



Effect Carbon Emissions Disclosure, Green Innovation, Green Investment on Firm Value with Moderating Corporate Governance

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Abstract. This research endeavors to evaluate and scrutinize the ramifications of carbon emission disclosure, green innovation, and green investment on corporate value, with good corporate governance acting as a moderating variable. The primary focus of this study encompasses enterprises functioning within the energy sector that are publicly traded on the Indonesia Stock Exchange (IDX) during the timeframe extending from 2022 to 2023. The selection process for the sample is conducted through a purposive sampling approach, wherein the criteria for sample selection are based on defined parameters. The comprehensive population for this research comprises of 87 energy companies whose shares are listed on the Indonesia Stock Exchange from 2022 to 2023. Subsequent to the execution of purposive sampling, a total of 62 samples were ascertained. The data collection methodology employed consists of secondary data, while the analytical processes are conducted utilizing the statistical product and service solution version 25 software. The findings of the research indicate that 1) carbon emission disclosure has a detrimental effect on corporate value; 2) green innovation exerts a positive influence on corporate value; 3) green investment does not affect corporate value; 4) good corporate governance is capable of moderating the relationship between carbon emission disclosure and corporate value; 5) good corporate governance does not moderate the relationship between green innovation and corporate value; 6) good corporate governance is ineffective in moderating the relationship between green investment and corporate value.

Keywords: Carbon Emission Disclosure, Green Innovation, Green Investment, Firm Value, Good Corporate Governance.

1 Introduction

In the contemporary context, numerous corporations that formerly concentrated exclusively on profit maximization are now redirecting their emphasis towards the management of sustainability dimensions that encompass economic, social, and environmental factors. Climate change and environmental sustainability have taken center stage in the global agenda over the past few decades [1]. The strong impetus to

address these challenges stems from a deepening understanding of the impact of human activities on our planet. Irrefutable scientific evidence has confirmed that activities such as fossil fuel combustion and deforestation have led to significant increases in global temperatures and climate change.

Global warming and climate change have become increasingly pressing issues around the world. The adverse consequences they impose upon both the ecosystem and societal structures are becoming progressively apparent, encouraging companies to take on greater social and environmental responsibilities. In this regard, the concept of sustainable and environmentally responsible business is gaining more and more attention, from both public and regulatory perspectives [2]. In the context of increasing pressures to evaluate the environmental ramifications associated with corporate activities, the prioritization of sustainable business methodologies is progressively emerging as a central concern for organizations striving to attain economic, social, and environmental sustainability. Corporations aspire to enhance their long-term valuation by augmenting the wealth generated for their shareholders [3]. Typically, the organization will disseminate information regarding its operational performance, which has the potential to ultimately elevate the company's value. The value of a firm encapsulates the perceptions of investors regarding the effectiveness or ineffectiveness of management in governing the organization. An elevated firm value engenders confidence within the market concerning the company's current operational performance, in addition to its potential for future growth [4].

The current condition in Indonesia is characterized by an increasing trend in the amount of carbon emissions that continues to increase every year. A report from the Global Carbon Project shows that Indonesia is among the top ten most carbon-intensive countries in the world. Among other countries, Indonesia emits more carbon by 18.3% in 2022. The use of fossil energy (mainly coal), land conversion, and deforestation in Indonesia are all factors that contribute to the increase in emissions. Indonesia's status as one of the preeminent greenhouse gas emitters serves as a salient indication that the nation ought to actively engage in efforts to curtail its carbon emissions, particularly within the energy domain. Companies in various industrial sectors have a responsibility to reduce their carbon footprint so as not to have a greater negative impact on the environment. Therefore, companies need to make disclosures related to carbon emissions, as a transparent and accountable measure [5]. Disclosure of carbon emissions not only enables companies to monitor and manage environmental impacts more effectively, but can also strengthen stakeholders' trust in the company's commitment to environmentally responsible business practices.

In addition to the transparency of carbon emissions, green innovation has been emphasized as a strategy to enhance the environmental performance of enterprises [6]. Green innovation encompasses the creation and implementation of environmentally sustainable technologies, processes, or products. Through green innovation, companies can explore new solutions to reduce their environmental footprint, improve efficiency, and minimize negative impacts on the environment. Green innovation can cover a wide range of things, from the use of renewable energy and energy-efficient technologies to greener product designs and more sustainable manufacturing practices. Companies can adopt green innovation in various aspects of their operations, including production, distribution, and waste management. In addition to

the direct benefits of reducing environmental impact, green innovation can also open up new opportunities for business growth and differentiation.

In addition to disclosure of carbon emissions and green innovation, green investment is also a concern in the literature and business practices [7]. There is a case of environmental damage in Bangka Belitung Islands Province, which resulted in a loss of Rp 271.06 trillion. The Minister of Environment stated that based on the calculation, the total environmental losses in the case included losses in terms of ecology, environmental economics, and recovery costs. From this case, it is clear that environmental responsibility is one of the factors that can greatly affect a company's financial performance. Companies that make the right investments to impact their environment will get a commensurate return. Thus, this study will pay attention to the influence of three main factors: carbon emission disclosure, green innovation, and green investment on firm value and good corporate governance as a moderator.

2 Literatur Review

2.1 Legitimacy Theory

Legitimacy theory is fundamentally grounded in the concept of a 'social contract' that exists between corporations and the communities reliant on the natural resources they exploit. In accordance with this theoretical framework, organizations are mandated to perpetually synchronize their operational practices with the societal boundaries and values that are broadly accepted in order to attain legitimacy. This theoretical construct posits that organizations are required to consistently align their operations with the parameters and ethical standards endorsed by society to secure legitimacy. This entails that the corporation must function in compliance with the established regulations and social norms prevalent in its operational milieu, thereby ensuring that its endeavors are perceived as legitimate and socially acceptable by external stakeholders. This theoretical framework posits that corporations may function with the acquiescence of society, a condition that is both provisional and demands continual modification in response to the shifting preferences and expectations of the populace. In conclusion, this theory emphasizes the paramount significance of meeting societal expectations in order to foster and maintain legitimacy.

2.2 Stakeholder Theory

A collective or individual entity that exerts influence upon, or is influenced by, the organization in pursuit of its strategic vision [8]. The continued existence of an organization is profoundly reliant on the support rendered by its collaborative partners. Sustainability reporting signifies that all principal stakeholders are simultaneously apprised of the organization's economic, social, and environmental performance metrics. This policy serves as a strategic framework aimed at fostering a constructive relationship between the organization and its stakeholders. Logically, such disclosures are capable of fulfilling the informational requirements of the organization to garner support from partners who impact the sustainability trajectory

of the organization. This aligns with the perspective that the disclosure of financial, social, and environmental dimensions constitutes a collaborative partnership between the organization and its stakeholders, facilitating the dissemination of information regarding the company's operations that may alter perceptions and expectations.

2.3 Company Value

The valuation of a firm is characterized as the financial consideration required during the acquisition of a company or the market's confidence in the current operational performance and prospective outlook of the company; firm value is evaluated through the lens of maximizing shareholder wealth. Elevating the company's value in accordance with anticipated outcomes represents a significant achievement, as the welfare of the proprietors will concomitantly increase with the augmentation of the company's value. This responsibility rests with the managers who have been entrusted by investors to oversee their corporate entities. Investors are inclined to prefer investment opportunities in firms demonstrating favorable performance metrics. The company's value, encompassing nominal, market, intrinsic, book, and liquidation values, is regarded as more favorable in the presence of robust investment demand for equity shares.

2.4 Carbon Emission Disclosure

Carbon Emission Disclosure represents a procedural practice adopted by corporations or organizations to disseminate information pertinent to the volume of greenhouse gas emissions resultant from their operational activities. This initiative is integral to efforts aimed at enhancing transparency and accountability concerning the environmental ramifications of their business undertakings [9]. The disclosed information typically encompasses the quantity of greenhouse gas emissions produced by a company's operations, expressed in a specific unit of measurement, such as tons of CO₂e (carbon dioxide equivalent). The provision of this data enables stakeholders, including investors, consumers, and the general populace, to comprehend and assess the environmental consequences of a company's business operations and its initiatives to mitigate greenhouse gas emissions. The practice of Carbon Emission Disclosure may also aid companies in strategizing and executing more efficacious climate change mitigation approaches.

2.5 Green Innovation

Green innovation constitutes a concept encompassing the formulation and execution of innovative concepts, technologies, procedures, products, or services that prioritize ecological sustainability [10]. This encompasses initiatives aimed at mitigating adverse effects on the environment, including but not limited to greenhouse gas emissions, also water contamination, as well as the unsustainable exploitation of natural resources. The objective of green innovation is to devise solutions that are environmentally sustainable while maintaining optimal performance and competitive edge. This may entail the advancement of technologies that exhibit greater energy

efficiency, the adoption of production processes that are more environmentally benign, the utilization of recycled or biodegradable materials, or the launch of products or services that empower consumers to diminish their carbon footprint. The primary goal of green innovation is to foster sustainable economic development while alleviating adverse environmental impacts. This aligns with the increasing recognition of the imperative to safeguard the environment and address the exigencies posed by global climate change. Consequently, green innovation has emerged as a critical component in global endeavors aimed at enhancing social and environmental sustainability.

2.6 Green Investment

Green investment pertains to a financial undertaking executed by enterprises, which is pursued as a protective measure to mitigate environmental repercussions and manage ecological systems resulting from corporate activities, commonly referred to as environmental investment [11]. Green investment initiatives are not solely the purview of governmental entities; rather, contemporary corporations are also engaging in initiatives to address environmental challenges. The expenditures associated with corporate green investment encompass costs related to technological innovation and research and development (R&D), the management of industrial waste and various pollutants, the establishment of clean and renewable projects, ecological restoration efforts, and initiatives aimed at reforestation. Corporations incur costs to enact measures for environmental conservation and management, thereby achieving superior environmental performance through the prevention of pollution, which consequently enhances corporate value. Firms are encouraged to engage in green investments predicated upon the three fundamental social responsibilities: conservation of natural resources, environmental protection, and social justice. In this manner, companies can mitigate the environmental ramifications of their operations by diminishing energy consumption and carbon emissions. Information regarding corporate green investments is disseminated through sustainability reports and annual reports, which illuminate the company's commitment to environmental stewardship.

2.7 Good Corporate Governance

The notion of good corporate governance embodies an intricate system of regulations that delineates the interactions among shareholders, corporate executives, creditors, governmental bodies, employees, and a variety of additional internal and external stakeholders concerning their respective rights and obligations. Fundamentally, it serves as a framework that supervises and directs a corporation, with the paramount objective of augmenting value for all stakeholders involved. In the context of this study, well corporate governance is operationalized through the presence of independent commissioners. Good Corporate Governance (GCG) pertains to the principles adopted by enterprises to optimize corporate value, enhance organizational performance and contributions, and ensure the sustainability of the company in the long term. The implementation of GCG practices aims to cultivate effective governance, which fosters a robust relationship between the corporation and its

stakeholders. When executed with efficacy and efficiency, good corporate governance will facilitate the seamless operation of all corporate functions, resulting in improvements across various dimensions of organizational performance, encompassing both financial and non- financial metrics [12].

3 Research Methods

This investigation was executed by empirically evaluating the previously established hypotheses utilizing quantitative research methodologies. In this analysis, the focus was directed towards the data accessible on the IDX, encompassing entities from the energy sector. The sampling methodology employed in this research utilized Non-probability sampling through the application of a purposive sampling technique. The purposive sampling technique enables researchers to identify samples that align with the objectives of the study. In this analysis, a singular category of data will be employed, specifically the ratio scale data type. The ratio scale in this research is utilized for the measurement of carbon emission disclosure variables, green innovation, green investment, firm value, and good corporate governance. Furthermore, the data source for this investigation is derived from secondary data. A comprehensive multiple linear regression analysis was conducted to evaluate the influence of two or more independent variables on a singular dependent variable. The multiple regression model utilized in this study is delineated as follow.

$$y = \alpha + \beta_1x + \beta_2x_2 + \beta_3x_3 + e \tag{1}$$

The mathematical framework of multiple regression analysis to evaluate the association between the independent variable and the dependent variable, as well as to examine the moderating effect, is delineated as follows.

$$y = \alpha + \beta_1x_1 + \beta_2x_2+ \beta_3x_3 + \beta_4 (x_1*m) + \beta_5 (x_2*m) + \beta_6 (x_3*m) + e \tag{2}$$

4 Results

The cohort under investigation in this research comprises energy sector corporations that are publicly traded on the Indonesia Stock Exchange (IDX) during the period spanning 2022 to 2023, specifically totaling 87 entities. The methodology employed for sample selection is purposive sampling, a technique that involves specific criteria, resulting in a final sample of 62 observations.

Table 1. Summary of Sample Selection

Sample Selection Process	Amount
Energy sector companies listed on the Indonesia Stock Exchange	87
Energy sector companies that publish annual and sustainability reports	(18)
Energy sector companies that include environmental costs	(34)

Energy sector companies that make disclosures related to carbon emissions	(2)
Number of samples that meet the criteria	31

Source: Data Researcher Process, 2024

Moreover, classical assumption testing is a prerequisite that must be met prior to the execution of regression analysis. The traditional evaluative assumptions performed include assessments for normal distribution, multicollinearity, heteroscedasticity, and autocorrelation. As a result, the dataset is deemed suitable for hypothesis testing as well as Moderated Regression Analysis (MRA).

Table 2. Research Model 1 t Statistical test

Unstandardized Coefficients			Standardize d Coefficients Beta			
Model	B	Std. Error		t	Sig.	
1	(Constant)	1.284	.150		8.562	.000
	CED	-1.169	.351	-.553	-3.327	.002
	GI	1.074	.363	.495	2.963	.004
	GT	-1.018	.656	-.183	-1.552	.126

Source: SPSS 25 Data Processing Result, 2024

The multiple linear regression equation can be elucidated in the following manner, the constant term in the regression equation (1) of 1.284 indicates that, assuming all independent variables remain unchanged, the value of the company will experience an increase of 1.284. The regression coefficient associated with X1, which is -1.169, signifies that a 1% escalation in the value of carbon emission disclosure results in a decrement of 1.169 in the company's value. Given that the regression coefficient for the X1 variable is negative, it can be inferred that the influence of variable X1 on Y is inversely related. The regression coefficient linked to X2, quantified at 1.074, denotes that an increment of 1% in the value of green innovation leads to an enhancement of 1.074 in the company's value. The positive nature of the regression coefficient in the X2 equation implies that the impact of variable X2 on Y is positively correlated. The regression coefficient for X3, recorded at -1.018, suggests that a 1% increase in the value of green investment results in a reduction of 1.018 in the company's value. The negative regression coefficient in the X3 equation indicates that the effect of variable X3 on Y is negative in nature.

Furthermore, to evaluate the hypothesis regarding the impact of independent variables on the dependent variable, a t-test is conducted. According to the significance findings (Coefficients) presented in Table 2, the carbon emission disclosure variable yielded a significance value of 0.002, which is below the established threshold of 0.05, thereby concluding that carbon emission disclosure adversely affects the company's firm value. The green innovation variable produced a significance of 0.004, also below 0.05, leading to the conclusion that green innovation positively influences firm value. Conversely, the green investment variable displayed

a significance of 0.126, exceeding 0.05, which allows for the conclusion that green investment does not exert any significant effect on firm value.

Table 3. MRA t Test Result for Research Model II

Coefficients Model		Unstandardized		Standardized Coefficients Beta	t	Sig.
	B	Std. Error				
1 (Constant)	2.096	.686			3.056	.003
CED	-4.225	1.562		-2.001	-2.706	.009
GI	3.521	1.857		1.623	1.896	.063
GT	-9.102	11.054		-1.634	-.823	.414
GCG	-1.733	1.401		-.336	-1.237	.221
CED with GCG	6.515	3.181		1.494	2.048	.045
GI with GCG	-5.327	3.870		-1.134	-1.376	.174
GT with GCG	16.382	22.243		1.468	.736	.465

Source: SPSS 25 Data Processing Result, 2024

The equation for moderated regression analysis can be delineated in the following manner, the intercept of the regression equation (2) quantified at 2.096 indicates that, in the absence of any influence from the variables related to carbon emissions disclosure, green innovation, green investment, and the moderating effect of good corporate governance, the valuation of the firm is projected to increase by 2.096. The variable pertaining to carbon emissions disclosure is associated with a coefficient value of -4.225. This implies that an increment of 1 unit in the disclosure of carbon emissions will result in a decrement of 4.225 in the value of the corporation. The coefficient value associated with the green innovation variable is 3.521. This signifies that a rise of 1 unit in green innovation correlates with an increase of 3.521 in corporate value. The coefficient for the green investment variable is recorded at -9.102. This indicates that an increase of 1 unit in green investment will lead to a reduction of 9.102 in the value of the firm. The moderating variable of good corporate governance yields a coefficient value of -1.733. This denotes that when the variables of carbon emissions disclosure, green innovation, and green investment each increase by 1 unit, the consequent effect will be a decrease of 1.733 in the firm's value. The interaction term of carbon emissions disclosure and good corporate governance presents a coefficient value of 6.515. This suggests that each additional unit of the good corporate governance variable will enhance the company's value by 6.515. The interaction of green innovation and good corporate governance yields a coefficient value of -5.327. This indicates that with each additional unit of the good corporate

governance variable, the value of the firm will diminish by 5.327. The interaction term for green investment and good corporate governance has a co-efficient value of 16.382. This means that each unit increase of the good corporate governance variable will elevate the firm's value by 16.382.

Moreover, to evaluate the hypothesis concerning the moderating effects of the independent variable on the dependent variable, a t-test has been conducted as follows. According to the significance results (Coefficients) presented in Table 3 above, the relationship between carbon emissions disclosure and good corporate governance exhibits a significance level of 0.045, which is less than 0.05. Therefore, it can be deduced that effective corporate governance serves as a significant moderator of the relationship between the disclosure of carbon emissions and the value of the firm. On the other hand, the interaction between green innovation and effective corporate governance is marked by a significance level of 0.174, which surpasses the threshold of 0.05. Consequently, it can be inferred that effective corporate governance does not serve as a moderating factor in the correlation among green innovation and firm value. Similarly, the significance level for green investment in conjunction with good corporate governance is determined to be 0.465, which is greater than 0.05. Therefore, it can be concluded that good corporate governance fails to moderate the effect of green investment on firm value.

5 Discussion

The analysis of the carbon emission disclosure variable reveals a significance level of 0.002 and a regression coefficient of -1.169. This result suggests that an augmentation in the quantity of carbon emission disclosure items reported by a corporation is associated with a reduced valuation from the standpoint of investors or shareholders, as this phenomenon is intrinsically connected to the financial performance of the entity. The depreciation in the market value of shares transpires because investors perceive that an increased revelation of GHG emissions culminates in a heightened burden of corporate social responsibility. Based on [13] research that GHG emissions disclosure will incur costs so that the market will be concerned about budget overruns. Likewise, with the comparison of costs and returns, if the amount of costs is greater than the return then the disclosure of greenhouse gas emissions is considered expensive. In addition, the market tends to dislike negative reports such as climate change from companies. Because it will bring a bad image for the company so that it will decrease the share price.

The analysis of the green innovation variable results in a significance level of 0.004 and a regression coefficient of 1.074. The findings reveal that, in isolation, green innovation exerts a significant and positive influence on the valuation of firms. Green innovation in the energy sector shows that the company is committed to sustainability and social responsibility, which is attractive to investors concerned about environmental impacts. This increases investor confidence and can attract more capital, which drives firm value higher. Energy companies that adopt green innovations tend to be more competitive in the face of changing market trends and regulations [14]. Today, the demand for renewable energy and sustainable energy solutions is rising sharply. Companies that are at the forefront of green innovation can

capitalize on this demand and increase their market share, which in turn will enhance the intrinsic worth of the corporation in the market. Many countries have implemented strict regulations regarding carbon emissions and fossil energy use. Energy companies that develop green technologies not only comply with these regulations, but also potentially receive incentives from governments, such as subsidies, tax breaks, or access to research and development funds. The avoidance of fines and the benefits of these incentives can reduce legal and financial risks and ultimately increase company value. Green innovation helps energy companies manage risks related to climate change. In the long term, climate change can affect the operations of energy companies, especially those that depend on certain natural resources (such as oil and gas). By turning to green technologies and renewable energy, energy companies can reduce their dependence on fossil resources that are vulnerable to price fluctuations and political risks, and prepare for the impacts of climate change.

The investigation of the green investment variable produces a significance level of 0.126 and a regression coefficient of 1.018. The findings indicate that, when considered independently, green investment does not exert a statistically significant impact on firm valuation. While green investments have a positive impact on the environment, many investors still doubt the short-term profitability of these projects. Green energy projects often require large amounts of capital upfront, with returns that may not be immediately apparent. As a result, some investors prefer companies that invest in projects that provide quick and stable returns, reducing the significant impact of green investment on company value. In the energy sector, especially those based on fossil fuels, green investment often makes up only a small portion of a company's total investment portfolio. This means that even if a company has a green investment program, its contribution to overall financial performance may still be relatively small, thus having no significant impact on firm value in the short or medium term. Many green technologies are still in the development stage or not yet fully mature. Uncertainty about the efficiency of these technologies may pose financial risks. If a company invests in green technologies that are untested or have not yet yielded optimal results, the value of the company may be negatively impacted. Investors will be more cautious and may consider green investments as high-risk investments.

The assessment of the good corporate governance variable as a moderator of the relationship between carbon emission disclosure and firm value results in a significance level of 0.045 and a coefficient of 6.515. The results show that well corporate governance is able to moderate the influence of carbon emission disclosure on firm value because GCG strengthens transparency, accountability, and credibility in disclosing environmentally related information can increase the positive impact of carbon emission disclosure or reduce its negative impact. Good corporate governance, through principles such as transparency and accountability, ensures that information disclosed by companies, including carbon emissions disclosures, is reliable and accurate. When well-governed companies disclose information regarding carbon emissions, investors are more likely to believe that the data is valid and reflects the company's real efforts in reducing environmental impacts [15]. This strengthens the positive relationship between carbon emissions disclosure and firm value, as investors appreciate companies that are not only regulatory

compliant, but also proactive in protecting the environment. GCG helps companies manage risks, including environment-related risks such as climate change. In the context of Carbon Emission Disclosure, GCG ensures that companies have clear policies and mechanisms to identify, measure and manage their carbon emissions. With good environmental risk management, companies do not just report carbon emissions, but also demonstrate concrete efforts to reduce these emissions. This gives a positive signal to the market and stakeholders that the company is ready to face environmental risks, which ultimately increases the value of the company.

The assessment of the good corporate governance variable as a moderating factor in the correlation among green innovation and corporate valuation results in a significance level of 0.174 and a coefficient of 5.327. The findings imply that good corporate governance is ineffective in moderating the influence of green innovation on the valuation of enterprises within the energy sector, as green innovation involves the advancement of environmentally sustainable technologies and processes that often demand considerable time, resources, and rigorous research. Even if the company has good governance, the complexity of green innovation including technological and market uncertainty may make its impact on firm value difficult to be moderated directly by GCG. Good corporate governance may not automatically accelerate the adoption or success of complex green innovations. While GCG can improve efficiency and better decision-making, green innovations in the energy sector typically have slow paybacks. These initiatives often take years before delivering significant financial results. Good governance may not have a direct influence on accelerating the influence of green innovations on firm value, especially in the short term. Investors who expect quick returns may still be skeptical of long-term projects, even under well-managed leadership. Good Corporate Governance tends to focus on basic principles such as transparency, accountability, and broader risk management, not just on green innovation. In other terms, while good corporate governance facilitates prudent decision-making, its emphasis may be more aligned with the overarching stability of the firm rather than being specifically directed towards green innovation. This renders the moderating influence of good corporate governance on the relationship between green innovation and corporate valuation less pronounced, as green innovation necessitates a more specialized and technical approach.

The examination of the good corporate governance variable as a moderator in the correlation among green investment and firm value yields a significance level of 0.465 and a coefficient of 16.382. The results suggest that good corporate governance is ineffectual in moderating the influence of green investment on firm valuation. The inadequate execution of good corporate governance practices within the energy sector has impeded its capacity to mediate the correlation among green investment and firm value. The implementation of good corporate governance that is merely superficial, lacking genuine commitment from management and shareholders, will diminish its efficacy in bolstering green investment. Organizations within the energy sector frequently prioritize immediate profitability over long-term benefits. Given that green investment typically yields long-term advantages, if good corporate governance does not facilitate this long-term strategic decision-making, the influence of green investment on firm value will not be reinforced by good corporate governance. Green investment frequently necessitates substantial initial expenditures, which may not yield immediate positive effects on firm value. Should good corporate governance

emphasize the management of financial risks or short-term cost efficiency, then it will not possess sufficient strength to moderate the correlation among green investment and firm value. The energy sector exhibits a significant reliance on technological innovation. The efficacy of green investment in enhancing firm value is contingent upon the support of innovation. If good corporate governance does not foster innovation or technological advancement that underpins green investment, its capacity to moderate this relationship will be constrained. Optimally functioning good corporate governance should ensure the alignment of interests between management and shareholders. In the presence of conflicts of interest or if management prioritizes the short-term interests of shareholders, good corporate governance will be unable to moderate the favorable impact of green investment on firm value of shareholders.

6 Conclusion

In light of the findings derived from the analytical research and discourse conducted in the preceding chapter, the inferences that may be articulated regarding the impact of carbon emission disclosure, green innovation, and green investment on corporate value, with well corporate governance serving as a moderating variable, are enumerated as follows:

The quantity of carbon emission disclosure items undertaken by a corporation inversely correlates with the perceived value of that company among investors or shareholders, as this is intrinsically linked to the financial performance of the entity. The depreciation of stock prices in the marketplace transpires because investors perceive that an increase in greenhouse gas emissions disclosure exacerbates the corporation's social responsibility burdens.

Green Innovation has a positive effect on Firm Value. Green innovation in the energy sector shows that the company is committed to sustainability and social responsibility, which is attractive to investors who are concerned about environmental impacts. This increases investor confidence and can attract more capital, which drives firm value higher.

Green Investment has no significant effect on Firm Value. Green energy projects often require large capital upfront, with returns that may not be immediately apparent. As a result, some investors prefer companies that invest in projects that provide quick and stable returns, thus reducing the significant impact of green investment on firm value.

Good Corporate Governance is able to moderate the effect of Carbon Emission Disclosure on Firm Value. GCG strengthens transparency, accountability, and credibility in the disclosure of environment-related information can increase the positive impact of carbon emission disclosure or reduce its negative impact. Good GCG, through principles such as transparency and accountability, ensures that information disclosed by companies, including carbon emission disclosures, is reliable and accurate. When well-governed companies disclose information on carbon emissions, investors are more likely to believe that the data is valid and reflects the company's real efforts to reduce environmental impacts.

Good Corporate Governance is ineffective in moderating the impact of Green Innovation on Firm Value. The principles underpinning Good Corporate Gov-

ernance typically prioritize foundational elements such as transparency, accountability, and comprehensive risk management, rather than exclusively concentrating on green innovation. In essence, while Good Corporate Governance facilitates sound decision-making, its emphasis may lean more towards the overall stability of the organization instead of being specifically directed towards green innovation. This phenomenon renders the moderating effect of Good Corporate Governance on the nexus between green innovation and firm value relatively inconsequential, given that green innovation necessitates a more specialized and technical methodology. The energy sector is profoundly affected by extrinsic factors, including fluctuations in energy prices, governmental policies, and environmental regulations.

Good Corporate Governance is ineffective in moderating the impact of Green Investment on Firm Value. Enterprises within the energy sector frequently prioritize short-term profitability over long-term initiatives. Conversely, Green Investment is typically associated with long-term advantages. Such investments often entail substantial initial expenditures, which may not yield an immediate favorable influence on firm value. If Good Corporate Governance predominantly emphasizes the management of financial risks or the optimization of short-term cost efficiency, it consequently lacks the requisite strength to moderate the correlation between green investment and firm value.

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