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DOI: 10.22219/jrak.v14i3.34412

Citation:
Susbiyani, A., Animah (2024). Testing Mediation Disclosure Of Green House Gas On The Relationship Between Corporate Governance And Firms' Value. Jurnal Reviu Akuntansi Dan Keuangan. 14(3), 736-755.

Article Process
Submitted:
May 21, 2024

Reviewed:
June 1, 2024

Revised:
September 25, 2024

Accepted:
October 6, 2024

Published:
October 6, 2024

Office:
Department of Accounting
University of Muhammadiyah Malang
GKB 2 Floor 3.
Jalan Raya Tlogomas 246, Malang, East Java, Indonesia

P-ISSN: 2615-2223
E-ISSN: 2088-0685

Article Type: Research Paper

TESTING MEDIATION DISCLOSURE OF GREEN HOUSE GAS ON THE RELATIONSHIP BETWEEN CORPORATE GOVERNANCE AND FIRMS' VALUE

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ABSTRACT

Purpose: The aim of this research is to examine the mediating effect of disclosure of GHG on the relationship between corporate governance represented by independent commissioners, board of directors, and management ownership on firm value

Methodology/approach: The research uses panel data from the annual reports of manufacturing companies listed on the IDX from 2020 to 2022 totaling 114 data.

Findings: This result shows that Corporate governance contributes positively to disclosure of GHG and firm's value. Disclosure of GHG can improve a firm's value when the role of independent commissioners and managerial ownership mechanisms are effective in controlling the management. However, the board of directors does not contribute to firm's value.

Practical implications: These findings can motivate companies to optimize the environment by utilizing environmentally friendly technology that has added value, namely by the actions of reusing, reducing and restoring. Managers who care about green investment will be more open in disclosing GHG so that they get a good response from stakeholders

Originality/value: There are still limited research references regarding corporate governance on company value mediated by disclosure of GHG. This research develops previous research by exploring modified GHG disclosure in a mediation model.

Keywords: Corporate Governance; Disclosure of Greenhouse Gas; Firm's Value; Transparency.

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ABSTRAK

Tujuan: *Penelitian ini bertujuan untuk menguji pengaruh mediasi pengungkapan GRK terhadap hubungan tata kelola perusahaan yang diwakili oleh komisaris independen, dewan direksi, dan kepemilikan manajemen terhadap nilai perusahaan.*

Metodologi/pendekatan: *Penelitian menggunakan data panel laporan tahunan perusahaan manufaktur yang terdaftar di BEI pada tahun 2020 hingga 2022 sebanyak 114 data.*

Temuan: *Hasil ini menunjukkan bahwa tata kelola perusahaan berkontribusi positif terhadap pengungkapan GRK dan nilai perusahaan. Pengungkapan GRK dapat meningkatkan nilai perusahaan ketika peran komisaris independen dan mekanisme kepemilikan manajerial efektif dalam mengendalikan manajemen. Namun dewan direksi tidak berkontribusi terhadap nilai perusahaan.*

Implikasi praktis: *Temuan ini dapat memotivasi perusahaan untuk melakukan optimalisasi lingkungan dengan memanfaatkan teknologi ramah lingkungan yang mempunyai nilai tambah, yaitu dengan tindakan menggunakan kembali, mengurangi dan memulihkan. Manajer yang peduli terhadap investasi hijau akan lebih terbuka dalam mengungkapkan GRK sehingga mendapat respon yang baik dari pemangku kepentingan*

Orisinalitas/kebaharuan: *Masih terbatasnya referensi penelitian mengenai tata kelola perusahaan terhadap nilai perusahaan yang dimediasi oleh pengungkapan GRK. Penelitian ini mengembangkan penelitian sebelumnya dengan mengeksplorasi pengungkapan GRK yang dimodifikasi dalam model mediasi.*

Kata Kunci: *Tata Kelola Perusahaan; Pengungkapan Gas Rumah Kaca; Nilai Perusahaan; Transparansi.*

INTRODUCTION

The The emergence of recent environmental regulations can be attributed to the issue of climate change and the growing public apprehension regarding its consequences. These changes focus on reducing greenhouse gas emissions worldwide, for example, through the adoption of strategies such as carbon pricing. Although there are some mandatory regulations related to reporting greenhouse gas emissions in several developed countries, the disclosure practices are still incomplete (Liesen et al., 2015) and their understanding is still questionable (Kolk et al., 2008). In addition, research on GHGs generally focuses on developed countries (Akbaş & Canikli, 2019).

Indonesia is one of the largest contributors to greenhouse gas emissions in the world. According to the Emissions Database for Global Atmospheric Research (EDGAR), Indonesia ranks seventh in the world in 2022 by emitting 1.24 Gt CO2e. This figure increased from 2021, amounting to 1.12 Gt CO2e (Annur, 2023). Disclosure of greenhouse gas emissions (GHG) in Indonesia is still voluntary, so not all companies disclose this information in their reports (Wedi & Kusumah, 2017).

Furthermore, research on greenhouse gas emissions in companies in Indonesia is still limited (Grediani et al., 2020). This serves as one of the motivations for researchers to examine the contribution disclosure of GHG to the relationship between corporate governance (CG) and firm's value. The company that discloses carbon emissions will benefit, such as gaining legitimacy from stakeholders (Rohani et al., 2023), to avoid threats, especially for companies that produce greenhouse gases, such as increasing operating costs, reduced demand, reputational risk, legal proceedings, fines and penalties (Berthelot et al., 2011). The role of CG is crucial, especially in building the company's image, achieving transparency, and accountability. It serves as a manifestation of the company's commitment to environmental disclosure, particularly in emissions disclosure. Investors are more interested in companies that have a good image in society because it will enhance consumer loyalty.

The composition of corporate governance plays a crucial role, especially in maintaining accountability and promoting transparency in disclosing information related to greenhouse gas emissions. CG structure in this study includes independent commissioners, board of directors, and management ownership. Independent commissioners are expected to maintain transparency and openness of information for stakeholders (Jizi et al., 2014) and capable of expanding the company's sensitivity in addressing social demands (Yunus et al., 2016). The board of directors has the responsibility to develop a sustainable business strategy, ensuring that the impact of the company's activities on the environment, which poses material risks, is carefully monitored and fully disclosed. (Ben-Amar & McIlkenny, 2015). Therefore, companies with a larger board of directors may be better equipped to address carbon emission issues and engage in carbon emission disclosures (Kiliç et al., 2015).

Agency Theory states that information asymmetry between agents and principals can be minimized through managerial ownership (Forslund et al., 2022). This agency theory connects the interests of shareholders with the company's managers (Alshirah et al., 2022). With high managerial ownership, management will also have high responsibility towards the owned shares (Moudud et al., 2020). Therefore, managers will make efforts to provide more information by reporting and disclosing activities related to the company, including carbon emission disclosures. It is expected to align the vision and reduce the presence of information asymmetry conflicts.

The stakeholder theory asserts that companies operate not only for personal profit but also have a responsibility to provide benefits to various related parties. Management, as the administrator and owner of the company, plays a crucial role in controlling the organization. Management ownership gives manager greater strength in managing the company and its investments (Aniktia & Khafid, 2015). The control strength possessed by managers motivates them to make efforts in providing benefits to stakeholders, including through the disclosure of carbon emissions. Therefore, higher managerial ownership encourages companies to disclose information regarding carbon emissions in their reports. The research findings conducted by Akhiroh & Kiswanto, (2016) state that managerial ownership positively influences the level of carbon emission disclosure. Based on the explanation provided, it is important to conduct research on the relationship between CG practices and disclosures of GHG in Indonesia, as well as to test their impact on the firm's value, which has not been extensively explored in previous studies.

Stakeholders Theory

Stakeholders are a group of individuals or people within a company who can influence or be influenced by the company's activities (Freeman, 1998). One principle of stakeholder theory is that everyone should be accountable for the consequences of their actions on others (Gray

et al., 1995b). Stakeholders with significant power will also wield substantial influence; consequently, the Company will enhance its efforts to adapt to its environment (Mahrani & Soewarno, 2018). Furthermore, (Gray et al., 1995a) argue that Stakeholder Theory can be tested through the content analysis of corporate annual reports. This is considered the most efficient way for organizations to communicate with stakeholders. Therefore, disclosure of GHG is seen as a part of the dialogue between the company and its stakeholders.

Agency Theory

Agency theory is predicated on the idea that an agent would act opportunistically, especially when their interests collide with those of the principal (Mitchell & Meacheam, 2011). Academics employ agency theory as a framework for analyzing the relationship between principals and agents. When principals assign tasks to agents, they expect the agents to fulfill these responsibilities in the principals' best interest (Eisenhardt, 1989; Jensen & Meckling, 1976).

Corporate Governance

Effectively applied CG can maintain stakeholders' trust. The countries around the world adhere to two CG systems, namely the single-tier system and the dual-tier system (Pellegrini et al., 2016). Indonesia adheres to a two-tier system, wherein the board of commissioners assumes a supervisory role, while the board of directors plays the role of executives responsible for managing the company (Tjahjadi et al., 2021). The separation of roles between the board of commissioners and the board of directors in a two-tier system can enhance the quality of oversight and transparency in the decision-making process (Pellegrini et al., 2016).

Firm's Value

Theory of the firm postulates that the primary objective of a company is to maximize the wealth or firm's value (Salvatore, 2005) which is reflected in the present value of all the company's expected future profits. Maximizing company value has an important meaning for the company because maximizing company value also means maximizing shareholder prosperity, which is the company's main goal. Firms' value is the price that prospective buyers are willing to pay if the company is sold. Keown, (2004) state that company value is the market value of the company's outstanding debt and equity securities. Company value is investors' perception of the company's level of success which is often linked to share prices. High share prices make the company value also high. A high company value will make the market believe, not only in the company's current performance but also in the company's future prospects.

Disclosure Of Greenhouse Gas Emission

Greenhouse gas emissions (GHG) are gases generated by the Earth's warming, subsequently released into the atmosphere, causing the formation of the greenhouse effect (Riebeek, 2010). The global average temperature at the Earth's surface has increased by 0.74 ± 0.18 C over the last 100 years (Damayanti & Pentiana, 2013). Several studies use the term carbon disclosure because most of the elements released and contributing to global warming are carbon (Akbaş & Canikli, 2019; Bae Choi et al., 2013; Liao et al., 2015). However, emissions that support global warming do not only come from the element carbon, such as sodium (N), fluorine (F), etc., so that several studies use the term disclosure of GHG (Rankin et al., 2011).

Independent commissioner and Disclosure of GHG

An independent board of commissioners is a board that is not affiliated with controlling shareholders, members of the board of directors, or other commissioners. Asymmetry information occurs because the principal and agent do not have the same role in the company. In carrying out supervision, the independent board of commissioners is expected to be able to maintain its independence, not be influenced by conflicts of personal interest, and focus on the interests of the company, and increase the value of the company in the long term. Therefore, the independence of independent commissioners is considered capable of maintaining transparency and openness of information for stakeholders (Jizi et al., 2014). Independent commissioners can also expand a company's sensitivity in dealing with social demands (Yunus et al., 2016) especially in responding to issues related to the environment. The board of commissioners is a way to deal with this agency problem. The results of previous research conducted by (Allegrini & Greco, 2013; Liao et al., 2015b; Widia Astuti & Setiany, 2021; Yunus et al., 2016) shows that the greater the proportion of independent commissioners, the greater the disclosure of GHG. Therefore we propose the following hypothesis:

H1: Independent commissioners have a positive influence on disclosure of GHG

Board of Directors and Disclosure of GHG

The board of directors can influence corporate strategy and decision making through monitoring management and provision of resources (Endrikat et al., 2021). They work to ensure that the company runs according to its goals and provides optimal benefits for all stakeholders (Tauringana & Chithambo, 2015). According to stakeholder theory, the board of directors needs to monitor managerial actions in order to achieve harmony between the interests of the company and stakeholders (Hill & Jones, 1992). In addition, the board of directors is responsible for developing sustainable business strategies, overseeing the prudent use of company assets, and ensuring that material environmental risks are properly monitored and fully disclosed. Therefore, companies with a larger board of directors can increase the effectiveness of handling carbon emissions issues and disclose carbon emissions (Kılıç & Kuzey, 2019). Results of previous research Jimantoro et al., (2023) found a positive relationship between board of directors and disclosure of GHG. Therefore we propose the following hypothesis:

H2: Board of Directors have a positive influence on disclosure of GHG

Managerial Ownership and Disclosure of GHG

Managerial ownership is one of the items contained in CG. Jensen & Meckling (1976) found that managerial ownership is a mechanism that is successful in reducing agency problems, namely by aligning the interests of managers and shareholders. If the manager owns more shares then he will try to fulfill the interests of shareholders including himself (Nurleni et al., 2018). Managerial ownership acts as a control mechanism by aligning the interests of managers and shareholders (Tejedo-Romero & Araujo, 2022).

In addition, managers as well as shareholders tend to feel more responsible for the company's growth and sustainability. Based on stakeholder theory, companies are under pressure from external parties, namely shareholders and funding providers, to disclose more information about GHG. Previous research has proven that there is an influence of managerial ownership on disclosure of greenhouse gas emissions (Budiharta & Primsa, 2020). Therefore we propose the following hypothesis:

H3 : Managerial ownership has a positive effect on disclosure of GHG

Disclosure of GHG And Firm's Value

Greenhouse gas emission disclosure is crucial for influencing company value. Research has consistently shown a positive relationship between greenhouse gas emissions disclosure and firm value (Gabrielle & Toly, 2019; Kristanto & Lasdi, 2021; Setiawan & Iswati, 2019). Companies that disclose their greenhouse gas emissions are perceived as more responsible and caring about the environment, which can enhance their image and reputation among stakeholders (Kristanto & Lasdi, 2021). Moreover, the disclosure of greenhouse gas emissions is seen as a way for companies to gain legitimacy and trust from the public, government, and investors. Companies that manage and disclose their emissions effectively can attract investors, enhance compliance with regulations, and respond to stakeholder pressures, ultimately contributing to improved firm value. Previous research shows that disclosure of GHG has a positive effect on company value (Anggraini & Wulan, 2019) and retun of asset (Ganda, 2018). Previous research shows that disclosure of GHG has a positive effect on company value (Anggraini & Wulan, 2019) and retun of asset (Ganda, 2018). Therefore we propose the following hypothesis:

H4 : Disclosure of GHG emissions has a positive effect on company value.

Independent Commissioner and Firm's Value

Independent commissioners have the function of balancing decisions, especially to protect minority shareholders (Ardianti et al., 2019). Independent commissioners have the responsibility to encourage the implementation of corporate governance principles so that the existence of independent commissioners has an influence on firm's value (Fauzi, 2021). Research conducted (Sarafina & Saifi, 2017; Thaharah & Asyik, 2016) concluded that an independent board of commissioners has a positive effect on firm's value. Therefore we propose the following hypothesis:

H5: Independent Commissioner has a positive effect on Firm's Value

Board of Directors and Firm's Value

The size of the board of directors can significantly impact firm value by facilitating knowledge sharing, enhancing monitoring capabilities, and promoting effective governance practices within the organization. Larger boards are often associated with a greater diversity of perspectives and expertise, which can lead to improved decision-making processes and governance effectiveness (Syakirra & Chia, 2023). This diversity of viewpoints can help address information asymmetry through enhanced supervisory control, ultimately benefiting the firm's performance (Pradipta et al., 2023). The increased number of directors can enhance the board's monitoring capacity, promoting value-creating activities within the organization (Kılıç & Kuzey, 2019). Previous research conducted by (Syakirra & Chia, 2023) found a positive influence of the board of directors on firm value. Therefore we propose the following hypothesis:

H6: Board of director has a positive effect on Firm's Value

Managerial Ownership and Firm Value

In agency theory, differences in interests between agents and principals can be overcome by management ownership mechanisms. Managerial ownership gives managers a dual role in the company, namely as owner and management of the company. This dual role makes

managers have the same interests as external shareholders. Managers will not prioritize personal interests because decisions are taken in the interests of shareholders as well. Managerial ownership results in managers not having different interests from shareholders, thereby reducing agency conflicts which can have an impact on firm value. The results of previous research conducted by (Dewi & Abundanti, 2019; Widayanti & Yadnya, 2020a) stated that managerial ownership has a significant positive influence on firm value. Therefore we propose the following hypothesis:

H7: Managerial Ownership has a positive effect on Firm value

The Impact of Independent Commissioners on Firm's Value Through Disclosure Of GHG

Independent commissioners play a vital role in enhancing firm value through the disclosure of GHG emissions by ensuring that environmental disclosures are in line with sustainability goals, maintaining the company's legitimacy, and strengthening the relationship between environmental management, firm performance, and firm value. Research by Susbiyani et al., (2022) indicates that independent commissioners have a direct impact on the disclosure of Islamic social reporting (ISR), which in turn influences firm value. They act as supervisors, ensuring that voluntary disclosure of carbon emissions can maintain the company's legitimacy (Ummah & Setiawan, 2021a). The study by Handriani, (2020) suggests that independent commissioners can lower agency costs and increase investor confidence in the firm, thereby affecting firm value positively. Additionally, Wijaya & Radianto, (2023) underscores the importance of independent commissioners in conjunction with financial metrics like Return on Assets (ROA) and Economic Value Added (EVA) in influencing firm value. These findings collectively support the notion that independent commissioners contribute significantly to enhancing firm value through various disclosure mechanisms.

H8: Independent Commissioners has a positive effect on Firm value throught disclosure of GHG

The Impact of the Board of Directors on Firm's Value through Disclosure of GHG

The existence of a board of directors can monitor management in determining strategies and decisions (Endrikat et al., 2021) and ensure the company runs according to its goals. They are also responsible for developing sustainable business strategies. Therefore, companies with larger boards of directors can increase the effectiveness of handling carbon emission problems and disclosing carbon emissions (Kılıç & Kuzey, 2019). Disclosure of GHG will provide positive benefits for the Company, namely in the form of good relations with stakeholders. In the end, this good relationship will improve company performance. The larger the size of the board of directors, the greater the effectiveness of handling and disclosing carbon emissions so that it can improve company performance. Therefore we propose the following hypothesis:

H9: Board of Directors has a positive effect on Firm's Value throught disclosure of GHG

The Impact of Management Ownership on Firm's value through Disclosure of GHG

Managerial ownership is a strategy for creating a control mechanism, namely with the aim of aligning the interests of management and shareholders (Tejedo-Romero & Araujo, 2022). Overall, the interplay between management ownership, GHG disclosure, and firm value underscores the importance of environmental transparency and accountability in shaping stakeholders' perceptions and ultimately impacting a company's financial performance. The

ownership structure of firms also plays a role in GHG disclosure behavior, with shareholder pressure influencing management decisions on disclosure practices (Akbaş & Canikli, 2018). Additionally, the presence of foreign ownership in a company can drive managers to enhance ESG disclosures due to stakeholder expectations (Aulia et al., 2024).

Therefore we propose the following hypothesis:

H10: Managerial Ownership has a positive effect on Firm's Value throught disclosure of GHG

METHOD

Data And Sample Selection

This research use a population of companies listed on the Indonesia Stock Exchange from 2020 to 2022. The total population consists of 770 companies. The sampling technique uses purposive sampling, namely by determining a certain number according to the research objectives. The exceptions in question are: 1) Companies categorized by IDX as financial sector companies among 139 company, 2) Companies that are not in the financial sector and are not part of the Performance Rating Program (PROPER) given by the Ministry of Environment of the Republic of Indonesia for the period 2020–2022 among 508 company, 3) Companies that fail to disclose their carbon emissions, whether explicitly or implicitly among 82 company. Furthermore, the number of samples that meet the requirements is 41 companies. Financial reports that could not be obtained were a number of 3 companies. After the sample selection process, the researcher obtained a final sample of 38 companies, then this number was multiplied by three years, so that the amount of data processed was 114. The procedure for determining the sample can be seen in table 1.

Table 1. Sample Selection Procedure

Descripton	Total
Total number of companies listed on the IDX between 2020 and 2022	770
Companies categorized by IDX as financial sector companies	(139)
Companies that are not in the financial sector and are not part of the Performance Rating Program (PROPER) given by the Ministry of Environment of the Republic of Indonesia for the period 2020–2022	(508)
Companies that fail to disclose their carbon emissions, whether explicitly or implicitly	(82)
Samples that meet the requirements	41
Unobtainable financial reports	(3)
Financial reports that can be processed	38
Total units of analysis (in the period 2020-2022)	114

Measurement

This research uses three variables, namely 1) The independent variable is corporate governance represented by independent commissioners, board of directors, and managerial ownership. 2) The intervening variable is disclosure of GHG, 3) The dependent variable is firm' value. Variable measurements are shown in table 2. Independent commissioners are measured by the ratio of the number of independent commissioners to the number of commissioners, board of directors is measured by the number of board of directors, managerial ownership is measured by the ratio between the number of shares owned by the manager and the total shares outstanding. The disclosure of GHG is measured using content analysis in the company's annual report (Bae Choi et al., 2013), the information disclosure checklist is attached in Appendix A, and company value is measured by price book value.

Variable	Definition	Measurement	Sources
Disclosure of GHG (DISC)	A dummy variable, that takes the value of 1, if the firm discloses the disclosure of GHG and 0 otherwise	Disclosure of GHG $= \frac{\text{Total score obtained}}{\text{Total of disclosure items}}$	(Bae Choi et al., 2013)
Independent Commissioners (IC)	The proportion of independent board of commissioners is measured by the percentage of the number of independent commissioners by total members of the commissioners	IC $= \frac{\text{Total independen Commisioners}}{\text{Total Commisoners}}$	(Ryno Ariesta & Chariri, 2013)
Board of Director (BD)	The board of directors is a company organ that determines company policies and strategies, both short and long term	Board of Director = Σ Board of Director	(Le & Nguyen, 2023; Ngatno et al., 2021)
Managemen Ownership (MO)	The sum of shares owned by the management, that is the executive director, board chairman and board members outstanding at the end of each fiscal year.	MO $= \frac{\Sigma\ of\ shares\ of\ directors, commissioners\ and\ manager}{\text{Book Value of Shares}}\ x\ 10$	(Made et al., 2016; Ogabo et al., 2021)
Firm's Value (FV)	Price to Book Value: the result of a comparison between the stock price and the book value of the shares	$\text{PBV} = \frac{\text{Stock Market Prices}}{\text{Book Value of Shares}}$	(Bahraini et al., 2021)

Analysis Data

The data analysis technique in this research uses the Warp PLS (Partial Least Square) structural equation model. Hypothesis testing uses inner model evaluation, namely by using path coefficient and p-value to test significance between variables in the structural model. Next, to test the mediation effect, the output of the significance test parameters looks at the indirect relationship between the independent and dependent variables through the mediation variable. If the p value <0.05 then it can be concluded that there is a mediation effect and vice versa.

The analysis path model is formulated as follows:

$$DISC = \alpha + \beta 1\ IC + \beta 2\ BD + \beta 3\ MO + e \quad (1)$$

$$FV = \alpha + \beta 1\ DISC + e \quad (2)$$

$$FV = \alpha + \beta 1\ DISC + \beta 2\ IC + \beta 3\ BD + \beta 4\ MO + e \quad (3)$$

Description:

DISC = Disclosure of GHG

IC = Independent Commissioners

BD = Board of Director

MO = Managemen Ownership

FV = Firm's Value

RESULTS AND DISCUSSION

Description statistics

Descriptive statistics for each variable are shown in table 3, which contains in-formation about the minimum, maximum, average and standard deviation. Standard deviation is an indicator of the extent to which the mean represents the data, and the average represents the entire data. Average scores for Independent Commissioner, Board of Directors, Management Ownership, Disclosure of GHG, and Firm's Value are 0.3029, 7.4211, 0.0043, 0.4852, and 4.1099 respectively. The results indicate a low rate of disclosure of GHG rate of 48%.

Variabel	N	Min	Max	Mean	SD
Independen Commisioner	114	.20	.40	.3029	.06065
Board of Directors	114	3	11	7.4211	2.40168
Management Ownership	114	.00	.01	.0043	.00248
Disclosure of GHG	114	.06	.83	.4852	.23220
Firm's Value	114	.23	11.51	4.1099	2.75784
Valid N (listwise)	114				

Table 3. Summary statistics and variable description

Model Fit

Table 4 shows the model fit values in this research. P-value for APC, ARS, and AARS is < 0.05. AVIF and AFVIF are less than 5, meaning that the conditions for model fit have been met.

Model of Fit and Quality Indices	Criteria Fit	Result
Average Path Coefficient (APC)	P < 0,05	(APC) = 0.217, P = 0.001
Average R-Squared (ARS)	P < 0,05	(ARS) = 0.424, P<0.001
Average adjusted Rsquared (AARS)	P < 0,05	(AARS)=0.412 P<0.001
Average block VIF (AVIF)	Acceptable if <=5, ideally <= 3,3	(AVIF)=3.983
Average full of collinearity VIF (AFVIF)	Acceptable if <=5, ideally <= 3,3	(AFVIF)=3.173

Table 4. Model fit and quality indices

Hypothesis Testing

Test of the direct influence of Equation 1

Hypothesis	Path coefficients	P-Value	Decision
Independent commissioners have a positive influence on disclosure of GHG	0.258	<0.001	Significant
Board of Directors have a positive influence on disclosure of GHG	0.065	0.205	No Significant
Managerial ownership has a positive effect on disclosure of GHG	0.211	0.003	Significant

Table 5. Hypothesis Test of Direct Effect of Equation 1

Table 5 details the results of the path analysis first equation. First, independent commissioners has a significant positive effect on disclosure of GHG emission with a coefficient (p value) of 0.258 (<0.001). Thus, H1 is supported. Table 5 details the results of the path analysis first equation. First, independent commissioners has a significant positive

effect on disclosure of GHG emission with a coefficient (p value) of 0.258 (<0.001). Thus, H1 is supported. Independent commissioners play a crucial role in influencing the disclosure of greenhouse gas (GHG) emissions within companies. Several studies have highlighted the significance of independent commissioners in promoting carbon emission disclosure. Research has shown that companies with a higher proportion of independent commissioners tend to disclose more information related to carbon emissions (Saraswati et al., 2021; Ummah & Setiawan, 2021b; Widiyati, 2023; Widodo et al., 2023). The presence of independent commissioners is associated with a positive effect on carbon emission disclosure, as they are more likely to make impartial decisions regarding such disclosures (Rorong & Lasdi, 2020). Additionally, the independence of the board of commissioners has been linked to greater carbon emission disclosures, especially in companies with a large portion of independent commissioners and female directors (Saraswati et al., 2021). These results support agency theory where independent commissioners act to represent the interests of the principle of reducing asymmetry information, namely by encouraging agents to be more transparent in conveying information.

Second, Board of Director has not a significant positive effect on disclosure of GHG emission with a coefficient (p value) of 0.065 (0.205>0.05). Thus, H2 is not supported. These results do not support stakeholder theory. This means that although the board of directors holds a supervisory position and decision-making process regarding GHG disclosure is often shaped by external influences such as government regulations and stakeholder pressures (Chithambo et al., 2020, 2021). Stakeholder pressure has been identified as a key driver for GHG disclosure, with different stakeholder groups impacting disclosure decisions (Chithambo et al., 2020). Additionally, the presence of government regulations and the demand for compliance with voluntary reporting standards contribute to the decision-making process regarding GHG disclosure (Gabriel, 2021).

Third, management ownership is positively associated with disclosure of GHG emission with a coefficient (p value) of 0.211 (0.003<0.05). Thus, H3 is supported. This empirical evidence shows that greater management ownership can increase information disclosure. Managerial ownership can be used as a mechanism to reduce agency problems, managers will try to fulfill the interests of shareholders including themselves. The role of managers and shareholders tends to feel more responsible for the growth and sustainability of the Company, including in terms of disclosing greenhouse gas emissions. These results support the agency theory put forward by (Jensen & Meckling, 1976) which states that conflicts of interest between the agent and the principal can be reduced by aligning the interests of the agent and the principal. It is known that conflict occurs due to information asymmetry and differences in interests between the agent and the principal. Alignment of interests can be achieved by giving the agent the opportunity to own several shares of the company. The results of this research are in line with research (Shan et al., 2021).

Table 6. Hypothesis Testing Direct Effect of Equations 2

Test of the direct influence of Equation 2

Hypothesis	Path Coefficients	P Value	Decission
Disclosure of GHG emissions has a positive effect on company value	0.487	<0.001	Significant

Table 6 details the results of the path analysis second equation. Disclosure of GHG is positively associated to Firm's value disclosure of GHG emission with a coefficient (p value) of 0.487 (<0.001). Thus, H4 is supported. This empirical evidence shows that the higher the disclosure of GHG, the more positive the market will respond. Disclosure of GHG is an information medium for stakeholders to understand the company's policies, values and motives for tackling GHG emissions and their environment (Ahmad & Hossain, 2015) thereby creating their own value for the company. These results support signalling theory where companies that have high environmental awareness will tend to be more transparent in conveying information. These results are in line with the findings of Ganda, (2018).

Test the direct effect of equation 3

Table 7. Hypothesis Testing Direct Effect of Equations 3

Hypothesis	Path coefficients	P-Value	Decission
Independent Commissioner has a positive effect on Firm's Value	0.153	0.024	Significant
Board of Directors has a positive effect on Firm's Value	0.111	0.076	No Significant
Managerial Ownership has a positive effect on Firm's Value	0.237	0.001	Significant

Table 7 details the results of the path analysis equation 3. First, independent commissioners is positively associated to Firm's value with a coefficient (p value) of 0.153 (0.024<0.05). Hence, H5 is supported. These results support the agency theory where existence of an independent Commissioner has a role in ensuring that every policy and decision does not favour the interests of management as an agent or is biased towards the interests of the owner. Effective monitoring can help minimize agency conflict which will ultimately have an impact on increasing firm value. This finding supports the study by Handriani (2020), Tambunan & Rosharlianti (2023), and Zealion & Santoso (2020) indicates that having a larger number of independent commissioners can help in reducing agency costs, increasing investor confidence, aiding in top management control, effective monitoring, and enhancing the supervisory duties of the board of commissioners.

Second, board of director has not a significant positive effect on Firm's value with a coefficient (p value) of 0.111 (0.076>0.005). Hence, H6 is not supported. This finding does not support agency theory in minimizing asymmetry information. These results indicate that large board of directors is less effective in terms of communication, coordination and decision-making processes. As a result, control over managers becomes less than optimal, especially in terms of monitoring management activities in increasing firm value. This may be caused by other factors that are more dominant in determining company value or limitations in the function and authority of the board of directors in the context of the company studied These results support the findings (Nurahma & Budiharjo, 2022).

Third, managerial ownership is positively associated to Firm's value with a coefficient (p value) of 0.237 (0.001<0.05). Hence, H7 is supported. These results indicate that a high proportion of management ownership is significantly able to increase company value. In accordance with agency theory, the dual role of management encourages goal alignment between agent and principal. managerial ownership can increase firm value lies in its ability to align interests, improve corporate governance, foster long-term strategic decision-making, and enhance the relationship between financial performance and firm value. By incentivizing

managers to act in the best interests of shareholders and the company as a whole, managerial ownership can be a powerful driver of value creation within organizations. This finding is in line with (Dewi & Abundanti, 2019; Widayanti & Yadnya, 2020b).

Indirect Effect Test

Table 8. Indirect Effect Hypothesis Testing

Hypothesis	Path coefficients	P-Value	Decision
Independent Commissioners has a positive effect on Firm's Value through disclosure of GHG	0.126	0.011	Significant
Board of Directors has a positive effect on Firm's Value throught disclosure of GHG	0.031	0.287	No Significant
Managerial Ownership has a positive effect on Firm's Value throught disclosure of GHG	0.103	0.031	Significant

Table 8 details the results of the indirect effect. First, independent commissioners have a positive significant relationship with firm's value througt disclosure of GHG emission with a coefficient (p value) of 0.126 (0.011 < 0.05). Thus H8 suported. Independent commissioners play a significant role in enhancing a firm's value through the disclosure of GHG emissions. Their presence not only strengthens governance mechanisms but also contributes to the overall performance and value of the company. The positive relationship between independent commissioners and firm value can be attributed to the effective monitoring and control they provide, aligning with agency theory principles (Tambunan & Rosharlianti, 2023). The influence of good corporate governance, including the presence of independent board members, has been found to significantly impact firm value (Chalif Lut'fia & Emil Rachman, 2024). These findings underscore the importance of independent commissioners in driving firm value through effective governance practices

Second, board of directors has a positive but not significant effect on firm's value througt disclosure of GHG emission with a coefficient (p value) of 0.031 (0.287 >0.05). Thus, H9 is not supported. The empirical results of this research show that although disclosure of GHG shows a positive relationship, the effect is not statistically significant. This may be caused by several factors. First, it could be that the market does not fully appreciate the disclosure of information related to GHG emissions, especially in developing countries like Indonesia where sustainability issues may not yet be a top priority for most investors. Second, GHG disclosure may not be fully integrated into corporate governance practices which can significantly influence company value.

Third, managerial ownership is positively associated to firm's value througt disclosure of GHG emission with a coefficient (p value) of 0.103 (0.031 < 0.05). Thus, hyphotesis 10 supported. Managerial ownership can serve as a mechanism to curb managerial opportunistic behavior, such as earnings management, which can further impact firm value (Rely, 2022). The disclosure of greenhouse gas emissions not only reflects environmental responsibility but also signals a firm's dedication to sustainability. This disclosure can positively influence investors' perceptions, lower the firm's cost of capital, and ultimately enhance firm value (Dorathy et al., 2024). Studies have shown that good corporate governance play crucial roles in influencing the disclosure of greenhouse gas emissions,

which subsequently affects firm value (Agustia & Wijaya, 2021; Kurnia et al., 2021; Ng et al., 2022)

Overall, the results of the path analysis are presented in Figure 1.

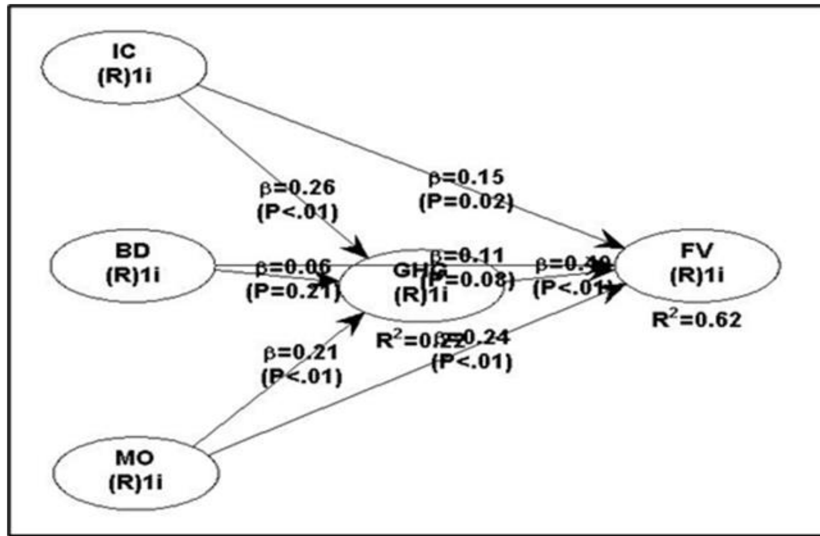

Figure 1. The Results Of Path Analysis

Testing Mediation Effect

In accordance with the aim of this study, namely to test the mediating effect of GHG disclosure variables. Therefore, further testing is needed which is presented in table 9.

Table 9. Testing Mediation Effects

Description	Path Coefficient		Comparison	Decission
	Direct Effect	Indirect Effect		
Independent Commissioners with Firms' Value	0.153			
Managerial Ownership with Firms' Value	0.237			
Independent Commissioners on Firm's Value through disclosure of GHG		0.126	0.153>0.126	Partial Mediation
Managerial Ownership on Firm's Value throught disclosure of GHG		0.103	0.237>0.103	Partial Mediation

Table 9 shows that the direct effect of Independent Commissioners to Firms' Value of 0.153 is greater than the indirect effect of 0.126, so it can be concluded as partial mediation (Baron & Kenny, 1986). This means that the Independent Commissioners has influence on firms's value, but this influence will be reduced through disclosure of GHG. Thus, H8 is supported. These results support agency theory which states that effective monitoring by independent commissioners can reduce agency problems between management and shareholders, and

with signal theory which shows that better information disclosure provides a positive signal to the market regarding the quality of the company. Therefore, having independent commissioners who are proactive in encouraging environmental transparency can be considered an important factor that increases company value. They are able to maintain transparency and openness of information for stakeholders (Jizi et al., 2014), focus on company interests, and increase firm value in the long term.

Furthermore, direct effect of managerial ownership to firms's value to firms' value of 0.237 is greater than indirect effect of 0.103. This mean that managerial ownership has influence on firms' value, but this influence will be reduced through disclosure of GHG. Thus, H10 is supported. This finding is in accordance with agency theory which states that managerial ownership can reduce conflicts of interest between managers and shareholders. With increasing share ownership by managers, they tend to be more motivated to act in accordance with shareholder interests, including in terms of more transparent disclosure of environmental information. Better disclosure of greenhouse gas emissions reflects a company's commitment to sustainable and socially responsible business practices. This can improve the company's reputation and stakeholder trust, which in turn can increase firm's value. This research is consistent with results obtained in the Indonesian context, where better disclosure increases firm value through increasing investor confidence and reducing the cost of capital.

CONCLUSION

The conclusion of this research shows that various corporate governance factors influence the disclosure of GHG and firm's value in manufacturing companies in Indonesia. Based on theoretical studies, the results of this research strengthen agency theory and stakeholder theory which states that companies with good governance are more likely to disclose environmental information transparently and have higher company value.

The management implication of this research is the important role of independent commissioners and managerial ownership in encouraging better disclosure of greenhouse gas emissions. Manufacturing companies in Indonesia can increase their company value by strengthening the role of independent commissioners and managerial ownership in corporate governance. The board of directors, although it does not show a significant influence in this research, still has an important role that should not be ignored. The results of this research emphasize the importance of transparency in disclosing greenhouse gas emissions to increase public and other stakeholder trust. Better disclosure not only increases company value but also contributes to global efforts to reduce the impact of climate change.

The limitations of this study are its used nonprobability sampling so that potentially introducing biases and affecting the representativeness of the sample. Moreover, the research design and variables considered in the study could also pose limitations. The exclusion of certain variables or the lack of consideration for potential mediation factors could restrict the depth of the analysis.

For future research, it is recommended to expand the scope of research by including other variables that might influence the disclosure of greenhouse gas emissions and company value, such as organizational culture, government policies, and pressure from external stakeholders. In addition, further research can deepen the analysis of the mechanisms by which independent commissioners and managerial ownership influence the disclosure of greenhouse gas emissions and firm value in more detail.

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