THE MEDIATING ROLE OF GREEN INNOVATION AND INVESTOR SENTIMENT IN CLIMATE RELATED RISKS ON SUSTAINABILITY REPORTING: EVIDENCE FROM THE INDONESIAN CONTEXT

a Inova Fitri Siregar, b Tubagus Ismail, c Muhammad Taqi, d Nurhayati Soleha

ABSTRACT

Objective: The purpose of this research is that companies must consider the impact that occurs on transition risks or physical risks and then need to know opportunities in risk mitigation efforts, so that it is hoped that there will be a need for opportunities from risks related to climate change. impact on how investors react and the innovations that will be created.

Methodology: Sample criteria are financial sector companies and companies that have completed sustainability reporting. This research collected 430 data from 740 companies that met the criteria. Data was collected from the 2021-2022 sustainability report.

Results: The results of this analysis provide important insights into the role of green innovation and Investor Sentiment in the relationship between Climate Change Related Risks and sustainability reporting.

Conclusion: These conclusions can help companies understand the factors that contribute to the relationship between Climate-related risks and sustainability reporting, as well as the potential impact of green innovation and investor sentiment. The implementation of sustainability reporting is expected to encourage companies to communicate sustainable practices, environmental performance, social impacts and corporate governance more transparently to stakeholders. This strategy will create a higher level of transparency in the company's operations and impact. There are several important implications for companies and practitioners when designing business strategies that focus on sustainability.

Keywords: climate related risks, sustainability reporting, green innovation, investor sentiment.

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O PAPEL DE MEDIAÇÃO DA INOVAÇÃO ECOLÓGICA E DO SENTIMENTO DOS INVESTIDORES NOS RISCOS RELACIONADOS AO CLIMA EM RELATÓRIOS DE SUSTENTABILIDADE: EVIDÊNCIAS DO CONTEXTO INDONÉSIO

RESUMO

Objetivo: O objetivo desta pesquisa é que as empresas devem considerar o impacto que ocorre nos riscos de transição ou riscos físicos e, em seguida, precisam conhecer oportunidades em esforços de mitigação de riscos, de modo que se espera que haja uma necessidade de oportunidades de riscos relacionados às mudanças climáticas.

Metodologia: Os critérios de amostra são empresas do setor financeiro e empresas que concluíram o relatório de sustentabilidade. A pesquisa coletou 430 dados de 740 empresas que atenderam aos critérios. Foram recolhidos dados do relatório de sustentabilidade de 2021-2022.

Resultados: Os resultados desta análise fornecem informações importantes sobre o papel da inovação ecológica e o sentimento do investidor na relação entre os riscos relacionados às mudanças climáticas e a geração de relatórios de sustentabilidade.

Conclusão: Essas conclusões podem ajudar as empresas a compreender os fatores que contribuem para a relação entre os riscos relacionados ao clima e o relatório de sustentabilidade, bem como o impacto potencial da inovação ecológica e o sentimento dos investidores. Espera-se que a aplicação de relatórios de sustentabilidade incentive as empresas a comunicar às partes interessadas, de forma mais transparente, práticas sustentáveis, desempenho ambiental, impactos sociais e governação empresarial. Essa estratégia criará um nível maior de transparência nas operações e no impacto da empresa. Há várias implicações importantes para empresas e profissionais ao projetar estratégias de negócios que se concentram na sustentabilidade.

Palavras-chave: riscos relacionados ao clima, relatórios de sustentabilidade, inovação verde, sentimento dos investidores.

1 INTRODUCTION

Accountability for reporting currently does not only focus on financial reports, but with the existence of IFRS S1 and S2 which will become effective on January 1 2024, making reporting intentions a very important thing, there are several components that will be covered in this research. The first is how prepared the company is to face the challenges of climate change, what costs it will incur, what strategies to face risk threats so that with this readiness it can meet the needs of meeting and complementing investors' needs.

The impact of climate-related risks is causing a cost of living crisis, where between the cost of living crisis and climate-related risks relates to how climate change can affect people's costs of living and increase existing economic pressures. Climate change, such as more frequent extreme weather due to global warming, can cause damage to crops, infrastructure, and supply chains. This could impact food and energy production,
which in turn could lead to increases in food and fuel prices. This price increase can cause an increase in the cost of living for the community. Climate change could lead to more frequent and severe natural disasters, such as floods, storms, droughts and forest fires, these disasters can damage infrastructure, harm economic businesses, and force the evacuation of residents (Broadbent et al., 2023).

Not only is the cost of living crisis occurring in climate-related risks, but there is also geoeconomic contraction, meaning if a country or region experiences a geoeconomic contraction, such as an economic recession or political conflict (Gede & Wicaksana, n.d.) its ability to address climate-related risks may become limited. Weak economic conditions can hinder a country's ability to invest in climate change adaptation infrastructure or in mitigation programs. Geoeconomic contractions can reduce government budgets for dealing with disasters and climate change adaptation. When the economy weakens, governments may be inclined to cut spending in areas deemed less urgent, including plans and measures to address climate risks. Geoeconomic contraction can mitigate disparities in climate change impacts. The most economically vulnerable communities may also be the most vulnerable to the impacts of climate change (Gill, 2017; Kennedy et al., 2022).

Given the gaps in this research, investors need to be sensitive to long-term decisions, calculate reserves, set the level of cost, and consider the risk of cost requirements caused by climate change risks in order to provide legal certainty and binding force (Mappong, 2023). The latest in this research is that companies must consider the impact that occurs on transition risks or physical and corporate risks and then need to know opportunities in efforts to mitigate risks, so that the need for opportunities from climate-related risks is expected to have an impact on how investors react and the innovation that will be created.

Not only does environmental uncertainty influence sustainability reporting, but climate-related risks are a factor. Because several studies show that companies facing risks related to climate change tend to be more active in reporting disturbing information. A study by Adams, 2016) found that companies in the energy and transportation sectors impacted by climate change were more likely to report on mitigation and adaptation strategies. The study also found that companies that have more diverse boards and more stakeholder committees are more likely to report on climate risks.
The influence of sustainability reporting on climate-related risks can help companies manage environmental risks and increase transparency in sustainability reporting (Nitescu & Cristea, 2020). However, there is still not much research exploring the relationship between sustainability reporting and climate-related risks. This research can help understand whether foliage can help companies cope with environmental conditions and improve operational environmental uncertainty. Environmental uncertainty on investor sentiment Environmental uncertainty can influence investor perceptions of company performance and its impact on stock prices. However, not many studies have examined the relationship between environmental uncertainty and investor sentiment (Bezabih & Sarr, 2013).

Other research by (Hoeipneir & Schneiideir, 2022) shows that companies exposed to higher climate risks tend to be more transparent in reporting desirability information, especially if they operate in sectors highly exposed to such risks. However, other research shows that risks related to climate change can hinder the reporting of climate disruption, research by (Ceres, 2018) shows that many companies in the energy and mineral sectors are not yet able to report risks related to climate change.

With climate change, environmental degradation, environmental damage and scarcity of natural resources are becoming increasingly pressing challenges. In the process of achieving desired goals, innovation is needed which will produce new, green solutions. One of them is through green innovation, companies can reduce negative impacts on the environment and create more sustainable products, services and processes. The reason for using it Green innovation the company in this research is d Reluctant green innovation will have an impact at a high cost (Zhao et al., 2023) then the development and application of technology and Green innovation that can reach businesses and consumers to adopt it (Shahzad et al., 2022).

Green Innovation has an important role in showcasing a company's efforts to reduce its negative impact on the environment and improve its environmental performance (Zhang & Li, 2022). Investor sentiment Refers to investors' views and opinions on the company and desired performance (Dhasmana et al., 2023). With green innovation and investor sentiment in sustainability reporting, it is hoped that it can improve the company's image (Cuomo et al., 2020). Green innovation and green governance can help companies build a positive image in the eyes of investors so as to obtain industrial policy and the dynamic interaction between legal reform and its impact.
on the development of ecological awareness (Dos Santos et al., 2023; Kumar & Dwidvedi, 2023; Wen & Song, 2017).

Additionally, climate-related risks may influence a company's decision to adopt green innovations (Rahman et al., 2022). However, more in-depth research is still needed on the relationship between climate-related risks and green innovation. This research can provide a better understanding of how companies can address climate-related risks to encourage green innovation and deliver greater environmental benefits. Sustainability reporting can help companies manage climate-related risks and increase transparency in ESG performance reporting. However, there is still not much research exploring the relationship between sustainability reporting and climate-related risks. This research can help understand whether outage reporting can help companies address climate-related risks and improve operation.

Climate-related risks can influence investors' perceptions of company performance and its impact on share prices (In et al., 2022). However, not much research has examined the relationship between climate-related risks and Investor sentiment. This research can help understand how climate-related risks can influence investors' perceptions of company performance and their impact on share prices. Sustainability reporting can also influence investors' perceptions of company performance and can influence share prices. However, more in-depth research is still needed on the relationship between sustainability reporting and investor sentiment in the context of climate-related risks. This research can help understand whether desirability reporting can help companies address climate-related risks and improve investor perceptions of company performance. The research question is as follows:

1. Does climate-related risk can positively influence green innovation and investor sentiment and develop a measurement model for climate-related risk scenarios that can minimize the high costs of implementing green innovation.
2. Does Climated Related Risk have a positive influence on Sustainability Reporting

2 THEORETICAL FRAMEWORK

Stakeholder theory is the theory that an organization not only has responsibilities to shareholders, but also to other stakeholders who are involved or have an interest in the organization. Freeman views stakeholders as individuals or groups who can influence or
be influenced by an organization, and who have interests that can be considered in
decision making. Stakeholders may include employees, customers, suppliers,
government, local communities, and the environment.(Freieiman & David, 1983).
Stakeholder theory then developed and was used in various organizational contexts,
including business, government, and non-profit organizations. This theory is becoming
increasingly popular among academics and management practitioners because it can help
organizations consider the interests and needs of all stakeholders in decision making and
business management. Stakeholder theory is a theory that suggests that an organization
must consider the interests and needs of all parties involved or interested in the
organization. These parties include employees, customers, shareholders, suppliers,
government, local communities, the environment, and so on.

Organizations have a responsibility to meet the interests and needs of all
stakeholders, not just shareholders or owners of the organization. By considering the
interests and needs of all stakeholders, organizations can build better relationships with
and minimize conflict or dissatisfaction. In practice, stakeholder theory can be applied in
various aspects of organizations, such as business strategy, decision making, and financial
and non-financial reporting. Organizations can identify key stakeholders, understand
needs and expectations, and build appropriate programs or initiatives to meet those needs
and expectations (Freeman et al., 2010; Laplume et al., 2008).

The principles of stakeholder theory, firstly, cooperation means value is formed
because there are stakeholders who jointly fulfill their needs and desires. Support from
each group is very important for the success of the business. The second is the principle
of complexity, where the main task of management is to determine answers to
fundamental value questions that will possibly bind an organization. The third principle
is sustainable creation where institutions are the source of value creation, meaning that
there is stakeholder cooperation and must provide motivation to create value. the last one
is the principle of emerging competition that competition will emerge from a relatively
free society so that stakeholders have choices (Peng & Isa, 2020; Sacconi, 2011).

Stakeholder theory began to emerge as from (Laplume et al., 2008), analyzes
179 articles on the development of stakeholder theory by Freeman starting from 1984 to
2007. argues that stakeholder theory is a theory that emerged as a result of issues relating
to ethics and morality in an organization, then there were scandals, media reports about
organizational behavior unethical, consumer demands that organizations must be socially
passionate. Stakeholder theory assumes that an organization is not only responsible to its owners, but also to various parties who have an interest in the organization. These stakeholders can include employees, customers, suppliers, society, government, and so on. According to this theory, organizations must consider the interests and needs of all stakeholders in their decision making and operations (Freeman et al., 2010).

2.1 LITERATURE REVIEW

2.1.1 Climate-related risks to green innovation

(Jacobsein, 2013) Study examines investor involvement in changing strategic priorities and balancing financial aspects. The study was conducted in Australia. Return risk implications of climate change. ESG does not provide sufficient legitimacy for environmental coverage of climate change, while climate change is less effective because financial performance will provide relatively more legitimacy to investors. This means that it does not directly provide sufficient legitimacy to enlighten the environment regarding climate change. ESG is a framework used to highlight environmental, social and governance factors in investment and business decision making.

Climate change makes maintenance activities uncertain, so that the impacts and risks received by the company, whatever the factors that create risks will change the climate, to anticipate the near environmental conditions, efforts are made to provide technology or innovation in terms of products produced, activity processes, to adequate service. according to(Li et al., 2018) Factors that determine a company's integration of environmental legitimacy and green innovation and the results of this research show that environmental legitimacy has a significantly negative effect on the possibility of the spread of climate change, one of which is the carbon produced by the company, meaning that environmental legitimacy does not only directly influence the possibility of the company's carbon coverage. However, it will indirectly affect green innovation, because companies must improve informal and formal mechanisms, namely environmental legitimacy, both external and internal.

Li et al.,(2019) developed a study with a focus on green innovation and environmental legitimacy towards climate change, but the follow-up study changed the strengthening or weakening variable in environmental regulation between the environmental management system and green innovation. The results show that the environmental management system consisting of ISO 14001 has a positive impact on
Green Innovation and Environmental Regulation is a strengthening variable. Therefore, companies must seriously implement the system and make a commitment to environmental legitimacy, then the government should not only formulate environmental regulation policies and environmental regulations. Strengthen environmental governance only, but also formulate appropriate fiscal policies and financial policies to motivate and promote investment in innovative resources.

2.1.2 The relationship between Climated related risks to Investor sentiment

G. Wang et al., (2021) This study investigates the relationship between environmental news, investor sentiment and stock returns in China. Using text analysis techniques, develop environmental index media from Chuna's stock market and accounting research database. There is a significant positive relationship between the environment and investor sentiment. (Li et al., 2019) developed a study with a focus on green innovation and environmental legitimacy towards climate change, but the follow-up study changed the strengthening or weakening variable in environmental regulation between the environmental management system and green innovation. The results show that the environmental management system consisting of ISO 14001 has a positive impact on investor sentiment and environmental regulations become a strengthening variable. Therefore, companies must seriously implement the system and make a commitment to environmental legitimacy, then the government should not only formulate environmental regulatory policies and Strengthen environmental governance only, but also formulate appropriate fiscal policies and financial policies to motivate and promote investment in innovative resources.

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2.1.3 The relationship between Climated related risks to sustainability reporting

Continue from the studies carried out (Azapagis, 2004) developed by (O'Dwyer & Uneirman, 2020) This study is motivated by the standard problematic of TCFD, namely (task force on Climate-related Financial Disclosure) and looks at how academic research
contributes, using the TCFD Disclosure approach, namely monitoring risks and opportunities, strategies for long-term climate-related risks and opportunities, management. TCFD implements preparatory forums for the oil and gas, electric utilities, and chemical sectors, bringing together leading companies to discuss accounting and deployment practices. As global temperatures increase, the intensity of extreme weather increases and climate change generally has a significant impact on operations and business models in these sectors, these sectors are often considered to have high financial risks related to climate change.

2.1.4 The relationship between Green Innovation and sustainability reporting

According to Li et al., (2018) Factors that determine a company's integration of environmental legitimacy and green innovation and the results of this research show that environmental legitimacy has a significantly negative effect on the possibility of the spread of climate change, one of which is the carbon produced by the company, meaning that environmental legitimacy does not only directly influence the possibility of the company's carbon coverage, However, it will indirectly affect green innovation, because companies must improve informal and formal mechanisms, namely environmental legitimacy, both external and internal.

2.1.5 The relationship between investor sentiment towards sustainability reporting

According to Keileiš & Ceitin, (2018), the result is that market returns will be lower after a period of high sentiment. Using stakeholder theory, if sentiment leads to overvaluation, sentiment-sensitive stocks will produce lower returns when sentiment changes. According to Keles, unstable stocks will lead to lower returns in accordance with higher sentiment in the previous period. When sentiment is high socially poor companies earn lower returns, especially taking environmental issues into account.

Study developed by Chein & Yang, (2020) that investors show an optimistic response to good news about companies with higher ESG scores, but give a pessimistic response to bad news about companies with lower ESG scores. Then ESG strategies can generate large profits in the short term, and will result in investors overreacting to environmental rather than social and governance factors. The differences in study results relate to investors' reactions to good (positive) news and bad (negative) news regarding the implementation of environmental, social and governance activities.
3 METHODOLOGY

The data collection method used in this study is to use secondary data. Based on data obtained from companies listed on the Indonesia Stock Exchange in 2021–2022, it is known that the number of companies listed on the Indonesia Stock Exchange is 430, hypothesis testing based on regression analysis, which is one of the tools that can be used to assist a researcher in drawing conclusions on hypotheses and statistical statements regarding the parameters of a population, and data analysis tools using Smart PLS (Kautsarina et al., 2020; Mikkelsen, 2012)

3.1 INDEPENDENT VARIABLE

Climate-related risks are risks associated with climate change and its impact on various sectors, systems or assets. These risks include those arising from physical changes such as extreme weather, sea level rise, and changes in rainfall patterns, as well as transition risks associated with the shift to a low-carbon economy such as policy changes, technological advances, and market changes. Where there is disclosure of information relating to climate-related risks consisting of physical risks, transition risks, regulatory risks. The measurements used are related to cash flow simulations (Revenue, Capital Expenditures, being a financial risk assessment) in climate-related risk scenarios (In et al., 2022)

3.2 VARIABLE DEPENDENCY

Sustainability reporting focus on issues relevant to sustainable, such as environmental protection, human rights protection, community engagement, risk management, sustainable innovation, and socio-economic impact. It includes information about a company's efforts to manage environmental risks, promote ethical business practices, improve environmental performance, manage supply chains responsibly, and contribute to sustainable development. The measurement used is using GRI G4. The number of items reported is in the GRI G4 item count section

3.3 MEDIATION VARIABLES

The first mediating variable is green innovation, Green innovation focus on reducing negative impacts on the environment, such as greenhouse gas emissions, air and air pollution, waste, and degradation of natural resources. This basic concept drives the
development of green technologies and practices to reduce human ecological footprint and the development of green technologies and practices consisting of products, services and processes. The measurement used is the natural logarithm of 1 which is added to the green patents owned by the Company (J. Wang et al., 2023). The second mediating variable is investor sentiment. Investor sentiment refers to the collective attitude or perception of investors towards financial market conditions or certain assets. It reflects investors' beliefs, hopes and emotions regarding the direction and prospects of investment. Investor sentiment can range from high optimism to extreme pessimism, and can influence individual investment decisions and overall market movements. Investor sentiment is a potential indicator for understanding and predicting market movements from investor behavior. The measurement used is the market to book ratio.

4 RESULTS AND DISCUSSION

Descriptive statistical analysis is used to describe data seen from the maximum value, minimum value, average value (mean), and standard deviation value, from the ESG (X1), Climate related risk (X2), Green Innovation (M1) variables., Investor Sentiment (M2) and Sustainability Reporting (Y).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Means</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate-Related Risks</td>
<td>0.0013</td>
<td>32947.2328</td>
<td>128.8951</td>
<td>1634.0483</td>
</tr>
<tr>
<td>Green Innovation</td>
<td>0.0000</td>
<td>147.0000</td>
<td>10.6129</td>
<td>16.2265</td>
</tr>
<tr>
<td>Investor Sentiment</td>
<td>0.0000</td>
<td>8.6075</td>
<td>0.0515</td>
<td>0.4725</td>
</tr>
<tr>
<td>Sustainability Reporting</td>
<td>0.2637</td>
<td>0.8242</td>
<td>0.6112</td>
<td>0.0872</td>
</tr>
</tbody>
</table>

Source: Prepare by author (2023)

Based on Table 4.1, the minimum value of Climate-Related Risks is 0.0013, with the maximum value 32947. Average Climate-Related Risks is 128.8951, with standard deviation 1634.0483. The minimum knowledge value of Green Innovation (M1) is 0.0000, with a maximum value of 147.0000. The average Green Innovation (M1) is 10.6129, with a standard deviation of 16.2265. The minimum knowledge value of Investor Sentiment (M2) is 0.0000, with a maximum value of 8.6075. Average Investor Sentiment (M2) is 0.0515, with a standard deviation of 0.4725. The minimum knowledge value of Sustainability Reporting (Y) is 0.2637, with a maximum value of 0.8242. The average Sustainability Reporting (Y) is 0.6112, with a standard deviation of 0.0872.
4.1 EXTERNAL MODEL EVALUATION

Convergent validity is part of the measurement model which in SEM-PLS is usually called the outer model, while in covariance-based SEM it is called confirmatory factor analysis (CFA) (Mahfud and Ratmono, 2013: 64). There are two criteria to assess whether the external model (measurement model) meets the convergent validity requirements for reflective constructs, namely (1) loadings must be above 0.7 and (2) the p value is significant (<0.05) (Rambut et al. in Mahfud and Ratmono, 2013:65). However, in some cases, the loading requirement above 0.7 is often not met, especially for newly developed questionnaires. Therefore, loadings between 0.40-0.70 must still be considered to be maintained (Mahfud and Ratmono, 2013:66).

Indicators with loadings below 0.40 should be removed from the model. However, for indicators with loadings between 0.40 and 0.70, we should analyze the impact of the decision to delete the indicator on average variance extracted (AVE) and Composite Reliability. We can delete indicators with loadings between 0.40 and 0.70 if the indicator can increase the average variance extracted (AVE) and Composite Reliability above its threshold (Mahfud and Ratmono, 2013: 67). The AVE cutoff value is 0.50 and the composite reliability is 0.7. Another consideration in removing indicators is the impact on the content validity of the construct. Indicators with small loadings are sometimes retained because they contribute to construct content validity (Mahfud and Ratmono, 2013: 67).

Table 4.3 Validity Testing based on Outer Loading

<table>
<thead>
<tr>
<th></th>
<th>Climate-Related Risks</th>
<th>Green Innovation</th>
<th>Investor Sentiment</th>
<th>Sustainability Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>1,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td></td>
<td>1,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td></td>
<td></td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td></td>
<td></td>
<td></td>
<td>1,000</td>
</tr>
</tbody>
</table>

Source: Prepare by author (2023)

Figure 1. Path coefficients

Source: Prepare by author (2023)
Based on testing the validity of the outer loading in Table 4.3 and Figure 4.1, it is known that the value of the entire outer loading is > 0.7, which means it has met the validity requirements based on the loading value. Next, validity testing was carried out based on the average variance extract (AVE) value.

**Table 4.4 Validity Testing based on Average Variance Extracted (AVE)**

<table>
<thead>
<tr>
<th></th>
<th>Average Variance Extracted (AVE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate-Related Risks</td>
<td>1.000</td>
</tr>
<tr>
<td>Green Innovation</td>
<td>1.000</td>
</tr>
<tr>
<td>Investor Sentiment</td>
<td>1.000</td>
</tr>
<tr>
<td>Sustainability Reporting</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Source: Prepare by author (2023)

The recommended AVE value is above 0.5 (Mahfud and Ratmono, 2013:67). Knowing that all AVE values are > 0.5, which means that they have met the validity requirements based on AVE. Next, reliability testing is carried out based on the Composite Reliability (CR) value.

**Table 4.5 Reliability Testing based on Composite Reliability (CR)**

<table>
<thead>
<tr>
<th></th>
<th>Composite Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate-Related Risks</td>
<td>1.000</td>
</tr>
<tr>
<td>Green Innovation</td>
<td>1.000</td>
</tr>
<tr>
<td>Investor Sentiment</td>
<td>1.000</td>
</tr>
<tr>
<td>Sustainability Reporting</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Source: Prepare by author (2023)

The recommended CR value is above 0.7 (Mahfud and Ratmono, 2013:67). Knowing that all CR values are > 0.7, which means they have met the reliability requirements based on CR. Next, reliability testing was carried out based on the Cronbach's alpha (CA) value.

**Table 4.6 Reliability Testing based on Cronbach's Alpha (CA)**

<table>
<thead>
<tr>
<th></th>
<th>Cronbach's Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate-Related Risks</td>
<td>1.000</td>
</tr>
<tr>
<td>Green Innovation</td>
<td>1.000</td>
</tr>
<tr>
<td>Investor Sentiment</td>
<td>1.000</td>
</tr>
<tr>
<td>Sustainability Reporting</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Source: Prepare by author (2023)
In discriminant validity testing, the AVE square root value of a latent variable is compared with the correlation value between that latent variable and other latent variables. It is known that the square root value of AVE for each latent variable is greater than the correlation value between that latent variable and other latent variables. So the conclusion meets the requirements for discriminant validity.

Based on the results of discriminant validity testing using the HTMT approach, it is known that all values are <0.9, which means the conclusion meets the discriminant validity requirements based on the HTMT approach.

### 4.2 EFFECT SIGNIFICANCE TEST (BOOSTRAPPING) (HYPOTHESIS TEST) (INNER MODEL)

Table 4.9 Path Coefficient Test & Significance of Direct Effect

<table>
<thead>
<tr>
<th></th>
<th>Original Sample (O)</th>
<th>Sample Mean (M)</th>
<th>Standard Deviation (STDEV)</th>
<th>T statistics ([O/STDEV])</th>
<th>P value</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate-Related Risks -&gt; Sustainability Reporting</td>
<td>0.053</td>
<td>0.049</td>
<td>0.031</td>
<td>1.691</td>
<td>0.046</td>
<td>Supported</td>
</tr>
<tr>
<td>Eco-Friendly Innovation -&gt; Sustainability Reporting</td>
<td>0.081</td>
<td>0.081</td>
<td>0.056</td>
<td>1.532</td>
<td>0.047</td>
<td>Supported</td>
</tr>
<tr>
<td>Climate-Related Risks -&gt; Investor Sentiment</td>
<td>-0.005</td>
<td>-0.010</td>
<td>0.007</td>
<td>0.617</td>
<td>0.269</td>
<td>Rejected</td>
</tr>
<tr>
<td>Climate-Related Risks -&gt; Eco-Friendly Innovations</td>
<td>-0.012</td>
<td>-0.002</td>
<td>0.047</td>
<td>0.259</td>
<td>0.398</td>
<td>Rejected</td>
</tr>
<tr>
<td>Investor Sentiment -&gt; Sustainability Reporting</td>
<td>0.003</td>
<td>-0.012</td>
<td>0.053</td>
<td>0.050</td>
<td>0.480</td>
<td>Rejected</td>
</tr>
</tbody>
</table>

Source: Prepare by author (2023)
Based on the results in table 4.9 the results obtained:

Climate-related risk has a significant effect on sustainability reporting (y), with p-values = 0.046 < 0.05 (hypothesis accepted). The results of statistical analysis show that the relationship between climate-related risk and sustainability reporting has a significant influence. A P-value of less than 0.05 indicates that there is strong statistical evidence to support the hypothesis that this relationship did not occur by chance.

In this context, it can be concluded that climate-related risks have a significant impact on permit permits. This could mean that companies or entities experiencing climate-related risks are more likely to actively report on their shutdown efforts or integrate climate issues into subscription reports.

Green innovation (m1) has no significant effect on sustainability reporting (y), with p-values = 0.076 > 0.05 (hypothesis accepted). The results of statistical analysis show that green innovation (sustainable innovation) in this context, which is represented as m1, does not have a significant influence on sustainability reporting, with a p-value of 0.076 which is greater than the generally used significance level, namely 0.05. Therefore, the hypothesis which states that there is a significant influence of green innovation on sustainability reporting (h0: m1 has no significant effect on y) is accepted.

This means that based on the data and statistical analysis carried out, there is not enough strong evidence to support the claim that green innovation significantly affects demand in the context of your research. However, keep in mind that these results depend on the data and methodology used in your analysis, and there are many other factors that can influence the relationship between green innovation and sustainability reporting in various situations.

Climate-related risk has no significant effect on investor sentiment, with p-values = 0.269 > 0.05 (hypothesis rejected). The results of statistical analysis show that there is no significant influence between climate-related risks and investor sentiment with a p-value of 0.269 which is greater than the generally used significance level, namely 0.05. Therefore, in this context, the hypothesis which states that there is a significant influence between climate-related risks and investor sentiment (h0: climate-related risks have a significant effect on investor sentiment can be rejected.

This means that, based on the data and statistical analysis conducted, there is not strong enough evidence to support the claim that climate-related risks significantly influence investor sentiment in the case under scrutiny. These results suggest that in the
samples or situations analyzed, climate-related risks may not have a significant impact on how investors evaluate or value investments.

Climate-related risks have no significant effect on green innovation (m1), with p-values = 0.398 > 0.05 (hypothesis rejected). The results of statistical analysis show that there is no significant influence between climate-related risks (climate-related risks) and green innovation (sustainable innovation), with a p-value of 0.398 which is greater than the generally used significance level, namely 0.05. Therefore, in this context, the hypothesis which states that there is a significant influence between climate-related risks and green innovation (h0: climate-related risks have a significant effect on m1) can be rejected.

This means that, based on the data and statistical analysis conducted, there is not strong enough evidence to support the claim that climate-related risks significantly influence the level of sustainable innovation in the overall case. These results suggest that in a sample or situational analysis, climate-related risks may not have a significant impact on sustainable innovation efforts. Investor sentiment has no significant effect on sustainability reporting (y), with p-values = 0.480 > 0.05 (hypothesis rejected).

The results of statistical analysis show that there is no significant influence between investor sentiment (investor sentiment) and sustainability reporting (reporting interest), with a p-value of 0.480 which is greater than the generally used significance level, namely 0.05. Therefore, in this context, the hypothesis which states that there is a significant influence between investor sentiment and sustainability reporting (h0: investor sentiment has a significant effect on y) can be rejected.

This means that, based on the data and statistical analysis carried out, there is not strong enough evidence to support the claim that investor sentiment significantly influences the level of permit applications in careful cases. These results indicate that in the sample or situation analyzed, investor sentiment may not have a significant impact on the company's efforts to report existing information.

<table>
<thead>
<tr>
<th>Table 4.10 R-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R square</strong></td>
</tr>
<tr>
<td>Green Innovation</td>
</tr>
<tr>
<td>Investor Sentiment</td>
</tr>
<tr>
<td>Sustainability Reporting</td>
</tr>
</tbody>
</table>

Source: Prepare by author (2023)
The R-Square value of Green Innovation is 0.077, which means that ESG and Climate related risk are can to explain or influence Green Innovation (M1) by 7.7%. The R-Square value is a statistical measure used in regression analysis to measure the extent to which independent variables are able to explain or influence the dependent variable Green Innovation. In this context, an R-Square value of 0.077 means that Climate related risk together are able to explain or influence Green Innovation 7.7%. In other words, around 7.7% of the variations or changes that occur in Green Innovation can be explained by variations Climate related risk.

Although this R-Square value indicates a relationship between the independent variables and the dependent variable, most of the variation in Green Innovation remains unexplained by ESG and Climate related risk. This shows that there are other factors that also influence the Green innovation.

The R-Square value of Investor Sentiment is 0.004, which means and Climate related risk are able to explain or influence Investor Sentiment 0.4%, the R-Square value is a statistical measure used in regression analysis to measure the extent to Climate related risk are able to explain or influence investor Sentiment. In this context, an R-Square value of 0.004 means that and Climate related risk together are only able to explain or influence Investor sentiment 0.4%. In other words, only about 0.4% of the variations or changes that occur in Investor Sentiment can be explained by variations in Climate related risk. These results indicate that there are other factors that are more dominant or significant in influencing Investor sentiment that are not included in your model analysis. These factors may vary from situation to situation and may need to be identified and included in further analysis to better understand what influences Investor sentiment.

The R-Square value of Sustainability Reporting is 0.026, which means Climate related risk, Green Innovation, Investor sentiment are able to explain influence sustainability reporting 2, 6%. In this context, an R-Square value of 0.026 means that Climate related risk, Green innovation, and Investor sentiment together are only able to explain or influence sustainability reporting 2.6%. In other words, around 2.6% of the variations or changes that occur in sustainability reporting can be explained by variations in Climate related risk, Green innovation, and Investor sentiment.

These results indicate that, even though all independent variables have been included in the analytical model, most of the variation in Sustainability reporting remains unexplained by the combination of these variables. This indicates that there are other
factors that also influence Sustainability Reporting that are not included in your analysis model. These factors may include broader contexts or specific aspects that have not been considered in your research.

<table>
<thead>
<tr>
<th>Table 4.13 Mediation Testing</th>
<th>Original Sample (O)</th>
<th>Sample Mean (M)</th>
<th>Standard Deviation (STDEV)</th>
<th>T statistics (O/STDEV)</th>
<th>P value</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate-Related Risks -&gt; Eco-Friendly Innovation -&gt; Sustainability Reporting</td>
<td>0.001</td>
<td>0.000</td>
<td>0.004</td>
<td>0.229</td>
<td>0.410</td>
<td>Rejected</td>
</tr>
<tr>
<td>Climate-Related Risks -&gt; Investor Sentiment -&gt; Sustainability Reporting</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.016</td>
<td>0.494</td>
<td>Rejected</td>
</tr>
</tbody>
</table>

Source: Prepare by author (2023)

Based on the results of mediation testing: Green innovation does not significantly mediate the relationship between climate-related risks and sustainability reporting, with P-Values = 0.410 > 0.05 (Mediation Hypothesis Rejected). The results of statistical analysis show that green innovation as a mediator does not have a significant influence in explaining the relationship between climate-related risks and sustainability reporting. The P-value of 0.410 which is greater than the generally used significance level, namely 0.05, indicates that the mediation hypothesis which states that green innovation mediates the relationship between climate-related risks and sustainability reporting can be rejected.

This means that, in the context in this research, green innovation does not have a significant role as a mediator in linking the influence of climate-related risks on sustainability reporting. These results suggest that although there is a relationship between climate-related risks and sustainability reporting, green innovation does not serve as a significant link or through which mechanisms related risks influence on sustainability reporting.

Green innovation does not significantly mediate the relationship between Climate related risk and Sustainability reporting, with P-Values = 0.060 > 0.05 mediation hypothesis rejected, the results of statistical analysis show that green innovation as a mediator does not have a significant influence in explaining the relationship between sustainability reporting. This means that, in the research context, green innovation does not have a significant role as a mediator in linking the influence of climate related risk on sustainability reporting. These results suggest that although there is a relationship between Climate related risk and sustainability reporting, green innovation does not serve as a significant link or mechanism through which climate related risk.
Investor sentiment does not significantly mediate the relationship between climate-related risks and sustainability reporting, with P-Values = 0.494 > 0.05 mediation hypothesis rejected. The results of statistical analysis show that investor sentiment (investor sentiment) as a mediator does not have a significant influence in explaining the relationship between climate-related risks and sustainability reporting. The P-value of 0.494 which is greater than the generally used significance level, namely 0.05, indicates that the mediation hypothesis which states that investor sentiment mediates the relationship between climate-related risks and sustainability reporting can be rejected. This means that, in the context of this research, investor sentiment does not have a significant role as a mediator in linking the influence of climate-related risks on sustainability reporting. These results suggest that although there is a relationship between climate-related risks and sustainability reporting, investor sentiment does not function as a significant relationship or through which mechanism climate-related risks interfere with sustainability reporting.

The results of statistical analysis show that the relationship between climate-related risk and sustainability reporting has a significant influence. A P-value of less than 0.05 indicates that there is strong statistical evidence to support the hypothesis that this relationship did not occur by chance. In this context, it can be concluded that climate-related risks have a significant impact on permit permits. This could mean that companies or entities experiencing climate-related risks are more likely to actively report on their shutdown efforts or integrate climate issues into sustainability reports.

The results of statistical analysis show that there is no significant influence between climate-related risks and investor sentiment, with a p-value of 0.269 which is greater than the generally used significance level, namely 0.05. Therefore, in this context, the hypothesis which states that there is a significant influence between climate-related risks and investor sentiment can be rejected. This means that, based on the data and statistical analysis conducted, there is not strong enough evidence to support the claim that climate-related risks significantly influence investor sentiment in the case under scrutiny. These results suggest that in the samples or situations analyzed, climate-related risks may not have a significant impact on how investors evaluate or value investments.

The results of statistical analysis show that there is no significant influence between climate-related risks and green innovation with a p-value of 0.398 which is greater than the generally used significance level, namely 0.05. Therefore, in this context,
the hypothesis which states that there is a significant influence between climate-related risks and green innovation Climate-related risks have a significant effect on can be rejected. This means that, based on the data and statistical analysis conducted, there is not strong enough evidence to support the claim that climate-related risks significantly influence the level of sustainable innovation in the overall case. These results suggest that in a sample or situational analysis, climate-related risks may not have a significant impact on sustainable innovation efforts. The results of statistical analysis show that there is no significant influence between investor sentiment and sustainability reporting with a p-value of 0.480 which is greater than the generally used significance level, namely 0.05. Therefore, in this context, the hypothesis which states that there is a significant influence between investor sentiment and sustainability reporting be rejected. This means that, based on the data and statistical analysis carried out, there is not strong enough evidence to support the claim that investor sentiment significantly influences the level of permit applications in careful cases. These results indicate that in the sample or situation analyzed, investor sentiment may not have a significant impact on the company's efforts to report existing information.

Green innovation does not mediate sustainability reporting due to different roles in the process. Green innovation creates innovative solutions to reduce environmental impacts, while sustainability reporting helps companies measure, report, and communicate about their impact on overall sustainability. Investor sentiment may affect the share price of a company in the short term, but sustainability reporting provides a more detailed understanding of a company's sustainability practices in the long term. Sustainable and sustainability-oriented investments often require a deeper understanding of sustainability practices.

5 CONCLUSION

5.1 LIMITATIONS AND FUTURE RESEARCH

A limitation of this research is that the impacts of climate change and sustainability reporting practices may vary by industry sector and geographic location. Research may need to consider differences in firms' responses to climate change across industries and countries. Climate change is a process that takes place over a long period of time. Research that only looks at short-term periods may not be able to capture the long-term impacts of climate change on sustainability reporting.
Research may not fully consider the factors that influence sustainability reporting. For example, economic, social, political, or government regulatory factors can also have a significant impact on licensing practices. Measuring variables such as climate change, sustainability reporting, and potential mediators such as growth innovation or innovation itself can be challenging. Different measures may produce different results. Although researchers may find a link between climate change and sustainability reporting, it can clearly be difficult to find a cause. Their factors or meddling variables that are not well thought out may influence this relationship. This research may be subject to sample selection bias or unavoidable environmental influences. This can have an impact on the generalizability of a larger population. Climate change can produce unexpected effects such as natural dissipation or sudden climate change that are difficult to incorporate into the analysis.
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