

## The Complexity of the Company Moderates the Relationship between Good Corporate Governance and Green Intellectual Capital with Sustainability Performance.

Anggun Anggraini<sup>1</sup>, Holiawati<sup>2</sup>, Endang Ruhiyat<sup>3</sup>

<sup>1,2,3</sup>Pamulang University

---

**ABSTRACT:** This study aims to test and analyze company complexity moderates the relationship between good corporate governance and green intellectual capital with sustainability performance in industrial companies listed on the Indonesia Stock Exchange, for the period 2017 to 2021. This type of research is quantitative research using secondary data. The data analysis method is panel data regression test using Microsoft Excel and Eviews 9 applications. The population in this study is all industrial companies listed on the Indonesia Stock Exchange in the period 2017 to 2021. The data collection technique in this study was purposive sampling technique, with the results of 50 research populations in 30 research samples processed in this study. The results showed that company complexity moderates the relationship between good corporate governance and green intellectual capital, simultaneously with sustainability performance in industrial firms from 2017 to 2021. While partially, good corporate governance has a positive effect on sustainability performance, green intellectual capital has a positive effect on sustainability performance, company complexity strengthens the relationship between good corporate governance and sustainability performance, company complexity weakens the relationship between green intellectual capital and sustainability performance.

**KEYWORDS:** Good corporate governance; Green intellectual capital; Company Complexity; Sustainability performance

---

### INTRODUCTION

Fajriyanti (2021) In the face of increasingly fierce business competition, companies must demonstrate their ability to increase and sustain the value that exists within them. One of them is business continuity. An important step to ensure business continuity is to report on its continuity. Sustainability reporting is increasingly required by regulators, investors and other stakeholders. A focus on transparency and understanding of a company's reporting strategy can promote progress, attractiveness and economic growth, as well as increase trust and help markets function more efficiently.

Addressing social, environmental, and economic elements is the goal of overall corporate management performance, particularly corporate sustainability performance (Epstein et al., 2003; Holiawati, 2020). Increasing and significant developments and advancements are creating competition in the business world. As a result, regulators and stakeholders increasingly require companies to demonstrate their performance in order to maintain and enhance corporate value (Hanifah et al., 2018).

From January to November 2020, industrial exports amounted to US\$118.24 billion, slightly higher than the same period in 2019, and the trade balance recorded a surplus of US\$13.13 billion. Food and beverages, basic metals, chemicals, pharmaceuticals and traditional medicines, metal products, computers, electronics, optical and electrical products, and textiles and apparel are the industrial sub-sectors with the highest export value. This is due to the fact that during the COVID-19 pandemic, many countries imposed lockdown policies, which prevented many companies in those countries from operating. As a result, Indonesia was able to sell its products to other countries.

Among the factors that can influence the company's sustainability performance is good corporate governance. The most important aspect of achieving corporate sustainability performance is good corporate governance (Moeljadi et al, 2021; Holiawati, 2020). Good corporate governance helps to create an environment that is conducive to efficient and sustainable growth in all areas of the company (Siswanti et al, 2017). Corporate governance is understood as an important element in achieving growth in corporate performance, which allows to increase investor confidence, which will have an impact on corporate sustainability (Aras et al, 2008; Holiawati, 2020). Holiawati et al, (2020) in their research found that corporate governance has a positive impact on corporate sustainability performance. These results indicate that the governance carried out by the company is considered as a control carried out by the management, if corporate governance is carried out properly, it will result in the implementation of sustainability performance is also carried out properly. In order to achieve the survival of the company, in this case an industrial company,

## **The Complexity of the Company Moderates the Relationship between Good Corporate Governance and Green Intellectual Capital with Sustainability Performance.**

stakeholder support is needed. Companies do not operate for their own interests, so companies must provide benefits to stakeholders to gain their support. In stakeholder theory, the position of stakeholders is considered as the party with the most power in the company, so the main consideration for companies in deciding whether or not to disclose information in the financial statements is stakeholders.

Another factor affecting sustainability performance is green intellectual capital, which can be seen from previous research on intellectual capital, this study proposes a novel new construction - green intellectual capital - in accordance with the awareness trend of strict international environmental regulations and the popular environmental awareness of consumers in the world. Green intellectual capital is an intangible asset in the form of information resources, innovation, and knowledge that can improve sustainability performance while protecting the environment and improving competitiveness (Yusliza et al., 2019). In addition, according to previous research on the classification of intellectual capital, this intellectual capital research is classified into three types: green human capital, green structural capital, and green relationship capital (Wang et al, 2021). Signaling theory states that in situations where there is asymmetric information between the parties involved, the party with more information can send signals or signs to other parties to influence their perception or interpretation of the information. This can affect stakeholders' perceptions and beliefs towards the company, which in turn can affect their decisions to invest, buy products, or interact with the company. The signals sent by green intellectual capital can strengthen the company's image as a player committed to sustainability (Ulum, 2017). Rukmana et al, (2017) The complexity of the company is related to the complexity of transactions in the company. This complexity may result from transactions involving foreign currencies, the number of subsidiaries and branches of the company, and the presence of foreign operations. Corporate complexity is used in this study as a moderating variable that links good corporate governance and green intellectual capital with sustainability performance. Organizational or operational complexity results from the formation of departments and divisions of labor that focus on a number of different entities. Increasingly complex interdependencies occur when organizations with different types or numbers of jobs and units cause more complicated organizational problems (Yuliandari et al., 2017). Complexity in this study is viewed from the business units in an organization. Complexity theory recognizes that modern business systems are complex entities, where internal and external factors are interrelated and influence each other. A business segment refers to a part or business unit that operates within a larger company. A company may have several different business segments, each with unique characteristics, challenges, and opportunities (Porter, 2010).

Researchers chose industrial companies listed on the Indonesia Stock Exchange as research objects because, based on OJK data as of 2016, only about 9% of all public companies listed on the IDX have published sustainability reports that refer to GRI standards. In addition, industrial companies have a high number of operations, namely the production process, the purchase of raw materials, processing to the sale of products. The number of complex operational activities allows high risks, so it is also necessary to see good corporate governance and green intellectual capital in the company. In addition, it is also to strengthen in seeing the sustainability performance of the company, especially in the social and environmental perspective, as it is known that the activities in the above industry are related to the environment and social. Based on the above background, the formulation of this research is whether company complexity moderates the relationship between good corporate governance and green intellectual capital with sustainability performance. The purpose of this study itself is to analyze and provide empirical evidence that Company Complexity Moderates the Relationship between Good Corporate Governance and Green Intellectual Capital with Sustainability Performance.

### **LITERATURE REVIEW**

Jensen and Meckling (1976) define an agency relationship as a contract in which one or more principals (owners) hire others (agents) to perform some services for their benefit by delegating some decision-making authority to the agent. Holiawati, (2020) Agency theory is related to good corporate governance. Good corporate governance as the effectiveness of mechanisms aimed at minimizing agency conflicts and is one of the key elements in improving economic efficiency, which includes the relationship between the board of commissioners, company management and shareholders.

Signalling Theory was first proposed by Spence (1973), which explains that the sender (owner of information) provides a signal or signal in the form of information that reflects the condition of a company that is beneficial to the receiver (investor). Signaling theory basically emphasizes the principle of reducing information asymmetry between the management of a company and its stakeholders (Ulum, 2017). Signaling Theory is related to green intellectual capital, which is classified into green human capital, green structural capital, and green relational capital. If the company is able to fully disclose information about the company's condition, including its human resource capabilities, it will be able to increase public trust in the company and ensure its business sustainability. (Josephine et al, 2020).

### **Sustainability Performance**

Aras & Crowther (2008) Sustainability performance is a concept in business management. This concept encompasses sustainable development and recognizes and incorporates environmental and social issues into the strategic planning of the company.

# **The Complexity of the Company Moderates the Relationship between Good Corporate Governance and Green Intellectual Capital with Sustainability Performance.**

## **Good corporate governance**

Puspitasari, R, et al (2023) Good Corporate Governance is defined as a company's internal control system that achieves its business objectives by safeguarding the company's assets and increasing the value of shareholders' investment in the long term.

## **Green Intellectual Capital**

**Chen (2008) Green** intellectual capital reflects the intangible assets owned by the company, including knowledge, wisdom, experience and innovation in the field of environmental protection.

## **Company complexity**

Rukmana et al. (2017) Company complexity is related to the complexity of transactions in the company. It may result from transactions involving foreign currencies, the number of subsidiaries, branches, and the presence of foreign operations.

Trihandayani (2016). Corporate governance is a principle that directs and controls the company to achieve a balance between the company's strength and balance in providing accountability to stakeholders and shareholders. (Holiawati et al., 2020) with the title risk management, corporate governance and corporate sustainability performance. The results showed that corporate governance has a positive effect on the sustainability performance of the company. These results indicate that the governance carried out by the company is considered as a control carried out by the management, if corporate governance is carried out properly, it will result in the implementation of the company's sustainability performance is also carried out properly. The results of this study support the agency theory, the emergence of conflicts of interest in the agency theory can be reduced by the implementation of good corporate governance, namely by managers will convince investors that management will provide returns for them, also convince that management will not commit fraud or invest in projects that are not profitable for investors in connection with the funds they invest (Holiawati et al, 2020). Based on the theory and previous research, the research hypothesis can be formulated as follows:

**H1 : It is hypothesized that good corporate governance has a positive effect on sustainability performance.**

Chen (2008). Green intellectual capital is to incorporate environmental concepts into intellectual capital to make up for the shortcomings of previous environmental issues. Green intellectual capital reflects the intangible assets owned by the company, including knowledge, wisdom, experience and innovation in the field of environmental protection (Chen, 2008). (Josephine et al, 2020). Effect of green intellectual capital on business sustainability. The results of this study prove that only GHC and GRC have a positive impact on business sustainability. If good employee management and improving relationships with consumers, suppliers and other working partners (stakeholders) are important things for companies to do. This can be the company's main source of strength to be able to win the competition in the business world by not neglecting the welfare of the environment in which the company operates. The results of this study support the signaling theory, which shows that information asymmetry can be overcome if the party with information can send positive signals to related parties. A signal can indicate the quality of the sender. If the company provides complete information about the company's condition, it will send a signal to stakeholders to increase public trust in the company. This trust will be the basis for ensuring the business sustainability of a company. Complete information can be disclosed by the company through voluntary disclosure. Voluntary disclosure becomes valuable when the company is able to manage all its resources properly and report them in this disclosure (Josephine et al, 2020). Based on the theory and previous research, the research hypothesis can be formulated as follows:

**H2: It is hypothesized that green intellectual capital has a positive effect on sustainability performance.**

Company complexity is part of the auditor's considerations before conducting an audit (Rukmana et al., 2017). The results of the research (Mappamiring, 2015) are that corporate governance positively affects the sustainability performance of banks and company complexity plays a positive role as a moderating variable between corporate governance and sustainability performance measured by the number of business segments. Business segments refer to business units or specific parts of a company. Each business segment may have a different impact on sustainability performance. Therefore, it is important to analyze and manage the environmental, social, and economic impacts of each business segment to achieve better overall sustainability performance. The complexity of the company is part of the auditor's considerations before conducting an audit (Rukmana et al., 2017). The results of the research (Mappamiring, 2015) are that corporate governance positively affects the sustainability performance of banks and company complexity plays a positive role as a moderating variable between corporate governance and sustainability performance measured by the number of business segments. The level of complexity of a company can influence the extent to which GCG contributes to sustainability performance. More complex companies need to develop GCG approaches that are more flexible and appropriate to the characteristics and challenges of each business segment. By understanding and considering company complexity as a moderating factor, companies can identify challenges and opportunities related to GCG and sustainability performance in the context of company uniqueness. (M. Eisenhardt, et al. 2011). Complexity Theory, also known as complexity strategy or complex adaptive organization, is a theory that addresses complexity systems in the field of strategic management and organizational studies. Complexity theory recognizes that modern business systems are complex entities in which internal and external factors are

# The Complexity of the Company Moderates the Relationship between Good Corporate Governance and Green Intellectual Capital with Sustainability Performance.

interrelated and influence each other. Good Corporate Governance (GCG) includes frameworks and practices designed to ensure that companies are run in an ethical, transparent and accountable manner. GCG focuses on how a company manages its operations. Sustainability performance refers to a company's ability to achieve balanced economic, social and environmental goals over the long term. complexity theory can help understand the complex interactions between business segments, GCG and sustainability performance. This can provide guidance for companies to identify important factors that influence this relationship and develop appropriate strategies to strengthen the link between GCG and sustainability performance in each business segment. Based on the theory and previous research, the following research hypothesis can be formulated:

**H3 : It is hypothesized that company complexity moderates the relationship between good corporate governance and sustainability performance.**

Cristansy, et al. (2018) The complexity of a company can be seen in the number of industry segments. The larger the company, the more industry segments it has. As the company becomes larger and more numerous, the labor required also increases, which means that jobs are created for the community. Therefore, with the growth of investors who buy shares of companies listed on the capital market, the company has the income to expand its business even further. The greater the growth of companies in the country is directly proportional to the economic progress of the country. Therefore, when the company has high intellectual resources, it will synergistically improve the performance of the company and also provide sustainability performance for the company to carry out social responsibility fairly and equitably (Garniwa, 2016). The findings of this study support complexity theory. In this case, complexity theory can help companies identify complex factors that influence the relationship between green intellectual capital and sustainability performance. Green intellectual capital refers to knowledge, skills, and intellectual assets related to environmentally friendly practices, sustainable innovation, and sustainability efforts within the firm. Sustainability performance refers to a company's ability to meet its environmental, social and economic sustainability goals. Sustainability performance includes measuring a company's environmental impact, resource use efficiency, social contribution, sustainable innovation, and the extent to which the company implements responsible business practices. With a better understanding of the complexity of the firm, companies can develop more appropriate and effective strategies for implementing green intellectual capital to achieve optimal sustainability performance. Based on the theory and previous research, the following research hypotheses can be formulated

**H4: It is hypothesized that company complexity moderates the relationship between green intellectual capital and sustainability performance.**

## RESEARCH METHOD

Research conducted using an associative quantitative approach. According to (Sugiyono, 2019), the quantitative method can be interpreted as a research method based on the philosophy of positivism, which is used to study certain populations or samples. (Sugiyono, 2019) stated that the associative method is a method that aims to explain the causal relationship and influence between variables through hypothesis testing. The data analysis technique used in this study is panel data regression. The data used in this study is secondary data. In this study, the secondary data sources are articles, journals and related literature. The data sources are obtained from the financial reports and annual reports of companies that meet the sample criteria for the period 2017-2021. The data are obtained from the official website of each company and the official website of the Indonesia Stock Exchange (IDX), which can be accessed at the domain [www.idx.co.id](http://www.idx.co.id).

### Sustainability performance

The dependent variable used is sustainability performance. The measurement uses 6 Balance Score Card perspectives or called financial perspective, customer perspective, internal business process perspective, learning and growth perspective, (Kaplan, 1996) and (Hery, 2016) while the social perspective uses the 2016 Social Progress Index and the environmental perspective uses the 2016 Environmental Performance Index (EPI) indicator (Porter & Scott, 2016), (Sherbinin, 2016), (Aryane, 2015). From the above 6 perspectives, 39 scores are obtained, which are given a score from 1 to 3. The measurement used in the study (Holiawati, 2020) company's sustainability performance using:

$$SBSC \text{ index} = (\sum di/M) \times 100 \% \dots \dots \dots (1)$$

### Good Corporate Governance

The measurement used is based on the Circular Letter of the Financial Services Authority No. 32/SEOJK.04/2015. The Corporate Governance Guidelines include 5 (five) aspects, 8 (eight) principles of good corporate governance, and 25 (twenty-five) recommendations for the implementation of aspects and principles of good corporate governance. The corporate governance aspects of public companies include 1) the relationship between the listed company and shareholders in ensuring shareholders' rights; 2) the function and role of the board of commissioners; 3) the function and role of the board of directors; 4) stakeholder participation; and 5) information disclosure. This variable can be measured using a percentage scale, where each item disclosed by the company is given a score of 1, and vice versa, if the company does not disclose it, it is given a score of 0. Then, the amount disclosed is divided

# The Complexity of the Company Moderates the Relationship between Good Corporate Governance and Green Intellectual Capital with Sustainability Performance.

by the total of all criteria to be disclosed.

$$GCG = (\text{Total Implementation of Aspect Recommendations})/(\text{Total Aspect Recommendations}) \dots\dots\dots(2)$$

## Green Intellectual Capital

The green intellectual capital index variable is an independent variable in this study. This variable can be measured based on the research conducted by Chen and Hung (2014), where each item disclosed by the company is given a score of 1, and vice versa, if it is not disclosed by the company, it is given a score of 0. Then, the number disclosed is divided by the total of all criteria that must be disclosed.

$$GIC = \frac{n}{k} \dots\dots\dots(3)$$

## Moderating Variable

### Company Complexity

The moderating variable in this study is company complexity (Z). Company complexity refers to the complexity of transactions that occur in companies as a result of transactions using foreign currencies, the number of subsidiaries, branches, and the existence of foreign operations. Company complexity in this study is measured by the number of business segments in a company (Holiawati et al, 2020).

$$\text{Business Segment: } \sum \text{Number of Company Segments} \dots\dots\dots(4)$$

This type of research data is secondary data obtained from the annual reports and financial reports of industrial companies listed on the Indonesia Stock Exchange during the period 2017-2021, which can be accessed through the website [www.idx.co.id](http://www.idx.co.id) and the official website of each company's PT. The population of this study is industrial companies listed on the IDX for the period 2017-2021, namely 60 companies. The sampling method used is a non-probability sampling method with purposive sampling technique, so that 27 companies are obtained with 5 years of observation. This study uses non-participant observation to collect data. The data are obtained from books, previous research journals, official websites, and annual and longitudinal reports of companies listed on the Indonesia Stock Exchange from 2017 to 2021. The data analysis technique used in this study starts with descriptive statistical analysis, which is then followed by a classical assumption test, which includes normality test, autocorrelation test, multicollinearity test, and heteroscedasticity test. After conducting the classical assumption test, the research continued by conducting Moderated Regression Analysis (MRA), Coefficient of Determination (R<sup>2</sup>) test, Model Feasibility Test (F-test), and Single Significance Test (t-test). The regression equation used in this study.

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3M + \beta_4X_1M + \beta_5X_2M + \epsilon \dots\dots\dots(5)$$

Information:

- Y = Sustainability Performance
- α = Constant
- β1-5 = Regression coefficient
- X1 = Good Corporate Governance
- X2 = Green Intellectual Capital
- M = Company Complexity
- X1M = Interaction between Good Corporate Governance and Company Complexity
- X2M = Interaction between Green Intellectual Capital and Company Complexity
- ε = Error term.

## RESULTS

This study uses secondary data in the form of audited annual financial reports (annual report) of companies in the industrial sector in 2017 - 2021, obtained from the website of the Indonesia Stock Exchange (IDX). The sampling technique used in this study is the purposive sampling technique, which has sample selection criteria in accordance with the research. The results of the research conducted using EvIEWS 9.0 are as follows:

**Table 1. Descriptive Statistical Results**

	SP	GCG	GIC	GCG*CC	GIC*CC
Mean	3.437053	0.896267	0.825495	2.721600	2.521960
Median	2.485150	0.960000	0.823500	2.640000	2.117600
Maximum	51.19710	1.000000	1.000000	6.720000	7.000000
Minimum	-1.618100	0.400000	0.352900	0.400000	0.705900
Std. Dev.	4.893809	0.141334	0.175536	1.379442	1.404809
Skewness	7.068282	-1.644775	-0.899148	0.910745	1.254483
Kurtosis	63.75536	5.164104	3.097815	3.604529	4.887656

## The Complexity of the Company Moderates the Relationship between Good Corporate Governance and Green Intellectual Capital with Sustainability Performance.

Jarque-Bera	24319.10	96.90305	20.27146	23.02050	61.61347
Probability	0.000000	0.000000	0.000040	0.000010	0.000000
Sum	515.5579	134.4400	123.8243	408.2400	378.2940
Sum Sq. Dev.	3568.455	2.976309	4.591131	283.5260	294.0497
Observations	150	150	150	150	150

Source: Research Data, 2023

Table 4.1 shows the results of descriptive statistics with a sample size of 30 companies during the period 2017 - 2022. The sampling technique uses purposive sampling, the results of the descriptive analysis table above show that the amount of data observed is 150 data from 30 companies multiplied by the observation period for 5 years, from 2017 to 2022. From the descriptive analysis results in Table 4.1 above, when comparing the dependent and independent variables, the following results are shown:

The results show that the minimum value of sustainability performance of -1.618100 in PT Tira Austenite, Tbk. In 2018, it was smaller than the good corporate governance value of 0.400000 at PT Mark Dynamics Indonesia Tbk. In 2017, this indicates that the company may not have been successful in implementing effective sustainability practices or may not have given sufficient priority to sustainability issues in the company's decision making and operations. This may indicate that corporate governance does not effectively encourage and integrate sustainability in all aspects of the company's operations. Meanwhile, the maximum sustainability performance value of 51.19710 achieved by PT Perdana Bangun Pusaka Tbk. In 2020, it is higher than good corporate governance of 1.000000, this indicates that the company may have a strong focus on sustainability and positive environmental, social and economic performance, but may not have fully integrated good corporate governance practices as a whole.

The results show that the minimum value of sustainability performance of -1.618100 at PT Tira Austenite, Tbk. In 2018, it is smaller than the green intellectual capital of 0.352900 at PT Mark Dynamics Indonesia Tbk. In 2017. This indicates a gap between companies' understanding of the importance of sustainability and their ability to implement it in their daily business practices. This can pose a challenge in achieving optimal sustainability performance and addressing relevant environmental risks. Meanwhile, the maximum sustainability performance value of 51.19710 achieved by PT Perdana Bangun Pusaka Tbk. In 2020, it is higher than the green intellectual capital of 1.000000 achieved by PT. Astra Internasional. Tbk. In 2020, this indicates that the company may have managed to achieve good results in the aspect of sustainability despite not having sufficient knowledge and innovation in sustainability practices. In this case, the company may rely on established practices that have proven effective in achieving sustainability performance, but has not actively engaged in developing new knowledge or innovation in the area of sustainability.

After conducting descriptive statistical analysis, a panel data model selection test is then carried out in which data is collected from the same observation unit repeatedly in a certain period of time:

**Table 2. Chow Test Results**

Effects Test	Statistic	d.f.	Prob.
Cross-section F	0.806999	(29,104)	0.7416
Cross-section Chi-square	28.009060	29	0.5174

The Chow test results shown in Table 4.7. above, the probability cross-section F value is 0.7416 and the probability cross-section chi-square value is 0.5174. This shows the result that both probability values are greater or more than the significance level of 0.05, so in this chow test, the selected model is the common effect, so the next estimation model is the Lagrange multiplier test (Ghozali, 2016).

**Table 3. Lagrange Multiplier Results**

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	4.859610 (0.0275)	0.079902 (0.7774)	4.939512 (0.0262)

The results of the LM test in Table 4.8 show that the Breusch-Pagan cross-section has a value of 0.0262, which means  $> 0.05$ . When the Breusch-Pagan cross-section  $> 0.05$  (alpha: 5%), it can be concluded that the data fit the joint effect model.

## The Complexity of the Company Moderates the Relationship between Good Corporate Governance and Green Intellectual Capital with Sustainability Performance.

Based on Table 4, it can be concluded that the appropriate model to be used in estimating the firm complexity variable that moderates the relationship between good corporate governance and green intellectual capital with sustainability performance is the conditional effect model. After conducting the model selection test, the next step is to conduct a classical assumption test, where the results show that the regression model has met the classical assumption test, which includes normality test, autocorrelation test, heteroscedasticity test, and multicollinearity test. In this study, there were no symptoms of classical assumptions. After conducting the classical assumption test, the panel data regression analysis test was conducted with the common effect model, and the following results were obtained.

**Table 4. Panel Data Regression Analysis Test Results (Common Effect)**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.225786	0.047448	-25.83407	0.0000
GCG	1.054746	0.084101	12.54135	0.0000
GIC	0.180187	0.082982	2.171399	0.0317
GCG*CC	0.063830	0.024325	2.623998	0.0097
GIC*CC	-0.064799	0.024883	-2.604113	0.0103

Source: Research Data, 2023

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_{x1} * z + \beta_{x2} * z + e$$

$$SP = -1.225786 + 1.054746 GCG + 0.180187 GIC + 0.063830 GCG * CC - 0.064799 GIC * CC + e.$$

1. The constant value obtained is -1.225786, which means that if the independent variable is zero (0), then the amount of SP is -1.225786 and vice versa.
2. The value of GCG regression coefficient obtained is 1.054746, which is positive, which means that each increase in GCG will increase SP by 1.054746 and vice versa.
3. The GIC regression coefficient value obtained is 0.180187, which is positive, which means that each increase in GIC will increase SP by 0.180187 and vice versa.
4. The regression coefficient value of GCG\_CC, which is the interaction between GCG and CC of 0.063830, is positive, which means that each increase in GCG\_CC will increase SP by 0.063830 and vice versa.
5. The regression coefficient value of GIC\_CC, which is the interaction of GIC with CC, of 0.064799 is negative, which means that each increase in GIC\_CC will decrease SP by -0.064799 and vice versa.
- 6.

**Table 5. Test Coefficient of Determination (R2)**

R-squared	0.882003
Adjusted R-squared	0.878454

The output results show that the adjusted R-squared value is 0.878454, which means that 87.84% of the magnitude of sustainability performance can be explained by the variables of good corporate governance, green intellectual capital and firm complexity studied, while the remaining 12.16% is explained by other variables outside the study.

**Table 6. Simultaneous Test (F-Test)**

F-statistic	248.5372
Prob(F-statistic)	0.000000

The results of the output table above Prob (F-statistic) for the entire model show a value of 0.000000, which means that the probability value is less than the significance of 0.05.  $df_1 (k-1) = (3-1) = 2$  and  $df_2 (n-k) = (150-3) = 147$  obtained F table 3.06, so  $F_{count} > F_{table} (248.5372 > 3.06)$ , so it can be concluded in this study that the variables of good corporate governance, green intellectual capital and simultaneously have a significant effect on the sustainability performance variable with company complexity as a moderating variable.

# The Complexity of the Company Moderates the Relationship between Good Corporate Governance and Green Intellectual Capital with Sustainability Performance.

**Table 7. Results of the t-test**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.225786	0.047448	-25.83407	0.0000
GCG	1.054746	0.084101	12.54135	0.0000
GIC	0.180187	0.082982	2.171399	0.0317

Alternative hypothesis 1 (H1) states that good corporate governance has a positive effect on sustainability performance. The regression test results show that the variable of good corporate governance has a probability value of 0.0000, this value is less than the significance level (0.05). Therefore, good corporate governance has a significant effect on sustainability performance. The results of the study support the agency theory, the emergence of conflicts of interest in the agency theory can be reduced by the existence of good corporate governance, namely managers will convince investors that management will benefit them, also convince that management will not abuse or invest in projects that are not profitable for them. related to the funds invested by investors. Consistent with the results of research conducted (Holiawati, 2020) states that good corporate governance has a positive impact on sustainability performance. Based on the results obtained when the company conducts good governance, the company can improve sustainability performance. Governance is a system by which companies are directed and controlled, which means that governance is internal control. Therefore, if governance is done well, it will have a good impact on the achievement of the company's sustainability performance. Because governance is also an important element in achieving growth in corporate performance to increase investor confidence, which has an impact on corporate sustainability.

Alternative hypothesis 1 (H3) states that green intellectual capital has a positive effect on sustainability performance. The regression test results show that the green intellectual capital variable has a probability value of 0.0317, which is less than the significance level (0.05). Then, green intellectual capital has a significant effect on sustainability performance. In line with the signaling theory, it shows that information asymmetry can be overcome if the party with information can send positive signals to related parties. A signal can indicate the quality of the sender. If the company provides complete information about the company's condition, it will send a signal to stakeholders to increase public trust in the company. This trust will be the basis for ensuring the business sustainability of a company. Consistent with the results of research conducted (Josephine, et al, 2020) states that green intellectual capital has a positive effect on business sustainability. Based on the results obtained when the company manages good employees and improves relations with consumers, suppliers and other work partners (stakeholders), this is an important thing for the company to do. This can be the company's main source of strength to win the competition in the business world by not ignoring the welfare of the environment in which the company operates.

**Table 8. Moderation Test Results (Z Test)**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.225786	0.047448	-25.83407	0.0000
GCG*CC	0.063830	0.024325	2.623998	0.0097
GIC*CC	-0.064799	0.024883	-2.604113	0.0103

Alternative hypothesis 3 (H3) states that corporate complexity, proxied by business segments, strengthens the relationship between good corporate governance and sustainability performance. The results of the study have a probability value smaller than the significance level (0.05), namely 0.0097. This can be seen from the fact that the probability value is smaller than the significance level, or in other words,  $0.0097 < 0.05$ . If the coefficient value for moderation is positive and the probability (p-value) is also positive, this indicates a significant interaction between the independent variable and the moderating variable. The positive coefficient of the moderating variable indicates that there is a positive effect of the moderating variable on the relationship between the independent variable and the dependent variable. This means that the moderating variable strengthens or increases the effect of the independent variable on the dependent variable. Based on the above description, the results indicate the existence of a pure moderation type. In pure moderation, the moderating variable has a direct influence on the relationship between the independent variable and the dependent variable. The positive coefficient of the moderating variable indicates that the moderating variable strengthens or increases the effect of the independent variable on the dependent variable. This is indicated by the significant increase in the relationship between the independent variable and the dependent variable when the moderating variable is taken into account.

The results of previous research on the relationship between company complexity proxied by business segments on sustainability performance, after being traced by researchers using various sources have not been found, but if linked to the theory there is a connection with complexity theory. (Porter, 2010) in his research entitled Complexity and Sustainability explains that complexity theory recognizes that modern companies are complex systems, where internal and external factors are interrelated and influence



## **The Complexity of the Company Moderates the Relationship between Good Corporate Governance and Green Intellectual Capital with Sustainability Performance.**

each other. Organizational complexity refers to the level of complexity that exists in the organization's structure, operations, and business environment. Businesses that strengthen the link between corporate governance (GCG) and sustainability performance typically reflect the company's commitment to best practices in social, environmental, and economic areas. Businesses that integrate sustainability principles into their business strategy demonstrate a long-term commitment to sustainability performance. This may include the development of measurable sustainability performance targets and indicators, as well as continuous efficiency improvements and innovation.

Alternative hypothesis 4 (H4) states that firm complexity, proxied by business segment, weakens the relationship between green intellectual capital and sustainability performance. This can be seen from the probability value, which is less than the significance level (0.05), which is 0.0103. Because the probability value is smaller than the significance level, or in other words,  $0.0103 < 0.05$ . The negative coefficient of the moderating variable indicates that there is a negative effect of the moderating variable on the relationship between the independent variable and the dependent variable. This means that the moderating variable weakens or reduces the effect of the independent variable on the dependent variable. Based on the above description, the results indicate the existence of a pseudo moderation type. In pseudo-moderation, there is a third variable that affects both the independent variable (green intellectual capital) and the dependent variable (sustainability performance), so it looks like firm complexity (business segment) moderates the relationship. However, firm complexity is not the actual moderating factor, but another variable that affects both variables.

The results of previous research on the relationship between corporate complexity proxied by business segments on sustainability performance, after being traced by researchers using various sources have not been found, but when linked to the theory there is a connection with complexity theory. (Porter, 2010) in his research entitled *Complexity and Sustainability* explains complexity theory and complex adaptive systems are examined as a conceptual and empirical framework for sustainability and sustainable common interests. The concept of Green Intellectual Capital (GIC) refers to knowledge, competencies and capabilities related to environmental and sustainability issues in an organization. GIC includes knowledge and understanding of green practices, sustainable technologies, green innovations, and sustainable business approaches in general. If the business unit weakens the relationship between Green Intellectual Capital (GIC) and sustainability performance, it is because the business unit does not prioritize the development of sustainability-related knowledge and competencies, which may weaken the relationship between GIC and sustainability performance. Lack of investment in training, research and development focused on environmental and sustainability issues may hinder the adoption of sustainable practices.

### **CONCLUSION**

The results showed that good corporate governance variables affect sustainability performance, green intellectual capital variables affect sustainability performance, firm complexity strengthens the relationship between good corporate governance and sustainability performance, and firm complexity weakens the relationship between green intellectual capital and sustainability performance. The implications of this research can provide a deeper understanding of how firm complexity, especially as manifested in business segments, can affect the relationship between good corporate governance, green intellectual capital, and sustainability performance. This can help organizations to identify and understand the challenges that may arise from corporate complexity and to develop more adaptive and effective strategies. Suggestions from the researchers based on the findings of the study include applying sustainable business practices in all aspects of business operations, including resource management, energy efficiency, waste reduction, and environmental protection; and collaborating with other parties, such as government, civil society, and academic institutions, to develop sustainable innovations and achieve sustainability goals together.

### **REFERENCES**

- 1) Fajriyanti, N. (2021). Pengaruh Diversifikasi, Tata Kelola Perusahaan, dan Modal Intelektual terhadap Kinerja Keberlanjutan dengan Kinerja Keuangan sebagai Mediasi (Studi pada Perbankan Syariah di Indonesia) (Doctoral dissertation, Universitas Brawijaya).
- 2) Epstein, M. J., & Roy, M. J. (2003). Making the business case for sustainability: linking social and environmental actions to financial performance. *Journal of Corporate Citizenship*, (9), 79-96.
- 3) Holiawati, Murwaningsari, Mayangsari (2020). Risk Management, Corporate Governance And Corporate Sustainability Performance South East Asia *Journal of Contemporary Business, Economics and Law*, Vol. 21, Issue 5 (April) ISSN 2289-1560 South East Asia.
- 4) Hanifah, & Rohman. (2018). Peran Sustainability Report Sebagai Atesenden Terhadap Manajemen Laba dan Pengaruhnya pada Cost of Equity.
- 5) Ulum, Ihyaul. (2017). *Intellectual Capital: Model Pengukuran, Framework Pengukuran, dan Kinerja Organisasi*. UMM Press. Malang.
- 6) Moeljadi, S., Aisjah, S., & Djawahir, A. H. (2021). Pengaruh Permodalan, Risiko Likuiditas, Tata Kelola Perusahaan

## **The Complexity of the Company Moderates the Relationship between Good Corporate Governance and Green Intellectual Capital with Sustainability Performance.**

Terhadap Kinerja Keuangan Dimediasi oleh Pertumbuhan Kredit (Studi Bank Umum Konvensional di Bursa Efek Indonesia) (Doctoral dissertation, Universitas Brawijaya).

- 7) Siswanti, I., Salim, U., Sukoharsono, E.G., dan Aisjah, S. (2017). Sustainable Business of Islamic Bank through on the Islamic Corporate Governance and Islamic Financial Performance. ISSN 0128-3103. *Journal of Finance and Banking Review*.
- 8) Aras, G., & Crowther, D. (2008). Governance and sustainability: An investigation into the relationship between corporate governance and corporate sustainability. *Management Decision*.
- 9) Puspitasari, R., Angraini, A., & Jatiningrum, C. (2023). Pengaruh Penerapan Financial Leverage, Good Corporate Governance dan Corporate Social Responsibility Terhadap Nilai Perusahaan. *eCo-Fin*, 5(2), 119-127.
- 10) Yusliza, M., Yong, J. Y., Tanveer, M. I., Ramayah, T., Juhari, N. F., & Muhammad, Z. (2019). A structural model of the impact of green intellectual capital on sustainable performance. *Journal of Cleaner Production*, 119334. <https://doi.org/10.1016/j.jclepro.2019.119334>
- 11) Wang, C. H., & Juo, W. J. (2021). An environmental policy of green intellectual capital: Green innovation strategy for performance sustainability. *Business Strategy and the Environment*, 30(7), 3241-3254.
- 12) Rukmana, M., Konde, Y.T., dan Setiawaty, A., (2017), "Pengaruh Risiko Litigasi, Corporate Governance, Karakteristik Perusahaan, dan Karakteristik Auditor Terhadap Audit Fee pada Perusahaan yang Terdaftar di BEI", Simposium Nasional Akuntansi 20.
- 13) S, D. P., Yulindari, W. S., & Yudowati, S. P. (2017). Pengaruh leverage, kompleksitas operasi perusahaan, reputasi auditor dan laba/rugi operasi perusahaan terhadap audit delay (studi pada perusahaan perdagangan, jasa dan investasi yang terdaftar di Bursa Efek Indonesia tahun 2013- 2015). *Majalah Ilmiah UNIKOM*, 15(2), 179– 188. <https://doi.org/10.34010/miu.v15i2.557>
- 14) Jensen, Michael C. dan W.H. Meckling. (1976). Theory of The Firm: Managerial Behavior, Agency Cost and Ownership Structure. *Journal of Financial Economics* 3. hal. 305-360.
- 15) Ulum, Ihyaul. (2017). *Intellectual Capital: Model Pengukuran, Framework Pengukuran, dan Kinerja Organisasi*. UMM Press. Malang.
- 16) Josephine, K., Ciptadi, B. A., & Aloysius, J. (2020). Pengaruh Green Intellectual Capital Terhadap Business Sustainability. *Jurnal Manajemen Strategi dan Aplikasi Bisnis*, 3(2), 117-128
- 17) Trihandayani, P. (2016). PENGARUH GOOD CORPORATE GOVERNANCE TERHADAP STRUKTUR MODAL PERUSAHAAN MANUFAKTUR YANG TERDAFTAR DI BURSA EFEK INDONESIA (Doctoral dissertation, Universitas Mercu Buana).
- 18) Chen, Y. S. (2008). The Positive Effect of Green Intellectual Capital on Competitive Advantages of Firms. *Journal of Business Ethics*, 77(3), 271-286.
- 19) Mappamiring, M. (2015). STRATEGI DIVERSIFIKASI DAN KOMITMEN TATAKELOLA PERUSAHAAN BERDASARKAN KINERJA DAN KEBERLANJUTAN PADA PERBANKAN SYARIAH DI KOTA MAKASSAR. *Jurnal Manajemen*, 19(3), 387-397.
- 20) M. Eisenhardt, Kathleen; McKelvey, Bill (2011). Complexity Theory and Corporate Strategy, from book - *The SAGE Handbook of Complexity and Management* edited by Peter Allen, Steve Maguire, Bill McKelvey. SAGE.
- 21) Cristansy, J., & Ardiati, A. Y. (2018). Pengaruh kompleksitas perusahaan, ukuran perusahaan, dan ukuran kap terhadap fee audit pada perusahaan manufaktur yang terdaftar di bei tahun 2012-2016. *Modus*, 30(2), 198-211.
- 22) Garniwa, G. R. (2016). Pengaruh Modal Intelektual dan Pengungkapan Modal Intelektual Terhadap Nilai Perusahaan dengan Kinerja Keuangan Sebagai Variabel Intervening (Suatu Studi Pada Perusahaan Jasa Sektor Keuangan Sub Sektor Bank yang Terdaftar di Bursa Efek Indonesia periode 2011-2015) (Doctoral dissertation, Fakultas Ekonomi dan Bisnis Unpas Bandung).
- 23) Sugiyono (2019). *Statistika Untuk Penelitian*. Bandung : Cv Alfabeta.
- 24) Kaplan, R. S., & Norton, D. B. (1996). *Translating strategic into action-The balanced scorecard*, Harvard Business school Press, Boston, Massachusetts.
- 25) Hery (2016). *Balanced Scorecard For Business*. Jakarta : Grasindo.
- 26) Indonesia, R. (2015). Surat Edaran Otoritas Jasa Keuangan Nomor 32. SEOJK. 04/2015 tentang Pedoman Tata Kelola Perusahaan Terbuka.
- 27) Chen, Ping Chuan and Shiu Wan Hung, 2014. Collaborative green innovation in emerging countries: a social capital perspective. *International Journal of Operations & Production Management*. Vol. 34 No.3.
- 28) Kusumastuti, A., Khoiron, A. M., & Achmadi, T. A. (2020). *Metode Penelitian Kuantitatif*. Deepublish.