissions	Revealed	1
GHG.2		Not disclosed	0
GHG.3		Revealed	1
GHG.4		Revealed	1

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Code	Disclosure Categories	Disclosure Results	Score
GHG.5		Revealed	1
GHG.6		Not disclosed	0
GHG.7		Revealed	1
EC.1	Energy Consumption	Revealed	1
EC.2		Revealed	1
EC.3		Revealed	1
RC.1	Reduction and Costs of GHG Emissions	Revealed	1
RC.2		Revealed	1
RC.3		Not disclosed	0
RC.4		Not disclosed	0
ACC.1	Accountability of Carbon Emissions	Revealed	1
ACC.2		Revealed	1
Total Disclosure Score		**14 of 18**	**14**

Based on Table 2, of the 18 indicators assessed, 14 indicators obtained a score of 1 and 4 indicators obtained a score of 0. The total disclosure score obtained by PT Kalbe Farma Tbk reached 14 out of a maximum score of 18, or 77.78%. These results show that most of the information regarding carbon emission disclosure has been submitted by the company in the 2025 sustainability report, although there are still some indicators that have not met the disclosure criteria based on the research instrument.

The disclosures that have been submitted by the company include the identification of climate change risks, emission measurement methods, the amount of greenhouse gas emissions, emission sources, emission comparisons between periods, energy consumption, emission reduction strategies, and sustainability monitoring

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responsibilities. Meanwhile, four indicators that have not received scores are in the aspects of external verification of greenhouse gas emissions, emission disclosure based on operational facilities, special costs for emission reduction, and future carbon cost estimates.

Distribution of scores by category

The score distribution is used to show the results of the carbon emission disclosure assessment based on the five categories of the Carbon Emission Disclosure Checklist. Each category has a different number of indicators, so the comparison is made by taking into account the number of scores obtained against the maximum score of each category. A recapitulation of the number of indicators, maximum score, actual score, and percentage of disclosure is presented in Table 3.

Table 3. Distribution of Carbon Emission Disclosure Score By Category

Disclosure Categories	Number of Indicators	Maximum Score	Scores Obtained	Percentage
Climate Change: Risks and Opportunities	2	2	2	100,00%
Greenhouse Gas Emissions	7	7	5	71,43%
Energy Consumption	3	3	3	100,00%
Reduction and Costs of GHG Emissions	4	4	2	50,00%
Accountability of Carbon Emissions	2	2	2	100,00%
Total	**18**	**18**	**14**	**77,78%**

Source : Data processed, 2026

Based on Table 3, the Climate Change: Risks and Opportunities, Energy Consumption, and Accountability of Carbon Emissions categories each received a percentage of disclosure of 100%. Furthermore, the Greenhouse Gas Emissions category obtained a percentage of 71.43%, while the Reduction and Costs of GHG Emissions category obtained the lowest percentage of 50.00%. These results show that

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there is a difference in the completeness of information in each category of carbon emission disclosure.

Overall, PT Kalbe Farma Tbk obtained a score of 14 out of 18 indicators with a disclosure percentage of 77.78%. These results show that the company's disclosure is relatively good in terms of climate change identification, energy consumption, and accountability. However, information on emission reduction costs and future carbon cost estimates still need to be strengthened. Thus, improving the quality of disclosure is needed so that the carbon emission information submitted is more complete, measurable, and transparent.

DISCUSSION

1. Climate Change: Risks and Opportunities

The results of the evaluation of the Climate Change: Risks and Opportunities category show that PT Kalbe Farma Tbk obtained a score of 2 out of 2 points maximum or 100%. These achievements show that the company has disclosed information about climate change risks and opportunities, including actions to anticipate its impact. This disclosure is important because climate change can affect operational activities, the availability of raw materials, and the sustainability of business activities. Transparency of environmental risks is part of the company's responsibility in maintaining its legitimacy and accountability (Alim & Mansour, 2026; Konadu et al., 2022; Dan et al., 2023).

Disclosure of climate change risks and opportunities also shows that companies are starting to consider environmental aspects in business management. Information on physical risks, operational disruptions, and opportunities to transition to more environmentally friendly activities can help stakeholders understand companies' readiness to face climate change. This is in line with research that emphasizes the importance of corporate strategies, environmental innovation, and sustainable growth in supporting carbon information transparency (Dilling et al., 2024; Zarefar et al., 2022; Meng et al., 2026).

2. Greenhouse Gas Emissions

The Greenhouse Gas Emissions category received a score of 5 out of a maximum of 7 points or 71.43%. These results show that Kalbe has disclosed information about measurement methods, the amount of emissions, emission sources, and the comparison of emissions between periods. However, the disclosure regarding external verification and emission details based on operational facilities has not met the research indicators. The completeness of this information is needed so that emission data can be traced, evaluated, and compared more objectively (Karim et al., 2021; Kasperzak et al., 2023; Li et al., 2025).

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The incomplete disclosure of these two indicators shows that there is room for improvement in the transparency of company emission data. The identity of the party verifying and the details of emissions based on facilities can provide a clearer picture of the reliability of measurements and emission sources from operational activities. In addition, openness regarding the scope of measurements is important to improve the quality of carbon information delivered to stakeholders. This aspect is also related to ownership structures and governance mechanisms that can promote environmental transparency (Bilal et al., 2022; Fan et al., 2024; Wardhani et al., 2026).

3. Energy Consumption

The Energy Consumption category received a score of 3 out of 3 points maximum or 100%. This achievement shows that the company has disclosed information about total energy consumption, energy sources, and energy use based on its type. This disclosure provides an overview of energy utilization in supporting the company's operational activities. Energy consumption information is also related to the measurement of carbon emissions because energy use is one of the sources of greenhouse gas emissions in industrial activities (Desai, 2022; Wahyuningrum et al., 2022; Xu et al., 2024).

Completeness of energy consumption information can help stakeholders understand a company's efforts to manage resources and improve operational efficiency. Disclosure by type of energy source also provides a basis for evaluating the utilization of renewable and non-renewable energy. Despite obtaining a full score, companies still need to maintain consistency in measurement and data presentation between periods so that energy performance developments can be evaluated on an ongoing basis. This is in line with the importance of transparency and quality reporting in supporting corporate accountability (Zhou et al., 2024; Anyigbah et al., 2023; Lavin & Montecinos-Pearce, 2021).

4. Reduction and Costs of GHG Emissions

The Reduction and Costs of GHG Emissions category received a score of 2 out of 4 points maximum or 50%, making it the category with the lowest percentage of disclosure. Kalbe has revealed carbon emission reduction strategies and targets, but information regarding the allocation of special costs for emission reduction and future carbon cost estimates has not been found according to the research indicators. This condition shows that the disclosure of environmental strategies has not been fully followed by transparency in financing aspects. In fact, environmental investment is an important part of integrating carbon responsibility with the company's business strategy (Goud, 2022; Barroso et al., 2024; Saha et al., 2026).

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These limitations indicate the need to strengthen information on the economic aspects of emission reduction programs. More detailed disclosure of costs and investments can help stakeholders understand the resources that companies are allocated to achieve environmental targets. In addition, future carbon cost estimates can provide an overview of companies' readiness to face the economic consequences of climate change. Transparency is important so that emission reduction commitments are not only visible from environmental targets, but also from the company's planning and financing support (Rustiarini et al., 2026; Wahyuningrum et al., 2025; Konadu et al., 2022).

5. Accountability of Carbon Emissions

The Accountability of Carbon Emissions category received a score of 2 out of 2 points maximum or 100%. The results show that Kalbe has disclosed management responsibilities in overseeing climate change activities as well as monitoring procedures for monitoring the progress of its management. Clarity of responsibilities and oversight mechanisms are important aspects to ensure that emission reduction policies are implemented through the company's control function. Adequate governance mechanisms can also improve accountability and transparency of environmental information (Gonenc & Krasnikova, 2022; Alim & Mansour, 2026; Dilling et al., 2024).

Accountability disclosure gives an idea that carbon emission management has become part of the company's organizational responsibility. Regular monitoring allows management to evaluate the development of environmental programs and identify aspects that need improvement. However, companies still need to maintain openness regarding the division of authority, evaluation mechanisms, and follow-up of supervisory results. Thus, accountability is not only demonstrated through the existence of organizational structures, but also through the effectiveness of the implementation of responsibilities in managing carbon emissions (Wahyuningrum et al., 2025; Anyigbah et al., 2023; Karim et al., 2021).

CONCLUSION

Based on the results of the study, PT Kalbe Farma Tbk's carbon emission disclosure in the 2025 Sustainability Report received a score of 14 out of 18 indicators or **77.78%.** The results show that most of the carbon emission information has been disclosed, especially related to climate change, energy consumption, greenhouse gas emissions, and corporate accountability. However, some aspects of disclosure are still unfulfilled, in particular external verification, emission breakdown by facility, as well as emission reduction costs and future carbon cost estimates.

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Overall, Kalbe has shown openness in conveying information on carbon emission management, but still requires increased completeness and depth of disclosure. Increased transparency is needed so that sustainability reports can provide a more comprehensive picture of environmental responsibility and companies' efforts to reduce carbon emissions.

RESEARCH LIMITATIONS

This study has limitations because it only focuses on PT Kalbe Farma Tbk using the Sustainability Report for 2025 as the main data source. The assessment was carried out based on 18 indicators of the Carbon Emission Disclosure Checklist with a dichotomous scale, so that the results of the study emphasized more on the completeness of the information disclosed than on the quality and effectiveness of the implementation of carbon emission reduction programs.

In addition, this study did not use direct interviews with management or external verifiers. Thus, the results of the analysis rely on the information available in the company's documents and cannot describe the overall practices of managing carbon emissions beyond the published information.

SUGGESTIONS

Further research is recommended to extend the observation period and use more than one company in order to provide a comparative picture of carbon emission disclosure practices. The use of additional methods, such as interviews or analysis of supporting documents, can also help deepen the evaluation of the quality of information submitted by the company.

For PT Kalbe Farma Tbk, increased disclosure needs to be focused on external verification of emissions, breakdown of emissions based on operational facilities, as well as transparency of costs and investment in emission reduction. More complete and measurable disclosure is expected to improve the company's accountability and the quality of sustainability information for stakeholders.

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