Green Intellectual Capital on Value Relevance in Indonesia's Manufacturing Companies

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ABSTRACT

Objective - Corporate concern for the environment is an important stakeholder demand. A company is obliged to preserve the environment with various investments, one of which is green intellectual capital to maintain the sustainability of the company, especially for companies that carry out their business activities in countries that are in conditions of high pollution such as Indonesia. The importance of green intellectual capital investment information for stakeholders can be seen from the value relevance of the information. This study aims to examine and analyze the effect of investment in green intellectual capital, which consists of the following dimensions: human, structural, and relation to value relevance. **Methodology/Technique** – This study will explain the causal relationship between the independent and the dependent variables through hypothesis testing based on the theory that has been formulated with data that obtained and tested through quantitative panel data testing. **Findings** - The results of a survey of 515 samples of data from a population of 183 manufacturing companies listed on the Indonesia Stock Exchange (IDX) in 2015-2019 found that green intellectual capital with its three dimensions had a significant positive effect on value relevance. This study also proves that green structural intellectual capital has influenced more on value relevance than human and relation intellectual capital. **Novelty** - The measurement of variables is green intellectual capital and value relevance in this study develops previous research with related government conditions and regulations in Indonesia. Green intellectual capital investment is measured by using content analysis from disclosures in annual reports and sustainability reports, and value relevance is measured by the Olhson model with beta correction by the stock market in Indonesia.

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1. Introduction

Companies need assets consisting of current assets and non-current assets in developing their business. In the current condition, where business activities can be used online, intangible assets become an important part of creating profit for the company.

For the sake of reliability and quality, sacrificing the quality of relevance, this trade-off causes the intangible assets developed by the company to not be reported, but the intangible assets developed by the company are often an important factor in determining the value of the company, as stated by Erawati and Sudana (2005). Francis and Schipper (1999) state that due to the economic change from an industrial economy to a high-tech and service-oriented economy, accounting information obtained from financial statements has lost some of its relevance for investors. This is confirmed by Lev and Zarowin (1999) who state that accounting information, especially profit, cash flow, and book value is deteriorating in use. This is due to the impact of changes in company operations and changes in the country's economic conditions that are not sufficiently represented in the reporting system.

Several studies reveal that intangible assets increasingly have an important role in increasing the success of a business to reach 50-80%, which is markedly different from 4 decades ago when it was only 15-20%. Vanaya Coaching Institute (2017) and Antariksa (2015) state that the number of contributions of intangible assets in the success of a business continues to increase, in 1975, the contribution of intangible assets to the success of a business was only 17%, and in 2015 it had grown to 84%.

The importance of intangible assets as part of the account that can provide information for investors can be seen from the results of research carried out by Ji and Lu (2014). The reliability of intangible assets has a positive effect on value relevance. Intangible assets are increasingly being disclosed due to changes in standards that require valuation of assets based on market value. Further, fixed assets that have a long life need to be revalued if there is a change in recognition by the market. Abubakar and Abubakar (2015) state that intangible assets can improve the quality of the company's accounting information and the relevance of the statement of financial position and is reliable. The same results also found by Kimouche and Rouabhi (2016) using (OHLSON, 1995) model, finding evidence that intangible and traditional accounting has more relevant value.

Intellectual capital combined with the concept of green accounting continues to grow because of the deteriorating natural conditions of the earth, hence the term Green Intellectual Capital. The concept of green intellectual capital is an intangible asset comprising of knowledge, capability, and company relationships that can maintain and preserve the company's environment, which is measured by integrating social responsibility and management intellectual capital. Companies that have advantages in green intellectual capital will have a competitive advantage (Chen, 2008a).

Suhaimi, President Director of RHB Asset Management Indonesia, said that the Sustainable and Responsible Investment Kehati (SRI KEHATI) stock index, an index that uses the principles of sustainability, finance, and good governance, as well as concern for the environment, has been able to provide growth which outperformed the JCI. It was recorded that as of the end of October 2017, the Sri Kehati Index grew by 17.7% from the beginning of the year, thus outperforming the JCI which grew by 13.39%.

Great attention by the government supports the implementation of Sustainable Development and a Green Economy. Various policies in Indonesia related to sustainability include the Financial Services Authority (OJK-Otoritas Jasa Keuangan) Regulation No. 51/POJK.03/2017 concerning the Implementation of Sustainable Finance for Financial Service Institutions, Issuers, and Public Companies, has required sustainable finance practices to be presented to stakeholders or the public. In relation to environmental performance in 1995, the Ministry of Environment and Forestry conducted a rating and assessment of environmental performance disclosures in Indonesia through the PROPER assessment (Company Performance Rating Program). In addition to the Ministry of Environment, which conducts assessments and awards for the company's environmental performance, the Ministry of Industry has also conducted an assessment called the green industry since 2010 as a form of non-fiscal incentives for manufacturing industrial companies that have made efforts in the efficient use of material resources, energy and water.

Some studies of problems in Indonesia at this time are Indonesia as a developing country, facing the conditions of the industrial era 4.0 (cyber Physical system) like other countries that create smart factories that require innovation and technology, encourage intangible assets as part of increasing company competitiveness and sustainability. In addition, Indonesia as a country that has natural wealth is recognized by the world that it

needs environmental awareness to preserve it so that green intellectual capital is part of an intangible asset that has relevance for companies in Indonesia. Ermsittiparsert (2021) states that increasing environmental problems are the basis for the need for research on green intellectual capital owned by a company because this can affect the sustainability of the organization. Likewise, Josephine et. al. (2020) prove that green intellectual capital affects business sustainability. The main strength of the company to be able to win the competition in the business is not to ignore the welfare of the environment in which the company operates for social legitimacy. An attitude of caring for the environment by applying environmentally friendly concepts is an important factor in achieving a company's competitive advantage through green innovation (Susandya et. al., 2019)

The abundance of information in the capital market makes it important to know the information value of financial statements and other reports. Value relevance can show the usefulness of financial statement information for investors relative to all information used by investors in the capital market (Lev & Zarowin, 1999). Research conducted by Rahmawati and Susilowati (2018) proves that intellectual capital, both voluntary and involuntary, affects value relevance.

Various conclusions are different from previous studies that examine the effect of intellectual capital and environmental performance on value relevance, including the difference in the effect of intellectual capital on value relevance (Vafaei et. al., 2011). Intellectual capital disclosure (ICD) has a positive effect on prices and market value (relevance value). Rieg and Vanini (2017) analyzed the effect of the company's intellectual capital capture and the MBV ratio in Germany providing evidence that intellectual capital disclosure does not affect the MBV ratio. Firmansyah and Yusuf (2020) were unable to provide evidence of the influence of intellectual capital on value relevance. Sarumpaet et. al. (2017) state that superior (good) environmental performance has an effect on stock prices, and inferior (poor) environmental performance has no relevant value to market value.

Based on the above background, there are many issues currently developing regarding the value relevance of reporting intangible assets and non-financial performance of the company, the high need for stakeholders to obtain non-financial information, and the need for the recording of investment in intangible assets related to the environment, especially in the environment. Indonesia as a country with very beautiful biodiversity and the declining condition of the earth motivates researchers to carry out this research. In addition, the results of previous studies show different results on the effect of green intellectual capital investment on value relevance, inspiring researchers to research this topic with measurements according to relevant conditions in Indonesia. In this study, the measurement of green intellectual capital uses the amount of disclosure in the company's annual report with the development of indicators from the three dimensions that are adapted to conditions in Indonesia. The population of this study is manufacturing companies listed on the Indonesia Stock Exchange with the years of observation being 2015 to 2019. This study aims to analyze the effect of green intellectual capital consisting of human, structural, and relation on value relevance.

2. Literature Review

2.1 Theoretical Framework

2.1.1. Legitimacy Theory, Signal Theory, and Resource-Based View Theory (RBV)

In this study, there is an independent variable (green intellectual capital) and the dependent variable is value relevance. In this regard, the theoretical basis used as the basis for the discussion of this research is legitimacy theory, signal theory, and resource-based view theory (RBV). Legitimacy theory states that there is a social contract between companies and the communities where they operate to get appreciation, especially in the CSR era. The company has a social responsibility to demonstrate the legality of actions deemed to have a fair impact on the internal and external environment (Zyznarska-Dworczak, 2018)

Legitimacy theory represents green intellectual capital; this variable can fulfill the social contract through environmental disclosure when environmental conditions need attention with the aim of survival of an entity (Burlea-schiopoiu & Popa, 2013). Green intellectual capital can be expressed as an implicit contract that can

get attention and support from the community (Hanifah, 2016). Green intellectual capital is an asset characterized by value and is rare, imperfectly imitable, and non-substitutable are assets that achieves a sustainable competitive advantage, thus representing a resource-based view theory. This theory requires entities to carry out strategies with various innovations from existing opportunities.

The signaling theory has been widely used by researchers to explain how one party can explain information so that it can be accepted and interpreted by other parties as useful information in decision-making. Signaling theory is concerned with efforts to reduce information asymmetry between two parties who have different access to information (Connelly et. al, 2011). In this theory, the public will evaluate the information submitted by the company in various forms, including in this case the value of green intellectual capital. Signaling theory on this research is the value relevance of green intellectual capital disclosure. One of the company's efforts to get community legitimacy is to disclose investments in green intellectual capital so that people can assess the extent to which the company is ready to face future environmental conditions. Good or bad information disclosed by the company will affect the public's assessment, as well as in terms of investment in intangible assets in the form of green intellectual capital.

Resource-based view theory, according to Sukma (2018), is related to analysis of the internal environment related to the strengths and weaknesses of strategic management in maintaining a competitive advantage. The company's competitive advantage is obtained by using resources that are not easily imitated by other companies. Companies compete with each other to develop a green strategy by seeking to explore environmentally friendly raw materials and energy. Green intellectual capital as one of the intangible assets owned by the company can increase the company's competitiveness because it is unique to overcome pressure from stakeholders related to current conditions. Green intellectual capital can be beneficial for a company and have different characteristics from its competitors to create a sustainable competitive advantage (Berney, 1991; Josephine et. al, 2020).

Green intellectual capital is one of the intangible assets owned by the company as a resource that is used to achieve the environmental performance expected by the community. This is a social contract between the company and society. At this time, green intellectual capital is one indicator that can increase the competitiveness of companies because of the public's demands on the attitude of issuers to care about the environment. Realizing the importance of green intellectual capital, the disclosure of this resource is a signal that is conveyed by the company to be responded to by stakeholders in making decisions (Ng, 2008)

2.2. Green Intellectual Capital

Intellectual capital is capital intangible assets in the form of knowledge, experience, organization structure, relationships and abilities that the company develops to be able to create value. Some studies divide intellectuals into human, structural, and relational capital. Green intellectual capital is one of the intangible assets that was developed based on the concept of green accounting (Chen, 2008a). The green intellectual is the total capital of intangible assets including knowledge, abilities, and relationships related to environmental protection or green innovation in a company. Green human capital is a combination of skills possessed by employees in the form of hard skills and soft skills, namely knowledge, employee skills and attitudes, and creativity regarding environmental protection.

Green structure capital is the capital of the ability, knowledge, and commitment of an organization in the ownership of resources and managing them for environmental protection. Green relational capital as corporate capital is related to interactive relationships with its stakeholders for various activities related to environmental management and protection. Studies conducted by Rahmawati (2017) prove that the three indicators of green intellectual capital do not have the same effect on firm value. The one with the most influence is relation capital. As stated by Firmansyah (2017), the high stakeholder push for external environmentalism needs to be responded to by the company by improving environmental performance which is reflected in the activities environmental activities carried out by companies or products or services that are produced must support

environmental sustainability. This action will have an impact on increasing the competitive advantage of a company.

Green intellectual capital as part of intangible assets affects the level of business sustainability of a company, especially when environmental conditions are not as good as it is today, as has been proven in the research of Josehine et. al (2020), although the three components have different results, green human capital and green relational capital have an effect on business sustainability, while green structural capital does not affect business sustainability.

2.3. Value Relevance

Value relevance is the ability of information conveyed through financial statements to be interpreted and translated into corporate values (Kargin, 2013). Investors, through stock prices, can absorb the data and information contained in a report that reveals a company's value. The basic concept of value relevance shows that the information submitted by the company can be used as material for making decisions. The first research was carried out by Ball and Brown (1968) on the relationship between accounting numbers and stock prices. Value relevance is increasingly popular from the research conducted by (OHLSON, 1995), with the concept of clean surplus theory. Ohlson studied the relationship of market prices with three accounting numbers, namely profit, equity, and dividends. Lako (2019) states that many literature review results show that social responsibility correlated with financial performance, stock price performance, and firm value.

Companies that care more about social and environmental profitability and have economic value relevance are considered careless companies. Non-financial information, such as social responsibility disclosures, has information that is relevant to investors because this information influences their decision to invest. Social and environmental performance is a strategic investment and an intangible asset that plays a strategic role in creating corporate and shareholder value. The content of financial statements should be developed with the disclosure of these intangible assets because intangibles have improved the value relevance of accounting information (Kimouche & Rouabhi, 2016). Currently, profit does not always guarantee the sustainability of the company in the future. The value relevance contained in signaling theory states that stakeholders in assessing the company and making decisions are based on the information they receive, both in the form of good or bad signals (Erinos & Yurniwati, 2018).

3. Hypothesis Development

Currently, intangible assets have a very significant value to the company over time, changes in standards, or stakeholder needs. Various studies show that intangible assets can increase firm value and increase competitive advantage. The current condition of the environment, which is increasingly getting worse, cannot be separated from the negative impact of the company's operations. The company is expected to be responsible for the environment. The responsibility is prepared through the company's willingness to allocate human resources, structural, and relationships related to environmental protection as its legitimacy to the environment. In the Resource-based View Theory, a company that can compete is a company that can have advantages and differences with other companies. The procurement of green intellectual capital is a company's effort to improve its competitive ability by carrying out the wishes of stakeholders ahead of its competitors through their various advantages and uniqueness. In signaling theory, all forms of information submitted by the company can be a reference for stakeholders in making decisions. Green intellectual capital can provide a positive signal in the form of information that reflects the condition of a company that is beneficial to stakeholders.

Susandya et. al. (2019) in their research found evidence that green intellectual capital (human, structural, and relations) had a positive effect on competitive advantage. Rao (2016) states that intangible assets gain and enhance a company's competitive position in the market and enable a business to defend against competitors for the long term. Intellectual capital, which consists of human capital, structural capital, and relationship

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capital, is part of an intangible asset that contains information and is valued by investors, thereby increasing value relevance. Intellectual capital can increase the market value of a company. Research conducted by Alfraih (2017) shows the importance of intellectual capital disclosure in increasing equity value. This provides evidence that intellectual capital disclosure has a positive and significant effect on market value.

Similarly, in the research of Vafaei et. al. (2011), intangible capital disclosure (ICD) has a positive effect on market prices (value relevance). Ellis and Seng (2015) found a positive effect between human IC and relational IC and ICD together, but the results for the structural disclosure of IC showed a significant negative effect. These results suggest that there may be a trade-off between the costs and benefits of disclosure. However, not all studies provide the same evidence for the influence of intellectual capital on market reaction and value relevance. Research conducted by Arnis et. al. (2019) shows that the coefficient on the intellectual capital disclosure index does not have a positive effect on stock prices. If it is divided into 3 components, it can be seen that the Human Capital Disclosure index (HCDI) has a positive effect on stock prices even though capital Structural (SCDI) and customer capital disclosure index (CCDI) do not affect stock prices.

Intellectual capital has recently begun to be introduced to the concept of environmental accounting. Green intellectual capital can increase the value relevance and level of competition of the company. Chen (2008b) identified three types of green intellectual capital (human, structural, and relational) which all have a positive influence on the company's competitive advantage. Green relational capital is the largest among the three types of green intellectual capital. Similarly, research conducted by Chen and Chang (2013) shows that green intangible assets have a competitive advantage. Green intellectual capital components consisting of human capital, structural capital, and relational capital provide different results on the value of the company and value relevance (Jermsittiparsert, 2021).

3.1 Green Human Intellectual Capital

Investments made in humans (human capital) as an intangible asset, either through training or education can provide better returns than investments in physical assets (physical capital) (Fahrozi, 2017). Through human capital, other organizational capital can be pursued to achieve organizational goals effectively and efficiently. This will support the success of the organization. Errinos and Rahmawati (2017) conclude that human resources and environmental capabilities have an effect on financial performance.

3.2 Green Structural Intellectual Capital

Green structural capital investment allows companies to avoid environmental damage and reduce the burden of paying fines (Chen et. al., 2006) thereby increasing economic performance and environmental performance. Firmansyah (2017) states that green structural capital is the specification, strengthening, and support of infrastructure for environmental protection and everything related to the environmental management system. Huang and Kung (2011) state that good green structural capital can increase the company's commitment and ability to compete. Erranos and Rahmawati (2017) conclude that green structural capital affects company performance. Research conducted by Yusoff et. al. (2019) shows that green structural capital affects business sustainability. A company that has a good structure will support and motivate employees and their environment to produce the expected outputs and achieve company goals.

3.3 Green Relational Intellectual Capital

These investments include a corporate image, customer loyalty, customer satisfaction, and interaction with suppliers by employees, negotiation capacity, distribution channels, supplier channels, licensing agreements, and franchise agreements (Starovic & Marr, 2003). The focus of relational capital is the level of mutual trust, respect, and friendship that arises from close interactions between internal and external partners (Kale et. al., 2000). The relational capital of companies has a positive influence on their competitive advantage (Johnson,

1999, Bontis, 1999). According to Yussof et. al. (2019), a company that has a good relational capital will easily get fast and up-to-date information. Errinos and Rahmawati (2017) state that green relational capital affects company performance. Yusoff et. al. (2019) in their research provide evidence that green relational capital affects business sustainability. Relational capital can also play a role in increasing customer profits by helping to improve quality, reliability, and flexibility, creating value for customers, through production and service delivery process innovations (Kijek, 2008 in Ramanda & Muchtar, 2015). The effect of relational capital on firm value and competitive advantage will also have an impact on market reaction; intellectual capital is believed to affect investors' assessment of the value of a company.

Based on the explanation provided above, the following hypotheses are proposed in this study:

H1. *Green intellectual capital has a positive effect on value relevance.*
H2. *Green human intellectual capital has a positive effect on value relevance.*
H3. *Green structural intellectual capital has a positive effect on value relevance.*
H4. *Green relation intellectual capital has a positive effect on value relevance.*

4. Research Methodology

This research will empirically examine the causal relationship between the independent variable and the dependent variable. The purpose of this study is to empirically prove the alleged influence of green intellectual capital consisting of human capital, structural capital, and relational capital on value relevance. The population of this study is manufacturing companies listed on the Indonesia Stock Exchange in 2015 – 2019 as many as 183 companies. Sample selection is done using purposive sampling method, namely companies that have complete data according to the needs of each variable, from 183 companies obtained as many as 103 companies with an observation time of 5 years. Data is collected from secondary data from financial reports on the IDX.co.id

4.1 Procedure Methodology

The types of variables in this study consist of independent variables, dependent variables, and control variables. Independent variables, namely green intellectual capital, which consists of human, structural, relational, and the dependent variable of value relevance, as well as the control variables of firm size, the book value of equity, operating cash flow, and the level of sensitivity of the company.

4.2 Variables and Measurements

4.2.1 Independent variables

4.2.1.1 Green Intellectual Capital

Green intellectual capital consists of three dimensions: Green Human Intellectual capital, Green Structural intellectual capital, and Green Relational Intellectual capital.

The indicators in each dimension of green intellectual capital in this study are a replication of the measurements made by (Firmansyah, 2017; Chen and Chang, 2013; Huang & Kung, 2011), which consist of five indicators for human capital, 6 indicators for structural capital, and four indicators for capital relevance. In this study, these three dimensions are also added with other indicators that are adapted to environmental conditions and the demands of stakeholders in Indonesia, especially in manufacturing companies. The addition of this indicator is a novelty in this research.

4.2.1.2 Green Human Intellectual Capital

Green human intellectual capital consists of eight indicators, five indicators based on previous research, and three new indicators developed in this study. The five indicators are: employees engaged in productivity contributing to environmental protection, support for employee's work relevant to environmental protection, environmental protection carried out with teamwork, employees have competence in environmental protection, and employees provide services and technology related to environmental protection.

The three indicators of green human intellectual capital developed from this research are based on the following concepts:

1. The World Economic Forum (WEF) states that soft skills are an important factor for future workers to possess, such as the ability to communicate and cooperate with others, solve problems, and other aspects of emotional intelligence. This is necessary for workers to be able to face changes in 2020 and beyond.
2. Indonesia as a developing country must be able to employ workers with low skill levels but able to compete with others. In Indonesia, to strengthen industry 4.0, vocational and retraining are needed to be more effective and productive, including the ability to be independent, creative, and innovative in work. The three indicators of green human intellectual capital developed are the company has employees who have experts and backgrounds in environmental education and are placed according to their competencies. entrepreneur spirit in social and environmental protection, Employees attend various training or practices related to the environment (Kuswanto, 2020).

4.2.1.3 Green Structural Intellectual Capital

Green structural intellectual capital consists of nine indicators, six indicators based on previous research, and three new indicators developed in this study. The six indicators of green structural intellectual capital are the knowledge management system in the company works well for accumulation and knowledge sharing on environmental management, the company has a good management system for environmental protection, the company has made detailed rules for environmental protection, the overall operation process for environmental protection within the company is going well, the company formed a committee to advance the main issues of environmental protection, sufficient investment in environmental R&D in the development of enterprise innovation.

The three indicators of green structural intellectual capital developed from this research are based on the following concepts:

1. In the industrial era 4.0 and the era of society 5.0, companies must be able to prepare the technology for the application of artificial intelligence.
2. The leadership strategy needed at this time by carrying the concept of U theory expressed by Prof. Otto Scharmer's leadership style is "Open mind, open heart, open will," by directly absorbing social aspirations, opening his heart to listening to the voices of his subordinates and opening up a strong will to realize and overcome various problems in society.

The three indicators of green structural intellectual capital developed from this research are companies use technological equipment to prevent or reduce environmental pollution and efficiency, the company conveys about the environment in corporate governance, the company has a vision, mission, and goals related to environmental protection that involves input from all stakeholders.

4.2.1.4 Green Relational Intellectual Capital

Green relation intellectual capital consists of seven indicators, four indicators based on previous research, and three new indicators developed in this study. The four indicators based on previous research are companies

design products and services to meet consumer desires for the environment, stable cooperative relationship on environmental protection of the company with suppliers, stable cooperative relationship on environmental protection of the company with major clients or consumers, the company has a good and stable cooperative relationship on environmental protection activities with its strategic partners.

Another indicator of the green relation intellectual capital developed from this research is based on the following concepts:

1. Prioritizing the ease of finding information and obtaining products.
2. Technology has caused the relationship between producers and consumers from the original vertical to turn into a horizontal one. Consumers can no longer be treated as passive objects, but they must be actively involved and included by companies or producers (Sabrina, 2019).
3. Indonesia Digital Business Ecosystem Forum (Indibest Forum), where a company can face the Industrial Revolution 4.0, should be Creative economy actors can think outside the box. Companies must be able to collaborate to form a stronger digital ecosystem amidst the onslaught of foreign expansion (Hariadi et. al., 2019).

Based on that, the additional indicators for relation capital are presentation and appearance of the green profile on the company website, the company conducts research and development in collaboration with other parties, the company has good relations with the government and other organizations related to environmental protection.

The value of intellectual capital is obtained by taking the quality of the disclosures related to the indicators mentioned above from the annual reports of the sample companies during the year of observation. Green intellectual capital disclosure quality index replicates the research conducted by Raar (2002).

4.2.2 Dependent Variable

4.2.1 Value Relevance

The relevance of the value used in this study is using the (OHLSON, 1995) because according to Wirana (2008), Mayangsari (2004 and Phansawadhi (2013), the Ohlson model produces a value that at least has an association with market prices. The Ohlson model is good in developing a more accurate valuation model. In this study, the calculation of the cost of capital is beta correction, because the trading conditions on the Indonesia Stock Exchange are not active so that the stock price used in the transaction is the previous share price. Corrective beta testing in this study uses the Dimson model; this refers to the research conducted by Soetjiono et. al. (2013).

Value relevance=

$$V_t = B_t + \Sigma E_t \frac{[(ROE_{t+1} - r_e)\, B_{t+i-1}]}{(1+r_e)^i}$$

i=1

Dimson model for correction beta testing

$$R_{i,t} = a_i + b_i{}_{-n}\, RM_{t-n} + \ldots + b_i\,0\, RM_t + b_{i+n}\, RM_{t+n} + e_i{}_t$$

4.2.3 Control Variables

The controlling variables in this study are earning per share, operating cash flow, the book value of equity, firm size, and industry sensitivity level. Earnings per share is the average profit earned by the company during

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a certain period divided by the number of shares outstanding. Operating cash flow is the total net operating cash flow divided by total assets. Book value of equity is obtained from net assets per share outstanding. Company size is seen from the logarithm of total assets. Industry sensitivity is given 1 point if the company has low environmental sensitivity and 2 point if the company has high environmental sensitivity which is a replication of (Fontana et. al., 2015).

4.3 Statistical Analysis

This study uses panel 9 data views to determine the model to be used and answer the hypothesis. The selection of regression estimates for the regression model on panel data is done by pooling least squares (Common Effect), fixed effects approach (Fixed Effect), and random effects approach (Random Effect). This is done to obtain the right model in estimating the panel data regression. In determining the best panel data regression model, two tests are carried out. First, the Chow test is used to choose between the common effect and fixed-effect model. Second, the Hausman test is used to choose between a fixed effect and random effect models. Based on the research objectives and the formed hypothesis, the equation of the regression model of this study is:

$$VR = \alpha + \beta_1 GIC + \beta_2 EPS + \beta_5 CFO + \beta_6 BE + \beta_7 CS + \beta_8 SI + \varepsilon$$

VR	= Value Relevance
GIC	= Green intellectual capital (Human capital, structural capital, relational capital)
EPS	= Earning Per share
CFO	= Cash Flow Operating
BE	= Book value Equity
CS	= company size
SI	= Sensitivity Industry
α	= Constanta
β	= coefficient regression
e	= *Error*

5. Result and Discussions

Based on data collection, the total population in this study was 183 companies registered in Indonesia Stock Exchange Year 2019, but the number of companies has registered for five years (2015-2019) was 143 companies. From this population, only 103 company data can be observed in this study. With an observation period of 5 years, the number of samples in this study become 515 data.

5.1 Analysis of Research Results

Table 1. Statistic Descriptive

	Mean	Median	Maximum	Minimum	Std. Dev.
Green intellectual capital	0.492854	0.499206	0.839947	0.068339	0.137480
Value relevance	4.360349	1.096669	70.11317	0.004142	9.782667

Table 1 above shows that the investment value of green intellectual capital in manufacturing companies in Indonesia, which is disclosed in published reports with a minimum value of 0.06 and a large maximum value of 0.839 and an average amount of information, is 0.49. This indicates that the amount of green intellectual property disclosed is an insufficient condition because it is still below 0.5 with the measurements in this study.

Furthermore, Table 2 below explains in more detail the characteristics of the GIC owned by the sample companies. The indicator that has the lowest score is entrepreneur spirit in social and environmental protection, and the indicator that has the highest value is employees attend various training or practices related to the environment; both are part of the green human intellectual capital.

Table 2. The average of the Green Intellectual Capital indicators

Green Human Intellectual Capital		Green Structural Intellectual Capital		Green Relational Intellectual Capital	
Average= 0.5219		Average=0.5044		Average=0.4521	
1	0.5737	1	0.5243	1	0.6090
2	0.6581	2	0.5968	2	0.4410
3	0.4485	3	0.5467	3	0.4782
4	0.5571	4	0.5975	4	0.5008
5	0.5399	5	0.3410	5	0.3555
6	0.3782	6	0.4395	6	0.3485
7	0.3338	7	0.4956	7	0.4317
8	0.6858	8	0.4967		
		9	0.4922		

5.2 Hypothesis Testing and Analysis

Based on the results of the data processing samples of Indonesian manufacturing companies, using the Chow test and the Hausman test, the outputs obtained are shown in Model 1 and Model 2. The results show that the hypothesis testing that can be used is the fixed model, because the results of the probability value in chi-square cross-section test and the random cross-section is 0.0000.

Table 3. Hypothesis Test (Model 1)

Variable	FIXED		
	Beta	Prob (2 tailed)	Prob (1 tailed)
C	-1.682425	0.4649	
Green intellectual capital	1.470451	0.0360	0.0180 **
Earning Per shares	6.75E-05	0.1105	0.05503*
Cash flows operating	0.773028	0.1788	0.0899*
Book value Equities	8.17E-06	0.2331	0.1666
Company size	0.164376	0.0356	0.0404**
Sensitivity industry	0.351261	0.0000	0.0000***
The goodness of Fit Model			
R-squared	0.893265		
Adj R-squared	0.864873		
F-statistic	31.46127		
Prob F-stat	0.000000		
Sample	515		

Table 4. Hypothesis test (Model 2)

Variable	FIXED		
	Beta	Prob (2 tailed)	Prob (1 tailed)
C	-1.682425	0.4649	
Green intellectual capital (Human)	0.387008	0.1657	0.0829 *
Green intellectual capital (Structural)	0.534769	0.0028	0.0014 ***
Green intellectual capital (Relational)	0.645751	0.1846	0.0923 *
Earning Per shares	6.53E-05	0.1594	0.0792 *
Cash flows operating	0.949261	0.1315	0.0653*
BV Equities	9.48E-06	0.2016	0.1008
Corporate size	0.121620	0.2217	0.1109
Corporate Sensitivity	0.349094	0.0000	0.0000***
The goodness of Fit Model			
R-squared	0.932592		
Adj R-squared	0.914238		
F-statistic	50.81229		
Prob F-stat	0.000000		
Sample	515		

*** sign < 1%, ** sign <5%, * sign < 10%

Table 3 and Table 4 show the value of the Adjusted R-Square (R2) for the two models respectively 0.864 (84%) and 0.941 (91%), this indicates that the ability of the independent variable and control variable in explaining the behavior of the dependent variable by 84% in model 1 and 91% in model 2. Meanwhile, the results of the F test for both models show a value on the Prob (F-statistic) of 0.000. If the probability value of F stat < 0.05 (alpha 5%) then Ha is accepted and Ho is rejected. It can be concluded statistically that there is at least 1 (one) independent variable that affects the dependent variable or it can be concluded that the model is feasible to use.

5.3 Discussion

H1: *Green intellectual capital has a positive effect on value relevance*.

The results of the significance test showed the probability value of 0.0180 <0.05 (alpha 5%). This statistically concludes that there is a positive influence of Green Intellectual Capital on value relevance. Based on the test results obtained, H1 is accepted.

Green intellectual capital is an asset owned by a company that can be used to support the implementation of activities related to the environment. Legitimation theory explains that companies, as independent organizations with stakeholders, should interact through various activities that are good for the environmental and social impact. Company concerns for the environment can be realized through green intellectual capital investment. With the current condition of the earth and the environment, companies that have green intellectual capital consisting of human, structural, and relations are expected to increase their competitive advantage and ultimately increase their value relevance. A company should have an advantage over the uniqueness of green intellectual capital as the development of intellectual capital with their environmental approach that is not easily imitated by its competitors.

Green intellectual capital can be disclosed as an intangible asset in its annual report. This investment in intangible assets greatly helps businesses to increase their green competitive advantage. Companies that have invested in resources and efforts in green intellectual capital cannot only meet the strict international trend with

environmental regulations and popular environmental on consumer awareness but also can finally achieve the company's competitive advantage.

The results of this study also support what is stated in the resource-based view theory (RBV), that companies compete with each other to develop green strategies by seeking to explore environmentally friendly raw materials and energy. In signal theory, the value of green intellectual capital has signaled the information submitted by the company on its advantages and uniqueness which are in line with the development of market needs to gain legitimacy from society, namely by disclosing assets that can support its concern for the environment.

This study supports several studies, namely Chen (2008b) which identified three types of green intellectual capital (human, structural, and relational) which all have a positive influence on the company's competitive advantage. Similarly, research conducted by Chen and Chang (2013) shows that green intangible assets have a competitive advantage. Intellectual capital that can affect competitive advantage and market value is shown in research by Rachmawati and Susilawati (2018), Alfraih (2017), Rao V (2016), (Vafaei et. al. (2011), Susandya et. al. (2019) and Salamudin et. al. (2010). The importance of disclosure of this uniqueness as a supporter of the company's legitimacy to increase the company's competitiveness. Rao V (2016) and Salamudin et. al. (2010) state that intangible assets can improve a company's competitive position in the market and enable a business to defend against competitors for the long term.

The long-term benefits to an entrepreneur through the intangible assets generated through green, sustainable practices in the marketplace will help the company to achieve success in the long term. Alfraih (2017) shows the importance of intellectual capital disclosure in increasing equity value. Intellectual capital disclosure has a positive and significant effect on market value. Similarly, in the research of Vafaei et. al., (2011), Intangible Capital Disclosure (ICD) has a positive effect on market prices (value relevance). Rachmawati and Susilawati (2018) state that there is an influence of intellectual capital both voluntary and involuntary on value relevance.

H2: *Green Human intellectual capital has a positive effect on value relevance.*
H3: *Green Structural intellectual capital has a positive effect on value relevance.*
H4: *Green Relation intellectual capital has a positive effect on value relevance.*

The next hypothesis testing is the influence of the dimensions of green intellectual capital consisting of human, structural, and relation on value relevance. These three dimensions has different responses, which are reflected in value relevance.

Based on the results of testing the hypothesis in Table 4 above, from the three components of green intellectual capital, namely human, structural, and relation, it is obtained evidence that the three indicators of green intellectual capital affect value relevance with different significance values, Green Human Intellectual capital has a significance value of 0.0829 (sign < 0.10), Green structural intellectual capital has a significance level of 0.0014 (sign < 0.01), Green relation intellectual capital has a significance level of 0.0923 (sign < 0.10). With the same direction, namely, green human, green structural, and green relations, it can be concluded that green intellectual capital which consists of human, structural, and relations each has a positive effect on value relevance with different significant levels.

5.3.1 Green Human Intellectual Capital and Value Relevance

Green Human intellectual capital with indicators, which are a combination of intelligence, skills, and expertise that exist in humans, is a human resource asset owned by an organization consisting of competence, innovation, knowledge, agility, and skills. This asset is one of the most valuable intangible resources for organizational growth in today's knowledge-based economy and for achieving competitive advantage to achieve sustainability (Akhtar et. al, 2015).

Human intellectual capital developed by training or education can provide better returns than investing in physical assets (physical capital) (Fahrozi, 2017). Human capital management can achieve efficiency and

effectiveness from other organizational capital. This will support the success of the organization (Putri, 2013). In today's 21st century, a company must be able to innovate, always putting its resources into generating new ideas to compete and maintain the sustainability of the organization in the long term. This is an important element that can provide benefit to the organization so that it can affect the relevance of the value or the value of sustainability (Bontis et. al., 1999; Chatzkel, Baron & Armstrong, 2007; Ng, 2008). Errinos and Rahmawati (2017) state that a company that has assets in the form of human resources with environmental capabilities can affect financial performance. In the movement towards a green economy, seeing the deteriorating condition of the natural environment, the pattern of employment experienced contrasting changes both quantitatively and qualitatively. Research conducted by Arnis et. al. (2019) has proven that the Human Capital Disclosure index (HCDI) has a positive influence on stock prices.

5.3.2 Green Structural Intellectual Capital and Value Relevance

Green structural intellectual capital has a positive effect on value relevance. A good green structural intellectual capital can increase the company's commitment and ability to compete, green structural intellectual capital can be the main driver in companies to create green intellectual capital as proven in this study. Green structural capital is expected to support infrastructure (Firmansyah, 2017), to avoid environmental damage and reduce the burden of paying fines (Huang & Kung, 2011). In this study, it is proven that green structural intellectual capital can increase the value relevance of financial information. Indicators in structural intellectual capital measure various indicators in terms of managing a company related to environmental protection and preservation. Various rules that have been made by the managers or managers of the company are used to regulate and as a guide for the implementation of environmental activities. The policies created and implemented by these managers are a positive sign for stakeholders.

This study supports that the Green Structural Intellectual capital dimension has the most positive effect on value relevance compared to Green Human Intellectual capital and Green Relation Intellectual capital. A company that has a good structure can support and motivate employees and their environment to produce the expected outputs and achieve company goals. This study produces the same evidence as research conducted by Erranos and Rahmawati (2017) and Yusoff et. al. (2019). Capital affects business sustainability but failed to provide the same evidence as research by Arnis et. al. (2019) which concludes that structural capital does not affect stock prices

5.3.3 Green Relation Intellectual Capital and Value Relevance

Ramanda and Muchtar (2015) reiterate the notion of relational capital according to Ordonez de Pablos is knowledge collected by companies as a result of collaboration with other parties and has the potential to accumulate knowledge in the future. The relational capital collaboration includes corporate image, customer loyalty, customer satisfaction, and interaction with suppliers by employees, negotiation capacity, distribution channels, supplier channels, licensing agreements, and franchise agreements (Starovic & Marr, 2003). The focus of relational capital is the level of mutual trust, respect, and kinship that arises from close interactions between internal and external partners (Kale et. al., 2000). The relational capital of companies has a positive influence on their competitive advantage (Johnson, 1999; Bontis, 1999). According to Yussof et. al. (2019), a company that has a good relational level will easily get fast and up-to-date information.

Errinos and Rahmawati (2017) state that green relational capital affects company performance. Yusoff et. al. (2019) in their research provide evidence that green relational capital affects business sustainability. Relational capital can also play a role in increasing customer profits by helping to improve quality, reliability, and flexibility, creating value for customers, through production and service delivery process innovations (Kijek, 2008 in Ramanda & Muchtar, 2015). The effect of relational capital on firm value and competitive advantage will also have an impact on market reaction; intellectual capital is believed to affect investors' assessment of the value of a company.

6. Conclusion

Adapting the perspective of the importance of environmental protection today, especially in Indonesia as a country that has a lot of natural wealth but also has a record as a country with the highest pollution level in the world. This has motivated this research to identify the actual relevance the value of green intellectual capital investment especially in Indonesian manufacturing industry companies with the third year of observation after the declaration of the digital era that requires intangible assets to maintain business continuity. The green intellectual capital measurement instrument was developed in this study by adding existing concepts to conditions in Indonesia that have not been extensively investigated in previous studies. The findings of this study have shown that green intellectual capital, which consists of human, structural, and relational has a positive influence on value relevance. This study also found that structural capital is the most important dimension in influencing value relevance compared to human and relational capital.

Suggestions that can be applied for further research, especially for research with a sample of companies in Indonesia, which are developing countries, can be considered that in the digitalization era the concept of technology investment is also needed. Whether technology investment will be a trade-off with intellectual capital investment or whether it is a compliment, because both require high costs and have different positive and negative impacts.

This research provides practical implications for several parties, namely the issuers, (managers, stakeholders and the government as national policymakers). For issuers, this research can be used as reference material that in the industrial era 4.0 and the current era of society 5.0, to achieve the sustainability of a company. Stakeholders are required to be able to prepare assets as operational support, not only for tangible fixed assets but also for intangible assets. The tendency of Indonesia's environmental conditions, which are seen by stakeholders to be deteriorating, where there are many intentional forest fires, excessive waste, makes the company's ability and awareness of the environment the main factor to get a positive reaction as reflected in the share price. Indicators of green intellectual capital (human, structural, and relational) need to be applied by companies to be able to compete and survive. This needs to be considered by managers as internal decision-makers of the company.

This research can also provide a signal to investors that companies in Indonesia, especially manufacturing companies, have begun to pay attention to intangible assets consist of intellectual capital, namely human, structural, and relation capital. Through the measurement of green intellectual capital in this research, it can be seen that companies are starting to apply environmental factors into human, structural, and relations, companies are starting to have an awareness of the importance of preserving the environment.

The government as the highest policymaker in a country plays a role in creating economic stability and the existing environment. The government must be able to read the wishes of investors on the reactions caused by the financial information of companies listed on the stock exchange. Based on the results of this study, it was found that companies must continue to increase their legitimacy with stakeholders; companies must provide as much information as possible to stakeholders so that information asymmetry can be reduced. The government must declare that the ability and sense of environmental concern in the form of investments related to the environmental domain are an obligation that must be submitted by companies in annual reports, and even better if sustainability reports are part of the reports that must be made by all companies, considering the importance of valuation that needs to be disclosed to the investors in this report.

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