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The impact of audit committee characteristics, financial performance, and listing age on greenhouse gas emission disclosures of highly emitted industry in Indonesia

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Abstract. Greenhouse gas or carbon emissions produced by manufacturing operations and other highly emitted industries are causes of global warming. Therefore, either in the sustainability reporting or in the corporate social and environmental reporting section, as stated in the annual report, the company usually discloses its activities related to carbon emission handling for sustainable business. In Indonesia, however, the extent of carbon emission disclosures is voluntary. The objective of this study was to investigate the effect of audit committee characteristics, financial performance, and listing age on carbon emissions reporting of highly emitted companies in Indonesia. Audit committee characteristics were measured by the number of audit committee members and the number of audit committee meetings, while Altman financial distress model measured financial performance. A checklist based on the Carbon Disclosure Project (CDP) evaluated the greenhouse gas emissions disclosures. This study uses 99 companies of highly emitted industry listed on the Indonesia Stock Exchange. Results of multiple regression analysis indicate that the number of audit committee meetings positively affects the greenhouse gas emissions report. The result suggests that the more active the audit committee in the company in conducting meetings, the higher the company's incentives to disclose carbon emission in the company's annual report or the sustainability reporting. The study provides insight into the regulation released by the capital market authority agency regarding strengthening factors that may influence listed companies to report their carbon emission.

Keywords : GHG, financial distress model, carbon disclosure project, carbon emission

1. Introduction

Companies have been forced to become more environmentally friendly due to the threat posed by climate change. In light of the threat, it is appropriate to urge widespread mitigation efforts. Corporate carbon emissions must be measured, disclosed, and reduced as part of the global carbon reduction effort, an essential component of the effort [1]. The purpose of greenhouse gas disclosure is to raise public understanding of the extent to which emissions are occurring, leading to more environmentally sustainable policymaking [2].

Previous literature confirms that the corporation's environmental accountability policies, such as disclosing data on carbon emissions, are useful to stakeholders [2–4]. The Indonesia Stock Exchange (IDX) does not require companies to disclose their carbon emissions. Previous studies assert that the

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company's governance structure ensures that additional details regarding carbon emissions are included either in an annual report or in the company's sustainability reporting [5–9].

The present research aims to test the determinants of the level of GHG emission disclosure. The determinants are audit committee characteristics, financial performance, and listing age. In conjunction with the Indonesia Government's effort in reducing carbon emissions, it is noteworthy to explore the factors that may encourage the highly emitted industry to disclose their carbon emissions either in annual reports or sustainability reporting. The extent of GHG emission disclosures is voluntary in Indonesia.

2. Literature review and hypotheses

2.1. Previous studies

Previous researches have examined factors associated with the extent of GHG emission reporting both in Indonesia [3,5,6,10] and in the international arena, such as in Australia [2], in Spanish [11], in Italy [4], in the Netherlands [12], and in Nordics country [7]. Among those studies, few studies discuss the involvement of audit committees on the extent of GHG emission disclosures, especially in Indonesia. If any, the proxy used for the audit committee variable is limited to the number of audit committee members [6,13]. In contrast, the number of audit committee members is only one aspect of measuring the audit committee's effectiveness [14]. Chariri et al. [7] tested several proxies of audit committee effectiveness such as the number of members, the number of meetings, independence, but his study took a sample of Nordic countries. Therefore, this study attempt to test a proxy other than the number of audit committee members to measure its effectiveness, namely audit committee meetings concerning GHG emission disclosures in Indonesia.

2.2. Hypotheses development

2.2.1. Audit committee characteristics. According to agency theory [15], issues can occur in the relationship between a principal (shareholder) and an agent (business management) as a result of the separation of ownership and management. As a result, agency theory strives to eliminate information asymmetries by including monitors and building systems that can protect shareholders against conflicts of interest on the side of management [16]. The audit committee is a committee formed by and responsible to the Board of Commissioners in helping carry out the duties and functions of the Board of Commissioners [17]. The audit committee's role may be used to resolve agency issues through its supervision responsibilities for financial reporting quality.

The number of audit committee members represents the resources of an audit committee in performing its oversight duties [18]. Therefore, the higher the number of audit committee members, the more influential the supervision and control of a business, including corporate social and environmental reporting [8]. Akhirah and Kiswanto [13] find a positive relationship between the number of audit committee members and the level of GHG emission disclosures.

The number of audit committee meetings represents the diligence of an audit committee in managing its supervision duties [18]. Therefore, the audit committee's ability to supervise management's financial reporting and information disclosure is dependent on how often members attend meetings. Audit committee members who attend regular meetings are more successful in monitoring tasks [9]. The frequency of audit committee meetings also allows members to examine the company's accounting standards, disclosures, and estimations. The more engaged the audit committee members are in regular meetings, the more possibilities they can debate and evaluate corporate financial reporting processes [19,20]. According to Chariri et al. [7], the more frequently audit committee members attend regular meetings, the higher the amount of GHG emission disclosure. Hence, this research will investigate the following hypotheses.

H1: The number of audit committee members positively affects the extent of GHG emission disclosure.

H2: The number of audit committee meetings positively affects the extent of GHG emissions disclosure.

2.2.2. Financial performance. Corporations that perform well financially have the financial capability to make environmental decisions, namely disclosure of environmental activities [21]. Hence, it is expected that a company whose financial condition is healthy is likely to conduct more activities in carbon emissions mitigation, increasing the GHG emissions disclosure. In this research, the Altman Z-score prediction of bankruptcy [22] is used as a proxy for financial performance. The assessment of Z-score may distinguish those who are financially healthy, in a grey area that needs more attention in managing the business, and financially distressed. Previous studies, to the best of authors' knowledge, have not yet examined the use of a set of ratios instead of a single ratio like return on asset, return on equity, leverage [4,5,10,12,23,24]. Using high leverage as a term for financial distress, Choi et al. [2] posit that GHG emissions disclosure tends to be lower in financially distressed firms. Hence, this research states the following hypothesis.

H3: Firms with healthy financial performance tend to increase GHG emissions disclosures.

2.2.3. Company age. Company age is essential in calculating carbon emissions since it indicates stakeholder strength, strategic approach, and financial success [25]. Environmental disclosure and policy-determining environmental conservation initiatives can boost a company's added value. Mature firms are believed to have more experience and better understand their constituents' informational demands [10]. Older businesses may demonstrate that a business may thrive in the face of a range of stakeholder expectations and government requirements. By publishing carbon emissions, the firm expects to have a beneficial influence and establish a favorable reputation that will enable it to function correctly. Previous studies have demonstrated that a company's age influences its carbon disclosure [23,24]. Therefore, this study proposes the following hypothesis.

H4: Company age positively affects the extent of GHG emissions disclosure.

2.2.4 Profitability. According to Haniffa and Coke [26], management's capacity to generate profit must complement their ability to fulfill their social duties. Through corporate social and environmental disclosure, a business conveys that it is interested in more than just profit and the social context. Businesses with a high profit margin are more concerned with the environment [24,27] and more capable of performing social disclosure than businesses with a low profit margin [28]. Some studies [2,3,24] discovered that businesses with high profitability were able to finance the additional time and material resources necessary for improved voluntary reporting and disclosure of GHG to overcome external pressures. However, some studies fail to prove that profitability relates to the extent of GHG emissions disclosure [4,5,12]. Thus, this study will investigate the ensuing hypothesis.

H5: Profitability positively affects the extent of GHG emissions reporting.

2.2.5 Corporate size. Earlier research confirms the inverse relationship between corporate size and the extent of GHG emission disclosures [2,4,5,11]. This beneficial association is based on the assumption that larger organizations engage in a broader range of sectors and operate globally. Additionally, larger firms must accommodate a broader spectrum of consumers who may be active in the environmental management and policies of the corporation. As a result, big enterprises are subjected to more societal and administrative pressure to release environmental information than smaller businesses [2,11,29]. Additionally, environmental transparency is complex and expensive, and larger enterprises are more likely to devote time to producing and publishing environmental information than smaller businesses [29]. As a result, the following hypothesis is tested in this study.

H6: Corporate size positively affects the extent of GHG emission disclosures.

3. Research method

3.1. Population, sampling, and data resources

The population of this study is companies in the highly emitted industry listed on IDX in 2020. The year 2020 was the newest data available at the start of this study. Besides, the year is the first financial data year after the covid-19 pandemic spreading in Indonesia. Therefore, this research may give an understanding of the GHG emissions disclosure during the pandemic time. The highly emitted industry is based on previous studies' industry classification such as manufacture, energy, transportation [2,30]. The population of the study is 166 companies. The sample selection procedures are as follows. First, the company has an annual report or sustainability reporting publicly available. Second, it has a GHG emissions disclosure policy in place and a policy to minimize its GHG emissions. Third, data related to the examined variables are complete. There are 56 companies out of 166 with incomplete data, or the annual reports are unavailable. Eleven companies are excluded due to outliers. This study gets 99 firms as the final sample based on these procedures.

Data associated with audit committee characteristics, financial performance, listing age, and control variables (profitability and size of the company) are obtained from the annual report. Meanwhile, data were obtained from the corporate annual report or sustainability reporting in calculating GHG emissions disclosures.

3.2. The assessment of Greenhouse gas emissions disclosures

This study examines the GHG emission disclosure level by utilizing a checklist series developed by Choi et al. [2]. The checklist was based on information supplied by the CDP (Carbon Disclosure Project) and has 18 items that address five GHG emissions disclosure key points: climate change: dangers and possibilities, carbon emissions reporting, energy consumption reporting, greenhouse gas reduction and cost, and carbon emission responsibility. The checklist evaluates the existence of a statement in a company's GHG emissions reporting. If an item in the checklist is disclosed, it obtains a score of one; otherwise, it receives a score of zero. The sum of the checklist score is then divided by 18. The number refers to the level of GHH emission disclosure of a business. The application of Choi et al. 's [2] content analysis in measuring GHG emissions reporting follows previous researches [1,3,5,6,31].

3.3. Independent variables

The independent variables of this research are audit committee characteristics, financial performance, and company listing age, while profitability and size are the control variables. Audit committee characteristics include the number of audit committee members (ACM) and the number of audit committee meetings within a year (ACMEET). Data relates to ACM and ACMEET are available in the annual report, specifically in the audit committee report section.

This study utilizes the Altman Z-score financial distress prediction model to appraise the highly emitted industry's financial performance (FP). When it comes to predicting the potential bankruptcy of a firm, Altman's Z is one of the most well-known statistically-based prediction models [32]. The following is how the equitation is presented.

$$Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 1.0X5 \quad (1)$$

Where

X1 = working capital divided by total asset

X2= retained earnings divided by total asset

X3= earnings before interest and taxes to total asset

X4= market capitalization divided by the book value of debt

X5= sales divided by total asset

Following Altman [22], a higher Z-score indicates a more favorable financial performance for the firm. The Z-score is divided into three categories, which are as follows.

If Z is above 2.99, the company is in good financial condition and not in distress.

If Z is between 1.81 and 2.99, the company's financial condition is in the grey area.

If Z is below 1.81, the company is in bad financial condition and included in the distressed condition.

The company's listing age (AGE) is when the company was first listed in IDX until December 31, 2020. The data is available in the annual report. Profitability was calculated by the return on asset (ROA), while firm size (SIZE) was assessed by the total asset transformed to the natural logarithm.

3.4. Regression model

This research applies multiple regression analysis to test the effect of audit committee characteristics, financial performance, listing age, and control variables on GHG disclosures. The regression model is presented as follows. This research also conducts normality and multicollinearity test of classical assumption tests to validate the regression results.

$$GHG = \alpha + \beta 1AGE + \beta 2FP + \beta 3ACM + \beta 4ACMEET + \beta 5ROA + \beta 6SIZE + e \quad (2)$$

4. Result and discussion

4.1. Descriptive statistic

Data characteristics of all variables used in this study are presented in Table 1. The lowest score of GHG emissions disclosures is 4 out of 18, referring to 22% of the total disclosures. The highest score is 18, representing 100% of the total disclosure in the index. The mean score of GHG disclosures is about 72%. The score is better than those in manufacturing companies 18.7% [33], in non-financial firms, 34% [6], and in the mining industry, 24% [31]. The highest score of GHG was achieved by four companies in the mining industry, namely PT Vale Indonesia, PT. Medco Energi Internasional, PT. Adaro Energy, and PT. Bukit Asam. The difference is probably due to the period and industry sample.

As shown in Table 1, the listing age of the sample companies is 7189 days on average, equal to 19 years and eight months. The Altman Z score of financial performance is 2.41 on average, indicating the sample companies are in a grey performance area since the value is below 2.99. Surprisingly, during the pandemic year, a company achieved a Z score of 18.81, indicating the company had an excellent financial performance. The mean score of SIZE and ROA are 29.71 and 0.04, respectively. The ROA mean score indicates that the sample company has achieved a profit of 4 percent during the pandemic.

Table 1 presents the average number of audit committee members and audit committee meetings, 3 and 8 respectively. These numbers comply with Financial Service Authority Regulation [17], stating that the audit committee members are at least three persons. The audit committee conducts regular meetings at least once in three months.

Table 1. Descriptive statistics

	Minimum	Maximum	Mean	Standard Deviation
GHG	4 (22%)	18 (100%)	12.90 (72%)	3.35
AGE	767	14704	7189.4	3924
FP	-5.75	18.81	2.41	3.11
ACM	3	5	3.27	0.5
ACMEET	2	57	8.31	7.91
SIZE	25.22	29.68	29.71	1.72
ROA	-1.01	1.55	0.04	0.23
N	99	99	99	99

4.2. Results of multiple regression

Multiple regression analysis is used to assess the impact of AGE, FP, audit committee characteristics, ROA, and SIZE on GHG. Table 2 shows the results of the analysis. As presented in the table, ACMEET is the only significant variable in explaining the extent of GHG. The number of audit committee

meetings is positively associated with the level of greenhouse gas emissions disclosure. The result suggests that the more active the audit committee conducts a meeting during the year, the higher the level of the GHG reporting of the company. The result is consistent with previous studies that state that an audit committee's meeting frequency increases the quality of financial reporting [7,34]. Meanwhile, the number of audit committee members does not affect the level of GHG disclosures. This finding contradicts Chariri et al. [7], who find that the number of audit committee members positively affects carbon emissions disclosures in Nordic companies.

Table 2. Result of multiple regression analysis

	B	t	Sig	Tolerance	VIF
Constant	2.437	0.419	0.676		
AGE	0.00005	0.667	0.507	0.963	1.038
FP	0.075	0.675	0.501	0.889	1.125
ACM	0.116	0.174	0.862	0.739	1.353
ACMEET	0.113	2.389	0.019**	0.760	1.315
ROA	0.386	0.259	0.796	0.909	1.100
SIZE	0.288	1.390	0.168	0.834	1.199
F Value			2.277		
F sig			0.043**		
Adjusted R^2			0.072		
Kolmogrov Smirnov Sig			0.200		

Note: ** implies significant at 5%

Table 2 also shows that AGE and FP do not impact GHG. The results indicate that listing age and financial performance does not affect greenhouse gas emissions reporting. ROA and SIZE do not have any impact either on GHG. The results denote that profitability and the company's asset do not influence the level of greenhouse gas emissions disclosures. The results are not similar with Borghei-Ghomi and Leung [23], who find that company size and company age positively affect carbon emissions disclosure in Australia. The results are also contradictory with Hapsoro and Ambarwati [24], examining the impact of company age and profitability in the oil, gas, and coal industry in international companies under the OSIRIS database. The country setting, sample, and time frame are probably the reasons for inconsistencies.

The adjusted R^2, as presented in Table 2 is 0.072. The number suggests that the predicting power of AGE, FP, ACM, ACMEET, ROA, and SIZE on GHG variability is about 7.2 %. The other 92.8% are other variables not examined in the regression model. The regression model in this study passes the normality of the classical assumptions test as the value of the Kolmogorov Smirnov sig is 0.200, far above 0.05. The model also passes the multicollinearity of classical assumptions test because the value of VIF is lower than 10 and the Tolerance is higher than 0.1.

5. Conclusion and directions for the subsequent research

This article investigates the impact of audit committee characteristics, financial performance, and listing age on the extent of greenhouse gas emissions disclosure. The disclosures are closely related to the activities done by the company in adapting and mitigating the consequence effect of carbon emissions from company operations to global warming. The results indicate that the number of meetings held by the audit committee stimulates the company’s management decision to produce a higher level of greenhouse gas emissions disclosures.

There are several limitations to this research that may be overcome in a subsequent study. First, the adjusted R^2 is only 7.2 %, which could be improved by adding new independent variables. The involvement of audit committee expertise and other corporate governance factors such as independent commissioners may be investigated further as the determinants factors of greenhouse gas emissions reporting. Second, this study explores the level of disclosures in a period during the covid-19 pandemic. The subsequent research may examine the difference in greenhouse emissions disclosures level between pre and post covid-19.

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