

## Board of Commissioners' Proportion, Green Innovation, and Carbon Disclosure in Enhancing Firm Value: The Role of Firm Size

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### **Abstrak**

**Tujuan** - Penelitian ini bertujuan untuk mengetahui proporsi dewan komisaris, inovasi ramah lingkungan, dan pengungkapan emisi karbon terhadap nilai perusahaan dengan ukuran perusahaan sebagai variabel moderasi pada perusahaan sektor konsumen non-siklis yang terdaftar di Bursa Efek Indonesia (BEI) tahun 2019-2022.

**Desain/metodologi/pendekatan** - Penelitian ini merupakan penelitian kuantitatif yang menggunakan data sekunder, yaitu data yang sudah diolah dalam bentuk jadi dan telah dipublikasikan. Populasi dalam penelitian ini adalah sektor konsumen non-siklis yang terdaftar di Bursa Efek Indonesia (BEI) tahun 2019-2022. Data dari penelitian ini menggunakan 32 perusahaan dengan empat tahun pengamatan menggunakan teknik purposive sampling sehingga diperoleh 128 sampel. Teknik analisis data yang digunakan dalam penelitian yaitu analisis uji asumsi klasik, uji koefisien determinasi, uji simultan, dan uji t dengan menggunakan software EVIEWS 12.

**Temuan** - Hasil penelitian ini menunjukkan bahwa variabel proporsi dewan komisaris berpengaruh positif terhadap nilai perusahaan, inovasi ramah lingkungan dan pengungkapan emisi karbon tidak berpengaruh terhadap nilai perusahaan, ukuran perusahaan memoderasi hubungan antara inovasi ramah lingkungan dan nilai perusahaan tetapi tidak memoderasi hubungan antara proporsi dewan komisaris, pengungkapan emisi karbon, dan nilai perusahaan.

**Keterbatasan/implikasi Penelitian** - Penelitian ini juga memberikan wawasan bagi manajemen perusahaan dan pemangku kepentingan tentang faktor-faktor yang memengaruhi nilai perusahaan dan strategi untuk peningkatan di masa mendatang..

**Kata Kunci:** *Proporsi Dewan Komisaris, Inovasi Ramah Lingkungan, Pengungkapan Emisi Karbon, Nilai Perusahaan dan Ukuran Perusahaan*

## Abstract

**Purpose** - This study aims to examine the impact of the proportion of the board of commissioners, green innovation, and carbon emission disclosure on firm value, with firm size as a moderating variable, in non-cyclical consumer sector companies listed on the Indonesia Stock Exchange (IDX) from 2019 to 2022.

**Design/methodology/approach** - This study is a quantitative research using secondary data, which are processed and published. The population in this study consists of non-cyclical consumer sector companies listed on the Indonesia Stock Exchange (IDX) from 2019 to 2022. The research data include 32 companies observed over four years, totaling 128 samples selected through purposive sampling technique. The data analysis techniques employed in this study include classical assumption tests, determination coefficient tests, simultaneous tests, and t-tests using EVIEWS 12 software .

**Findings** - The results of this study indicate that the proportion of the board of commissioners has a positive effect on firm value, while green innovation and carbon emission disclosure do not significantly influence firm value. Firm size moderates the relationship between green innovation and firm value but does not moderate the relationships between the proportion of the board of commissioners, carbon emission disclosure, and firm value.

**Research limitations/implications** - This study also provides insights for firm management and stakeholders regarding the factors influencing firm value and strategies for improvement in the future

**Keywords:** *Board of Commissioners Proportion, Green Innovation, Carbon Disclosure, Firm Value, and Firm Size*

## Introduction

Global warming threatens the sustainability of the earth, with global temperatures rising each year due to increased greenhouse gas emissions trapping solar energy in the earth's atmosphere (Zuhrufiyah & Anggraeni, 2019). According to the Intergovernmental Panel on Climate Change (IPCC), human activities are the primary cause of global warming. Indonesia must collaborate with other countries to address this issue, in line with international political commitments governed by the United Nations Framework Convention on Climate Change (UNFCCC). Greenhouse gasses like carbon dioxide threaten both human and natural systems due to extreme weather and changing climate patterns (Khuong et al., 2021).

The IPCC (2022) states that global temperature increases pose a threat to the planet, human societies, and the species that

support life on earth. One of the impacts of climate change is the increase in greenhouse gas emissions. The 2023 Climate Change Performance Index (CCPI) ranks Indonesia 26th, up from 27th in 2022 in terms of greenhouse gas emissions. In Indonesia, energy use has increased compared to the previous year. The country ranks mid-range in renewable energy but faces criticism in the electricity sector for its limited support programs.

Through Presidential Decrees No. 61, 71, and 98 of 2021, Indonesia aims to reduce carbon emissions. Presidential Decree No. 71 of 2011 defines greenhouse gasses as natural or anthropogenic gasses in the atmosphere that absorb and re-emit infrared radiation. Greenhouse gas emissions are the greenhouse gasses released into the atmosphere from a specific area over time. Article 4 of Presidential Decree No. 61

of 2011 states that corporations help reduce greenhouse gas emissions.

Industrial and commercial activities are the main causes of greenhouse gas emissions and global warming (Saka & Oshika, 2014). Rapidly developing industries often negatively impact the environment, polluting air and water to dangerous levels (Agustia et al., 2019). Indonesia uses WBCSD-WRI and UNEP references for carbon emissions reporting.

The proportion of the Board of Commissioners is necessary to improve firm performance and value. The Board of Commissioners' proportion is a pattern of relationships, systems, and processes used by companies to add sustainable value for shareholders. Managerial ownership, institutional ownership, audit committees, independent commissioners, and external auditors implement good firm governance. These mechanisms will enhance firm oversight and performance, thereby increasing value (Suryandari & Mongan, 2020).

The proportion of the Board of Commissioners regulates the relationships between parties with rights and obligations towards the firm (Cadbury Commission, 1992). This can boost a firm by separating the responsibilities and interests of managers and owners, reducing agency problems, and fostering cooperation to achieve firm goals (Firmansyah, 2021).

Green issues are among the crucial topics in global economic discussions today. High public expectations for companies to be more green responsible push governments to tighten green regulations. Examples include Green Law No. 46 of 2017 on Green Economic Instruments and OJK Regulation No. 51/POJK.03/2017 on the implementation of sustainable finance for Financial Service Institutions.

Green innovation is one way for companies to develop their business with healthy competition. This innovation requires investment in costs and time but

also provides long-term positive impacts for the firm.

Carbon emissions reporting in Indonesia is mandatory (Gabrielle & Toly, 2019; Rachmawati, 2021). Companies transparent in disclosing greenhouse gas emissions can lower the required return rate for investors. Greenhouse gas emissions disclosure helps management and investors communicate, increasing firm value and public trust.

Some studies show that concerns about carbon or greenhouse gas emissions and global climate change can enhance firm value (Anggraeni, 2015). Good green strategies can increase firm value by balancing green and economic interests (Agustia et al., 2019). However, some studies indicate that green protection can reduce shareholder wealth due to high costs (Hsu & Wang, 2013; Dwi & Septiani, 2017).

Firm size, measured by assets and sales, also affects firm value. Larger companies tend to have more stable conditions and easier access to capital markets, maximizing firm value (Dewi & Abundanti, 2019).

Previous research indicates various factors affecting firm value, but the results are still varied. Damas et al. (2021) and Kurnia et al. (2021) found that carbon emissions disclosure could increase firm value. However, other studies show that the costs associated with green initiatives can reduce shareholder wealth (Alsaifi & Elnahass, 2019).

This research differs from previous studies by updating independent variables and adding moderation variables from research journals by Damas et al. (2021) and Anggita et al. (2022). This study decides not to use green accounting variables as many previous studies reached similar conclusions. Therefore, Damas et al. (2021) suggested incorporating new variables such as the proportion of the board of commissioners, green innovation, and carbon emissions disclosure as independent

variables, and firm size as a moderating variable.

This study selects the non-cyclical consumer sub-sector because companies in this sub-sector tend to be more economically stable and less affected by economic conditions. The goods and services produced by companies in this sub-sector are daily necessities for society, making their demand relatively stable.

This research aims to gather valid and reliable data on factors affecting firm value in the non-cyclical consumer sub-sector. The findings can help businesses increase their value and move closer to sustainability goals by advising them on creating more environmentally friendly and sustainable practices.

## Literature Review and Hypothesis

### Legitimacy Theory

Legitimacy theory examines the relationship between companies and society, suggesting that corporations gain legitimacy through social recognition by aligning their actions with societal norms and values (Dowling & Pfeffer, 1975; Suchman, 1995). This theory supports the voluntary reporting of green and social information to communicate a firm's management of issues such as greenhouse gas emissions (Ghomi & Leung, 2013).

Industries with significant greenhouse gas emissions must legitimize their activities by disclosing efforts to manage and implement good green practices (O'Donovan, 2002). Such disclosures help companies gain legitimacy from their communities, allowing them to sustain operations by aligning with societal norms (Agustia et al., 2019).

Applying legitimacy theory to Proportion Of The Board Of Commissioners, green innovation, carbon emissions disclosure, and firm value demonstrates that companies aim to meet societal expectations. Gaining legitimacy enhances a firm's reputation, stakeholder trust, and long-term success, emphasizing

the importance of responsible green practices and sustainable development (Alfayerds & Setiawan, 2021).

### Firm Value

Firm value compasses current performance and future potential, reflecting how well a firm meets its goals and adds value for stakeholders. It can also indicate the price potential buyers are willing to pay. Strong investments and strategies enhance a firm's reputation among investors, boosting stock prices and firm value. Investors base their decisions on firm value, seeing it as a sign of short-term and long-term success. Therefore, management should prioritize financial performance, sustainable growth, innovative strategies, and risk management to enhance value. Higher Firm value attracts funding and resources, and builds trust among shareholders, employees, business partners, and other stakeholders (Kelvin et al., 2017).

Investors consider both current performance and future growth when evaluating firm value. Operational efficiency, innovation, and effective risk management are key value drivers. Optimizing operations and reducing inefficiencies help companies compete and profit. Innovation differentiates companies by creating new products and services, leading to new market opportunities and increased revenue. Effective risk management safeguards value and minimizes losses. Green sustainability is increasingly important, and eco-friendly practices add value and stakeholder support. Strong stakeholder relationships also enhance firm value, building support and a good reputation (Wijaya & Sedana, 2015).

Stock prices reflect firm value. Rising stock prices indicate market confidence in the firm's performance and future, leading to higher shareholder returns. Higher stock prices show strong revenue growth, increased profits, and effective business strategies, attracting more investors and boosting market confidence. As stock prices rise, so does firm value, benefiting

employees, business partners, and the government. This growth supports stakeholder negotiations and collaboration (Anggita et al., 2022).

### **Proportion Of The Board Of Commissioners**

Consistent with legitimacy theory, it is observed that a good proportion of the Board of Commissioners increases firm value. The expected impact of the proportion of the Board of Commissioners with an independent committee on firm value is significant. Members of the issuer's management team who also meet the criteria for independence are considered independent supervisors. To be considered independent, a commissioner must not be an executive of the company, a major shareholder, an officer, or have other ties with the major shareholders of the company (Rudangga & Sudiarto, 2021). In line with the findings of Taraf & Casmi (2022) and Nugroho & Budiman (2022), which found that a good proportion of the Board of Commissioners increases a company's value, the researcher found the following. Therefore, the hypothesis of this study is:  
H1: The proportion of the Board of Commissioners has a positive effect on firm value.

### **Green Innovation**

Agustia et al. (2019) found that green innovation contributes significantly to increasing firm value. One way is by using resources such as water and electricity more intelligently, which can reduce production costs and increase productivity. Additionally, green innovation can open new revenue streams for businesses by driving demand for green innovation goods and services. Companies can gain a market advantage by adopting green innovations that enhance product quality, operational efficiency, and public perception. O'Donovan's legitimacy theory (2002) also highlights the importance of businesses acting in accordance with social rules and

norms. The business world can gain public support while simultaneously reducing its negative impact on the environment through the use of "green innovation." This can help the company's long-term growth and increase its value. Damas et al. (2021) found that green innovation significantly increases business value. Supported by research (Dewi & Rahmianingsih, 2020) which successfully proved that green innovation has a positive effect on firm value. Yao et al. (2019) also presented findings from their own research, which contradict previous findings that green innovation increases firm value. Based on these statements, the following hypothesis can be formulated:

H2: Green innovation has a positive effect on firm value.

### **Carbon Emission Disclosure**

In legitimacy theory, companies often strive to gain legitimacy or recognition from their surroundings through their business activities. One way to gain this recognition is by being transparent and honest about the impact of your business practices on the environment. Carbon emission disclosure refers to the exchange of information between the business world and stakeholders regarding the business's impact on global warming and the environment. Several previous studies observing the influence of carbon emission disclosure on firm value support this explanation. Carbon emission disclosure has been proven to significantly increase firm value based on research by Sari & Budiasih (2021). The study by Damas et al. (2022) on manufacturing companies found a similar positive impact of carbon emission disclosure on firm value, making these findings consistent with theirs. However, Anggita et al. (2022) found that a company's carbon emission disclosure does not affect its stock price. Based on these statements, the following hypothesis can be formulated:

H3: Carbon emission disclosure has a positive effect on firm value.

**Firm Size**

Effendi & Ulhaq (2021) states that the size of a company is defined as the size of the company (Gunawan et al., 2022). Financial backers can feel assured knowing they will see a return on their investment thanks to a well-established control system known as the "Proportion of the Board of Commissioners" (Siew Yee et al., 2018). Shareholder confidence in the security of their investment is a natural consequence of a good Board of Commissioners proportion (Andayani & Yanti, 2021). Most large companies use an effective Board of Commissioners proportion to curb poor management practices (Muhammad, 2016). This demonstrates how a good Board of Commissioners proportion, regardless of company size, can enhance its value. Therefore, the Board of Commissioners proportion practice can have a greater impact on a company's value as its size increases. According to Darniaty & Murwaningsari (2022), as company size increases, firm value also rises in the eyes of investors, because its stock value increases, leading to higher returns for investors (Astria et al., 2021). The size of a company can influence decision-making in implementing green environmental strategies such as green innovation. Green innovation can increase productivity and provide new opportunities for companies through product innovation, showing environmental concern (Dewi & Rahmianingsih, 2020). The larger the company, the better it can grow and develop to maximize its value. Company size is a measure of a company's scale, often assessed by total assets. Significant company growth facilitates capital acquisition from investors, thereby increasing the company's value. Previous research has found that company size can moderate firm value (Firmansyah & Surasni, 2020). Based on these statements, the following hypothesis can be formulated: H4: Company size can strengthen the influence of Proportion Of The Board Of Commissioners on firm value.

H5: Company size can strengthen the influence of green innovation on firm value.  
 H6: Company size can strengthen the influence of carbon emission disclosure on firm value.

**Research Methods**

**Population and Sample Size**

In this study, the population consisted of non-cyclical sector companies listed on the Indonesia Stock Exchange (IDX) that published comprehensive sustainability reports and annual reports between 2019 and 2022. The sampling method employed was Non-Probability Sampling, specifically purposive sampling, which involves selecting samples based on specific criteria and considerations. The outcomes of the sampling technique are summarized as follows:

**Table 1  
 Research Sample**

No	Information	Amount
1.	Consumer non-cyclical sector firm listed on the Indonesia Stock Exchange (IDX) for the period 2018-2022	124
2.	Firms excluded due to non-publication of financial reports	(44)
3.	Firms excluded due to non-publication of sustainability reports	(48)
Total number of firms used as samples		32
Year of Study		4
Total Research Sample		128

**Source: Data Processed (2024)**

**Operational Variable  
Independent Variable**

The independent variables in this study are Board of Commissioners Proportion (X1), Green Innovation (X2), Carbon Emission Disclosure (X3).

1. Board of Commissioners Proportion (X1)

The Proportion of the Board of Commissioners, as defined by the Indonesia Stock Exchange (IDX), ensures professional company management through principles like transparency, accountability, and independence. It aims to boost competitiveness by attracting investors. According to the OECD, this proportion should foster transparent and efficient markets while maintaining regulatory stability and clear responsibilities among oversight, regulation, and enforcement. Daniri (2018) identifies key principles: transparency, accountability, responsibility, independence, equality, and fairness. The measurement focuses on the proportion of independent board members, not major shareholders, ensuring oversight without direct ties to majority shareholders (Ngedo et al., 2019).

$$\text{Board of Commissioners Proportion} = \frac{\text{Proportion of Independent Board of Commissioners}}{\text{Total Proportion of Board of Commissioners}}$$

2. Green Innovation

In the era of increasing environmental awareness, Barforoush et al. (2021) argue that green innovation is crucial for firm success. In practical terms, green innovation involves creating products or processes that are efficient and environmentally friendly (Fabiola & Khusnah, 2022). Dewi & Rahmianingsih (2020) state that content analysis is used to evaluate green innovation. Here are examples of indicators used in this study:

Green Innovation =

$$\frac{\sum \text{items disclosed}}{\sum \text{item green innovation}}$$

**Table 2  
Indicator Green Innovation**

Variabel	Indicator
Green Innovation (GI)	1. The firm implements production processes using new technologies to reduce energy, water, and waste (GI-1)
	2. Products produced by the firm use green innovation materials or materials that minimize green impact and hazardous substances (GI-2)
	3. The company uses packaging made from green innovation materials (GI-3)
	4. The firm uses materials and components that are recyclable (GI-4)

Source: Dewi & Rahmianingsih (2020)

3. Carbon Emission Disclosure (X3)

Firm environmental responsibility includes carbon disclosure efforts aimed at reducing greenhouse gas (GHG) emissions. The index table based on research by Bae Choi et al. (2013) and Damas et al. (2021) categorizes carbon emissions disclosure into five categories: GHG/Greenhouse Gas, CC/Climate Change, RC/Reduction and Cost, and EC/Energy Consumption. Within these five categories:

$$CED = \frac{n}{k}$$

CED = Carbon Emission Disclosure  
n = Total items disclosed by the firm  
k = Total items included in CED

**Table 3**  
**Indicator Carbon Emission Disclosure**

Indicator	
Climate Change: Risks and Opportunities (CC)	CC-1: Assessment/description of climate change and the actions taken to manage the associated risks. This includes related risks (general or specific regulations).
	CC-2: Current (and future) assessment /description of the financial, business, and opportunity implications of climate change.
Greenhouse Gas (GHG)	GHG-1: Description of the methodology used in the calculation of greenhouse gases (e.g., GHG protocol or ISO).
	GHG-2: Existence of external verification of GHG emission quantities, by whom, and on what basis.
	GHG-3: Total greenhouse gas emissions (metric tons CO <sub>2</sub> -e) produced.
	GHG-4: Disclosure of Scope 1, 2, and 3 direct emissions.
	GHG-5: Disclosure of GHG emissions by origin or source (e.g., coal, electricity, etc.).
	GHG-6: GHG emission disclosure based on facility or segment level.
	GHG-7: Disclosure of GHG emissions by facility or segment level.
Energy Consumption (EC)	EC-1: Amount of energy consumed (e.g., tera-joules or peta-joules).
	EC-2: Quantification of energy used from renewable resources.
	EC-3: Disclosure by type, facility, or segment.
Reduction and Cost (RC)	RC-1: Details of plans or strategies to reduce GHG emissions.
	RC-2: Specification of the target levels and years for GHG emission reductions.
	RC-3: Emission reductions and cost savings currently achieved as a result of carbon reduction plans.
	RC-4: Future emission costs required in capital expenditure planning.
Accountability of Emission Carbon (AEC)	AEC-1: Indication of where the board committee (or other executive body) has responsibility for climate-related actions.
	AEC-2: Description of mechanisms by which the board (or other executive body) reviews the company's progress related to climate change.

Source : Damas et al. (2021)

**Dependent Variable**

The dependent variables in this study are Firm Value (Y). The capital market determines a firm's value based on the supply and demand for its shares (Anggraeny & Suwitho, 2020). Tobin's Q

ratio is a financial metric used to assess a firm's value based on its stock price. It reflects the investment conditions needed for firm expansion. The formula used in research to calculate Tobin's Q is (Soleha, A. P., & Isnalita, 2022).

$$\text{Tobin's Q} = \frac{\text{Total Market Value} + \text{Total Book Value of Liabilities}}{\text{Total Book Value of Assets}}$$

Source : Soleha et al. (2022)

**Moderate Variable**

The moderating variable in this study is firm size. According to Darniaty & Murwaningsari (2022) measuring firm size can use a ratio scale using the following formula:

$$\text{Size} = \ln (\text{Total asset})$$



## Results and Discussion

### Analysis Statistics Descriptive

**Table 4**  
**Descriptive Statistical**

	<b>FV</b>	<b>CG</b>	<b>GI</b>	<b>CED</b>	<b>SIZE</b>
<b>Mean</b>	1.92	0.48	0.62	0.55	29.50
<b>Median</b>	1.23	0.50	0.50	0.56	29.79
<b>Max</b>	11.70	0.83	1.00	0.94	32.40
<b>Min</b>	0.09	0.33	0.25	0.11	26.25
<b>Std. Dev.</b>	1.95	0.14	0.22	0.24	1.52

Source: Data Processed (2023)

From the table above, it can be seen that each variable has an average, minimum, and maximum value. The highest value of the 3 independent variables is green innovation with a nominal value of .62.

**Table 5**  
**Normality Test Result**

<b>Normalitas</b>	<b>N</b>	<b>Residual</b>	<b>Decision</b>
Probability	128	0.173	Normally distributed

Source: Data Processed (2024)

Based on Table 5, the p-value of the Jarque-Bera statistic is 0.173, which exceeds the significance level of 0.05. Therefore, the normality assumption is satisfied.

**Table 6**  
**Multicollinearity Test Result**

<b>Variable</b>	<b>VIF</b>	<b>Conclusion</b>
CG	1.166	No multicollinearity
GI	1.006	No multicollinearity
CED	1.029	No multicollinearity
CG_SIZE	1.157	No multicollinearity
GI_SIZE	1.038	No multicollinearity
CED_SIZE	1.058	No multicollinearity

Source: Data Processed (2024)

To check for multicollinearity, the Variance Inflation Factor (VIF) values are analyzed. If the VIF value is less than 10, it indicates that there is no multicollinearity among the independent variables. Conversely, if the VIF value is greater than 10, it indicates the presence of multicollinearity.

**Table 7**  
**Heteroscedasticity Test Result**

F-statistic	0.002	Prob. F	0.965
Obs*R-squared	0.002	Prob. Chi-Square(1)	0.965

Source: Data Processed (2024)

The results of the heteroscedasticity test using the ARCH test are shown in Table 7. The p-value of Obs\*R-squared is 0.965, which is greater than 0.05, indicating that Ho is accepted. Therefore, it can be concluded that heteroscedasticity is not present, fulfilling the model's assumption of no heteroskedasticity.

**Table 8**  
**Autocorrelation Test Result**

F-statistic	1.102	Prob. F	0.296
Obs*R-squared	1.175	Prob. Chi-Square	0.278

Source: Data Processed (2024)

The results of the autocorrelation test using the LM test are shown in Table 6. The p-value of Obs\*R-squared is 0.2783, which is greater than 0.05, indicating that Ho is accepted. Therefore, it can be concluded that there is no autocorrelation.

**Table 9**  
**Determination Coefficient Test Result**

Model	R <sup>2</sup>	Adj R <sup>2</sup>
Firm Value	0.4187	0.3846

Source: Data Processed (2024)

The model fit results for the firm value model show an adjusted R<sup>2</sup> value of 0.3846. This means that 38.46% of the variation in Firm Value is explained by the independent variables—CG, GI, CED, Size, and their interactions—while the remaining 61.54% is due to other factors not included in the model. For companies listed on the Indonesia Stock Exchange, this adjusted R<sup>2</sup> value indicates a well-fitted model.

**Table 10**  
**Simultaneous Test Result**

Model	F <sub>statistik</sub>	P-value	Conclusion
Firm Value	12.249	0.000	Hypothesis supported

Source: Data Processed (2024)

The processing results for the simultaneous test for the firm value model are presented in the table. The table shows an F-statistic value of 12.249 with a p-value of 0.000, which is less than the significance level of 0.05. This indicates that Ho is rejected and Ha is accepted. Therefore, it is proven that at least one independent variable significantly affects the dependent variable, Firm Value.

**Table 11**  
**Partial Test Result**

Variabel	Idiosyncratic Model		
	Koefisien	T <sub>statistik</sub>	P-value
CG	1.337	2.730	0.004
GI	-0.401	-1.412	0.080
CED	-0.416	-1.589	0.057
CG_SIZE	-0.064	-0.785	0.217
GI_SIZE	0.115	1.722	0.044
CED_SIZ E	-0.095	-1.504	0.068

Source: Data Processed (2024)

### Hypothesis 1

Based on the results in Table 11, the board of commissioners proportion variable shows a significant value of  $0.0004 < 0.05$ , indicating that board of commissioners proportion positively affects firm value. Independent commissioners help reduce financial reporting fraud and enhance supervisory effectiveness, thereby improving the quality of financial statements. Effective oversight minimizes management's fraudulent actions, increasing investor trust and raising the company's stock price and value (Rudangga, 2016). Effective board monitoring also helps minimize agency conflicts, further increasing firm value. This finding is supported by Taraf & Casmı (2022) and Nugroho & Budiman (2022).

### Hypothesis 2

Table 11 shows a significant value of  $0.80 > 0.05$  for the green innovation variable, indicating that green innovation does not affect firms value. Firm implement green innovations primarily to comply with regulations, not as a primary factor for investor assessment. The varied and costly nature of green innovations means they do not significantly impact firm value (Apriandi & Hexana, 2023). This finding contradicts previous studies by Agustia & Dianawati (2019), Fabiola & Khusnah (2022), and Damas et al. (2021), which stated that green innovation positively affects firm value.

### Hypothesis 3

The carbon emission disclosure variable in Table 11 shows a significant value of  $0.0573 > 0.05$ , indicating that carbon emission disclosure does not affect firm value. Disclosing carbon emissions does not necessarily increase firm value, contradicting the legitimacy theory that suggests increased environmental responsibility enhances company reputation and value (Alfayerds & Setiawan, 2021). This finding aligns with Anggita et al. (2022)

but contradicts Damas et al. (2021) and Hardiansyah et al. (2021).

### Hypothesis 4,5, and 6

Firm size does not moderate the influence of independent commissioners on firm value. The average number of independent commissioners is insufficient to effectively prevent or detect managerial opportunistic behavior, thus not impacting firm value indicate that the hypothesis stating firm size strengthens the positive effect of Proportion Of The Board Of Commissioners on firm value is not supported.

Firm size moderates the positive effect of green innovation on firm value, affecting both large and small companies. This finding is supported by Fabiola & Khusnah (2022).

Firm size does not moderate the effect of carbon emission disclosure on firm value. Larger companies do not necessarily have more extensive carbon emission disclosures or better investor evaluations. This finding aligns with Ayem & Hikmah, who state that firm size does not strengthen the effect of carbon emission disclosure on firm value.

## Conclusions and Recommendation

### Conclusion

The result showed :

1. Proportion of Independent Commissioners: The proportion of independent commissioners has a positive effect on firm value. This finding aligns with Taraf & Casmı (2022) and Nugroho & Budiman (2022), who also found a significant impact of independent commissioners on firm value.
2. Green Innovation: Green innovation does not affect firm value. This result is consistent with Tonay & Murwaningsari (2022), who found no significant impact of green innovation on firm value.

3. Carbon Emission Disclosure: Carbon emission disclosure does not affect firm value. This finding aligns with Anggita et al. (2022), who also found no significant impact of carbon emission disclosure on firm value.
4. Firm Size and Independent Commissioners: Firm size does not moderate the effect of independent commissioners on firm value.
5. Firm Size and Green Innovation: Firm size moderates the positive effect of green innovation on firm value. This finding is consistent with Fabiola & Khusnah (2022).
6. Firm Size and Carbon Emission Disclosure: Firm size does not moderate the effect of carbon emission disclosure on firm value. This finding is in line with Ayem & Hikmah (2022).

### Recommendation

Future research should consider extending the study period to include more companies that have published sustainability or annual reports, thereby expanding the sample size. Additionally, focusing on specific industry sectors rather than a broad range of sectors in one study could provide more precise and comparable data on firm values, minimizing discrepancies in value assessment.

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