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Research Article

The Effect of Environmental Social Governance, Research and Development, Intellectual Capital, and Leverage on Firm Value

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Abstract.

This research analyzes the influence of environmental social governance, research and development, intellectual capital, and leverage on firm value. Three control variables are included: size, age, and type of company. Secondary data in the form of ESG risk scores and annual reports of 22 companies listed on IDX ESG leaders for the 2018-2022 period with a total of 110 observations is used. The data analysis employs is multiple linear regression. The research results reveals that research and development influences company value, meaning that the level of R&D can impact the value and sustainability of the company. Intellectual capital influences company value, showing that increased productivity due to creativity, expertise that comes from knowledge, and the support of good systems and relationships can improve the company. Meanwhile, environmental social governance does not affect firm value because markets in developing countries are at a stage of economic growth and development that pays more attention to the scale and speed of economic growth and financial indicators than environmental, social, and governance responsibilities. Leverage does not effect firm value because changes in leverage tend not to affect stock prices in the market.

Keywords: firm value, environmental social governance, research and development, intellectual capital, leverage

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1. Introduction

The objective of a company is to optimize firm value. Firm value is a guide for investors in making decisions to invest [1]. Company value can be realized by the business's share price [2]. The rise and fall of share prices is influenced by demand, financial market supply, and public assessment of the company [3]. The pandemic of Covid-19 has had a tremendous influence on the global economy. Various policies were issued for business continuity after the Covid-19 pandemic. Recampaign for fulfilling the commitments and efforts of several countries to achieve the SDGs targets which are drivers of sustainable development is a very relevant matter to fight for. Several factors driving sustainable

development that are relevant to increasing corporate value include environmental social governance, research and development, intellectual capital, and leverage. High corporate social and environmental responsibility and good corporate governance will inspire investors to invest their capital in companies which will have an affect on enhancing firm value [4,5]. Increasing investor interests and global awareness of risks related to environmental and nonfinancial factors, for example good governance and social responsibility, are driving companies enhance efforts to focus on stakeholders [5].

Several researches have investigated the affect of ESG on firm value but achieved mixed research results. Several studies show that ESG has a positive relations with firm value [5-9] . Meanwhile, Wu et al. [10] research proves that ESG has a significant and positive influence on company value in the western and eastern regions of China, but not in the central region, because in the central region, ESG performance is considered poor compared to western and eastern regions. Several other studies expose that ESG has a negative correlation with firm value [11]. In addition, some researchers also found that ESG does not correlate with firm value.

A country's economy does not depend on natural resources but on innovation and productivity carried out by companies in producing goods or services which can be a factor in achieving sustainable economic growth [12]. Intense business competition in the market encourages company to be more competitives in innovating the products they produce. Companies must have the right strategy in dealing with the changes that have occurred after the Covid-19 pandemic. Research and development is one of the strategies to encourage the creation of innovation. However, when facing a recession, the company faced a dilemma. Some companies consider R&D to be something that is very expensive and can only be done when economic conditions are good. Some companies continue to carry out R&D because they see it as a way to develop and grow. Based on this, we conducted research to further explain the affect of R&D on firm value.

Companies today are not only based on a workforce that focuses on the production of goods or services but also involves knowledge from human resources (human capital) for the sustainability of their business [13], especially after the COVID-19 pandemic. Companies that have human resources who have high competence, commitment and capability will enhance productivity and efficiency both individually and cooperatively,

thus expanding the company's capability to produce returns for the business [14]. Knowledge (human capital) supported by a good system (structural capital), good relationships (relational capital), efficient and effective management of financial capital (capital employed), and innovation capital can help encourage economic growth in Indonesia. Because the main driving force in increasing productivity and the Indonesian economy is creativity, innovation, and expertise, brands come from knowledge. Bearing in mind that long-term economic growth depends on HR productivity.

Leverage is one of the company's fundamental factors because it can have a good or bad impact on the firm [15]. Leverage is difficult for a manager to decide because changes in debt levels can have an impact on financial risk and can cause an enhance in the capital cost [16]. Companies need to use financial resources effectively to achieve the desired level of profitability [17]. Leverage is important for the Indonesian economy, especially for improved companies on the IDX ESG leaders microsite because the condition for a company to be improved is to have good company performance [18]. One way to have good company performance is by knowing the company's solvency ratio in making decisions regarding company financial policies, both short and long term. Several studies [19,20] revealed that the use of debt has a significant negative impact on firm value. Meanwhile Al-Slehat [17] revealed that leverage has no impact on firm value.

As explained above, this study was performed to achieve empirical evidence concerning the influence of ESG, R&D, intellectual capital and leverage on firm value. To improve model fit, control variables are included. The control variable used is company size which is measured using the natural logarithm of total assets. Company age is calculated by the number of years since the company was founded and the type of company is identified using a dummy variable.

2. Literature Review

2.1. Agency theory

Jensen and Meckling as the originators of agency theory, in their article which examined the theory of the firm. Agency theory regulates agency relations which are defined as a contract between one or more parties (principal) and another party (agent), to deliver a provision on their behalf, which contains assigning decision-making authority to agents. Both principals and agents have the same goal of maximizing utility [21].

2.2. Stakeholder theory

The use of the term stakeholder arose from the work of the Stanford Research Institute in the 1960s and was developed by Igor Ansoff and Robert Stewart in Lockheed's planning department. Freeman and McVea [22], states that managers need to understand and care about employees, shareholders, suppliers, customers, creditors, and society to develop the business's goals in the long term. Stakeholder theory illustrates that firms are not only responsible for maximizing profits for shareholders but are also responsible for providing benefits to the community, social environment, and government (stakeholders) [23].

Stakeholders play a crucial role in the sustainability of the company. One of the business's efforts to maintain company sustainability is by implementing environmental, social, and governance policies. This policy is stated in the annual report and/or sustainability report to be reported to stakeholders. Stakeholder theory is also closely linked to intellectual capital because with maximum and good management of human resource potential, structural capital, employed capital, relational capital and innovation capital can create added value to promote the performance of company's financial which is a stakeholder orientation in the relevant management process [24].

2.3. Firm value

Firm value is a guide for investors in making investment decisions [1]. Firm value can be revealed in the company's stock price [2]. Rise and fall of share prices. Influenced by demand, financial market supply, and public assessment of the company [3]. Firm value is used to designate the condition of a corporation by analyzing implementation of business that applies company rules and standards properly and correctly, therefore that the good and bad conditions of the business can be seen which reflects the business's achievements in a certain period [25]. The company needs a good firm value to know and evaluate the success of the firm based on the financial activities performed. There are various dimensions of measuring firm value. Tobin's Q is a ratio applied to measure company value by dividing capitalization of market by the value of replacement assets. A business's Tobin's Q value will be classified as high if it is greater than one (>1). A high Tobin's Q value represents that the value of businness's market is greater than the value of the assets owned by the company [8].

2.4. Environmental, social, and governance

Environmental, social and governance is a set of standards that addresses three main provisions in measuring sustainability aspects. Environmental, the firm deliberates the effect of company processes on the environment in which the business controls as well as the company's role as environmental steward. Social, considering the company's associations and reputation with shareholders and the way the firm develops its stakeholders. Governance, considering corporate governance principles in managing the company. This term is commonly applied in the commercial world as a matrix used to make investment decisions in certain entities, and is used as a guiding category for reporting the influence of a company's business activities. Increasingly serious issues for example climate change, ethical supply chains, loss of natural resources and global prosperity, as well as the growing desire of investors, regulators management and other interested parties in leading business activities that help solve these problems. ESG is one of the key globally recognized considerations in investment decision-making as well as being the focus of the company's strategic and operational agenda [26].

IDX ESG Leaders is an index launched by the Indonesia Stock Exchange PT Kustodian Sentral Efek Indonesia dan PT Kliring Penjaminan Efek Indonesia with the support of OJK [27]. The launch was in the form of support for achieving the UN's sustainable development goals (SDGs) [28], a form of implementation in creating an inclusive and globally competitive capital market, as well as being a motor in realizing a healthy, stable and developing Indonesian economic sector as stated in the Roadmap of SDGs: Indonesia published by Bappenas [29]. The leaders IDX ESG is an indictor that measures the price performances of shares with strong environmental and social ratings and good governance, are not significantly controversial, and have strong financial performance. Assessment is carried out by Sustainalytics with predetermined assessment criteria and formulas and is evaluated every March and September for major evaluations, and June and December for minor evaluations. Sustainalytics is a primary independent agency involved in ESG and corporate governance research [30].

When conducting an ESG risk assessment, sustainalytics utilizes the concept of risk decomposition, which involves evaluating companies based on two dimensions of ESG issues, namely exposure and management. Exposure refers to the significant ESG risks that a company faces and greatly influences the overall ESG risk assessment. Management pertains to a company's dedication and concrete actions in addressing ESG issues through the implementation of various policies and work programs. Additionally, the ESG score assessment results in the categorization of listed companies into one of

five categories there are severe (risk score >40), high (risk score 30-40), medium (risk score 20-30), low (risk score 10-20), and negligible (risk score 0-10) [31].

2.5. Research and development

Research and development (R&D) is a form of company investment to increase sales, growth, and business sustainability. Investment in R&D plays an significant role for companies in developing sophisticated and creative new products, processes, services, and technologies to increase product competitiveness in the market. R&D can provide benefits to entities through innovation to achieve effective sales value. Researchers Del Monte and Papagni [32] state that companies that are strongly committed to R&D have higher growth rates.

2.6. Intellectual capital

Intellectual capital can be described as the totality of all abilities and knowledge that support a business to improvement and support the sustainable competitive advantages. Intellectual capital is a resource that contributes to increasing firm value [33]. Intellectual capital information disclosed in company reports should represent a source of competitive advantages, thereby leading to increased company value [24]. Intellectual capital in this study uses five components which are the development of several previous studies, namely human capital based on human resources who have the potential and abilities attached to them [24]. Structural capital is based on process, structure, culture, and support systems, both facilities and infrastructure that support employee performance in enhancing the company's intellectual capital.

Capital employed is based on physical and financial capital [33,34]. The capital used is a form of business and the firm's capability to accomplish resources in the form of capital assets. The capital used can produce greater returns for the firm and can growth the company's value if managed properly [35]. Relational capital is knowledge about marketing and the firm capability to maintain relationships between the company and external parties and the surrounding environment to maintain company sustainability [36-38] , so, the focus of relational capital is the knowledge contained in external associations with the company. Such as, brand, customers, company name, customer loyalty, business collaborations, distribution channels, license agreements, and franchises [39]. Innovation capital is based on innovation generated by human resources and explicitly lies in organizational intellectual property, business process techniques,

business design, copyrights trade secrets, patents, and other factors that can encourage increasing firm value [40].

2.7. Leverage

The leverage ratio is a ratio employed to measure the capacity of a firm's assets to be funded by debt, or the business's capacity to cover all its liabilities, both short and long-term [41]. Based on various research on the relations between ownership structure and capital structure, a high leverage ratio in a company is a negative sign of future financial problems [16]. Therefore, leverage management is very important because it will be of value to the company, if the leverage ratio is good, it will attract investors to invest.

3. Hypothesis

3.1. ESG on firm value

Environment, Social and Governance is a form of business responsibility to develop social and environmental problems that happen as a result of the business's operational activities, thus that the firm can grow sustainably. This is to the research of Liu and Zhang which shows that ESG can be beneficial and can improve the company's long-term [6]. In theory, the better the company in economic, social, and environmental aspects, the firm value will increase [10]. ESG research is focused on companies that have improved on the IDX ESG leaders microsite. Companies that implement environmental, social, and governance and have been assessed by Sustainalytics with predetermined criteria and assessment formulas [31]. Aboud and Diab's research states that companies involved in ESG indicators have higher company value. There is positive relationships between the higher a business's ranking in the indicator and the firm's value as measured by Tobin's Q [9]. From this analysis, the research hypothesis is as follows.

H_1: ESG influences firm value

3.2. Research and development on firm value

Research and development have been proven to contribute to company revenues obtained from new innovative products [42]. In the modern economy, value creation,

growth and employment opportunities are essential for innovation. Innovation encourages the creation of new companies, creates new products and services, and creates competitiveness among existing companies [43, 44]. Innovation can produce an acceleration in catching up with developing countries [45]. Research Del Monte and Papagni [32] found that innovation makes a positive contribution to the growth of companies and the country's economy. In particular, in developing countries including Indonesia. The backwardness of developing countries compared to developed countries can be developed through research and development [43].

H_2: Research and development influences on to firm value

3.3. Intellectual capital on firm value

Intellectual capital is a meaningful pillar in improving a company to create competitive advantages [46]. Intellectual capital information published is a signal for investors that can be applied as a basis for making investments decision [24]. Intellectual capital that has a positive value encourages changes in stock trading volume because investors tend to pay more for companies shares that have high intellectual capital [33], thus the firm value will increase. Companies that have human resources who have high competence, commitment and capability will enhance productivity and efficiency both individually and cooperatively, thus expanding the business's capaability to create returns for the firm [14].

Companies that employ competent employees and have high commitment (human capital) can demonstrate their productivity. This commitment and competence (human capital) desires to be maintained by good company infrastructures (structural capital), the firm's capability to handle resources in the form of capital assets (employed capital), good relationship skills (relational capital), and organizational ability to innovate, create products and new services (innovation capital). The combination of these five elements can encourage productivity and good financial performances. Good financial performing will certainly attract investors' interest in investing, which in the end can encourage an increase in share prices and company value [14]. This is supported by research results Sumedrea [12], Nuryaman [14], Ulum [24], Zeghal D [33], Wang Z et al. [34], Salvi A et al. [46-48] which reveals that capital of intellectual has a significant affect on firm value. The formulation of the hypothesis based on this explanation is.

H_3: Intellectual capital influences firm value

3.4. Leverage on firm value

Leverage ratio is a measurement of total debt divided by total assets which is employed to measure the capability of a company or industry to fulfill its debt requirements, both long and short-term debt [41]. A company is said to have a high level of debt if the amount of assets held by the company is less than the amount of assets held by its creditors. The higher the leverage ratio, the higher the risk of the business being unable to pay its creditors. The leverage ratio is an important thing in a business or company because, with the leverage ratio, investors can see and understand the capital structure they will invest.

Researchers Lestari et al. [20] found that leverage measured using DER significantly influences firm value as measured by Tobin's Q. Therefore, the research hypothesis is as follows.

H_4: Leverage influences firm value

4. Conceptual Framework

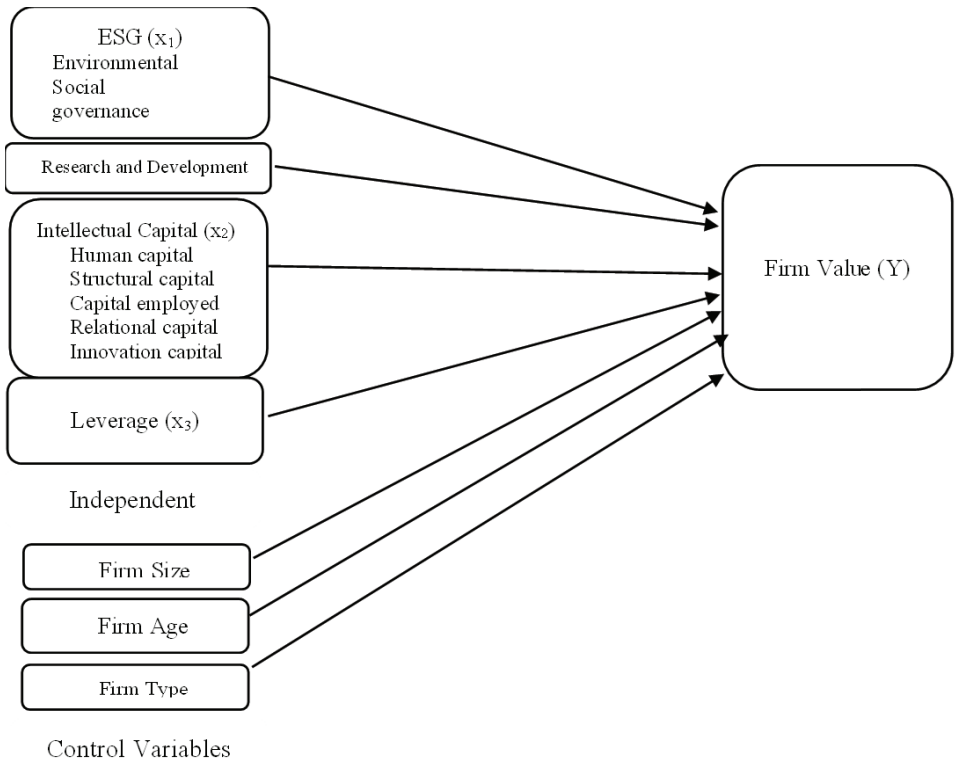

Figure 1: Conceptual framework.

5. Research Methods

This research uses quantitative methods, research design uses causality and data analysis uses multiple linear regression [49]. The dependent variable, firm value, and independent variables, namely environmental social and governance, research and development, intellectual capital and leverage as well as control variables size, age, and type of company. The study was performed on companies listed on the BEI ESG leaders, namely an index containing shares of companies with good ESG ratings. The focus of this index is to measure the price performance of several shares that meet environmental and social assessments as well as good governance, has never been contained in significant controversy, and has good financial performance and transaction liquidity. The ESG risk score can be measured via the website www.idx.co.id. Observations were carried out from 2018 to 2022, the years chosen taking into account the obtainability of up-to-date data.

5.1. Types, sources, and population

The types of data employed is polling data, applying secondary data in the form of annual reports, and determining the sample population using purposive sampling. There are several criteria used for a research population.

TABLE 1: Population and sample.

No.	Information	Amount
1.	The company is listed on IDX ESG leaders	30
3.	Financial sector companies are listed on IDX ESG	(5)
4.	New listing company	(3)
Research Sample		22

There are 30 companies listed on IDX ESG leaders, but there are 5 financial sector companies and 3 new listing companies, so there are 22 companies with 5 years of observation from 2018 to 2022, making 110 observations.

6. Research Variables

6.1. Dependent variable

In this research, the dependent variable is firm value which is proxied using Tobin's Q.

$$Tobin's\ Q = \frac{equity\ market\ value\ + total\ liabilities}{book\ value\ of\ assets}$$

6.2. Independent variables

6.2.1. Environmental, social, and governance

ESG is measured using the risk score and controversy score from Sustainalytics. The IDX ESG Leaders index calculation method uses "the Capped Free Float Adjusted Market Capitalization Weighted Average and ESG Tilt Factored". This technique adds other factors besides free-float market capitalization, thre are ESG factors, besides that the constituent weight is also capped at a maximum of 15%. The ESG factor is defined as the ESG slope factor calculated based on the z-score of the ESG risk score. The index computation formula is [18].

$$index = \frac{\sum_{i=1}^{n} (Market\ Cap_i \times Free\ Float\ Ratio_i \times ESG\ Tilt\ Factor_i)}{Base\ Market\ Cap} \times 100$$

Where:

n = number of index constituents

Market Cap_i = total listed shares x share price of shares i

ESG Tilt $factor_i$ = ESG titl factor (from the ESG risk score) of stock i

Free Float $Ratio_i$ = ratio of the number of free float shares to the number of registered shares of share i

Base Market Cap_i = Market capitalization at the base date is adjusted during the evaluations period if there is a change in the number of stocks calculated for the index

6.2.2. Research and development

Research and development in this study uses dummy variables. Score 1 if the company discloses R&D costs and score 0 for companies that do not disclose R&D costs.

6.2.3. Intellectual capital

In this research, intellectual capital is measured according to added value consisting of capital efficiency (CEE), human capital efficiency (HCE), innovation capital efficiency (InCE), structural capital efficiency (SCE), and relational capital efficiency (RCE). The combinations of these five added values are symbolized by M-VAIC, of which there are 3 (human capital, structural capital, physical capital/capital employed) were developed by Public. Then Williams and Firrer; Chen et al., Mavridis; Tan et al. have tested and adopted this concept. For relational capital/customer capital developed by Bontis et al. [36]. Innovation capital was developed [50-52]. The following are the stages of calculating M-VAIC: $CEE = VA/CE$.

Calculating VA (Value added). $VA = OUT - IN$. Out = output : total sales and other income; In = input: sales costs and other costs (other than employee costs).

Calculating CEE (Efficient Employed Capital). $CEE = VA/CE$. VA = Value added; CE = Capital Employed: available funds (equity and net profit).

Calculating HCE (human capital efficient). $HCE = VA/HC$. VA = Value added; HC = human capital: employee expenses.

Calculating RCE (relational capital efficiency). $RCE = RC/VA$. VA = Value added; RC: Relational capital: advertising and marketing costs [51].

Calculating SCE (structural capital efficiency). $SCE = SC/VA$. SCE = ratio of SC to VA; SC = Structural capital: VA – HC; VA = Value added.

Calculating innovation capital efficiency (InCE). $InCE = InC/VA$. VA = Value added; InC = Innovation capital: research and development [52].

Calculating M-VAIC. $M - VAIC = HCE + CEE + RCE + SCE + InCE$

6.2.4. Leverage

Leverage in this research is measured applying the debt to equity ratio (DER).

$$Leverage\ (DER) = \frac{debt}{equity}$$

6.2.5. Control variables

Control variables were involved in the study to improve model fit. The control variable used is firm size, assessed as the natural logarithm of total assets. Age is assessed by

the number of years since the company was founded. Industry type is measured by a dummy variable, scoring 1 for high profile firms and 0 for low profil firms.

7. Data Analysis Technique

This study employs multiple linear regression. The following is a statistical model of multiple linear regression equations.

$$NP = \alpha + \beta_1 ESG + \beta_2 R\&D + \beta_3 IC + \beta_4 L + \beta_5 Size + \beta_6 Age + \beta_7 Type + \in$$

Information:

NP : Firm Value

ESG : Environmental Social and Governance

R&D : Research and Development

IC : Intellectual Capital

L : Leverage

Size : Company size

Age : The age of the company

Type : Industrial type

α : Intercept

β1, β2, β3, β4, β5 & β6 : Regression coefficient

$\in$: Term error

The steps for multiple linear regression analysis are tests of descriptive statistical, and tests of classical assumption, including data normality tests, autocorrelation, heteroscedasticity, and multicollinearity. Model accuracy test (F-test), determination coefficient test (R^2), and variable significance test (t-test) [49].

8. Research Result

8.1. Variable significance test (t-test)

TABLE 2: Multiple linear regression test results.

Variable	Regression Coefficient	Standard Error	t-value	p-value	Hypothesis
ESG	-0.109	0.055	-1,277	0.205	H1 not accepted
R&D	0.181	0.515	2,172	0.032	H2 accepted
IC	0.270	0.063	2,801	0.006	H3 accepted
DER	0.168	0.216	1.936	0.056	H4 not accepted
Size	-0.492	0.244	-5,459	<0.001	
Age	0.544	0.011	7,485	<0.001	
Type	0.132	0.542	1,464	0.146	
Dependent Variable: Tobin's Q					

Source: SPSS processed data, 2023.

Referring to the results test in Table 2, it shows that the regression coefficient for the ESG variable is -0.109 and the t value is -1.277 (p=0.205).These results reveal that ESG has no statistical influence on firm value. This outcome is contradictory to the study [5] which asserts that ESG has a significant and positive impact on firm value. The R&D regression coefficient is 0.181 and the t value is 2.172 (p=0.032), meaning that R&D influences firm value. The regression coefficients for the intellectual capital variable is 0.270 and the t-value is 2.801 (p = 0.006). This shows that intellectual capital has a statistically significant impact on firm value. These results agree with previous findings [46] which asserted that intellectual capital had a positive significant influence on firm value.

The regression coefficient for the leverage variable is 0.168 and the t-value is 1.936 (p = 0.056). This reveals that leverage has no statistical influences. These results are inconsistent with previous research [20] which states that leverage impact firm value. The regression coefficient for the control variable company size is -0.492 and the tvalue is -5.459 (p=<0.001). This indicates that company size has a statistical effect. The coefficient of regression for the firm age control variable is 0.544 and the t-value is 7.485 (p = <0.001). This shows that the company age has a statistical affect. The regressions coefficient for the company-type control variable is 0.132 and the t-value is 1.464 (p = 0.146). This shows that the type of company has no statistical effect.

9. Discussion

9.1. Analysis of the effect of environmental social and governance on firm values

The outcome of multiple linear regression analysis in Table 2, the ESG regression coefficient is -0.109 and the t value is -1.277 (p = 0.205). This shows that ESG proxied using the index of ESG leaders combined environmental, social, and governance scores does not effect corporate value as assessed by Tobin's Q. The research results are not relevant to stakeholder theory. Apart from that, it is not in line with research found that ESG has a significant impact on firm value [5-7]. ResearchsToti GK. [3] found that ESG data originating from the Thomson Reuters ESG database influences firm value. Researchers Melinda et al. [8] state that ESG significantly and positively influences company value. This reveals that firms with good ESG performance scores have high firm value. Research Cardilo et al. [53] found that ESG factors in companies can help build resilience and increase the chances of survival during bad economic conditions. However, resilience and competitive advantage must be combined with a healthy company financial condition such as a flexible financial structure.

Researchers Ningwati et al. [54] proved empirically that ESG has a negative and significant relationships to company value. Research Triyani A et al. [55] asserts that ESG disclosure has a positive impact on company performance, meaning that firms that have good environmental performance will enhance ROE and have an effetct on enhancing firm value. Research Aboud A. [9] states that companies listed on the ESG index have high firm value. Research Jenice J et al. [56] provides empirical evidence that ESG has a negative significant impact on company performance as a proxy for ROE, However, ESG does not significantly and negatively affect PBV. Research Setyahuni et al. [57] provides findings that ESG influences a performance of company's financial. The existence of different findings can be caused by several factors, one of which is that markets in developing countries are at the stage of development and/or economic development, where developing countries pay more attention to the scale and speed of economic growth and financial indicators which often ignore environmental, social and governance responsibilities company. In contrast to markets in developed countries that have been established [11].

According to Toti GK et all. [3] states that the better the environmental practices, the greater the company's costs for implementation, this gives a bad signal to investor behavior. Investors will consider ESG activities because they require large costs that

can decrease financial performance in the short term. This results in investors being less interested in investing, resulting in decreased market demand. This is possible because investors, consumers, employees, and stakeholders cannot yet see that social, environmental, and governance responsibilities have a positive impact on companies in preserving the sustainability of the company, especially after the COVID-19 pandemic. This is by research Ruan et all. [11] which states that ESG from Chinese companies has a significant and negative relations with company performance, meaning that ESG in companies in developing countries is a serious cost burden for companies and can affect company performance. Such as, companies are faced with high costs due to energy-saving requirements, reducing company emissions, and converting outdated technologies to clean technologies. However, as time goes by, the cost impact of ESG activities will gradually weaken, and positive impacts will always emerge from these activities.

9.2. Analysis of the effect of research and development on firm value

As the outcome of multiple linear regression analysis, the R&D regression coefficient is 0.181 and the t-value is 2.172 (p=0.032), meaning that R&D has an impact on firm value. Agrees with the findings of researchers [32] stating that companies with strong commitments to R&D have higher growth rates. Companies that have developed superior products, superior technology, or superior organizational skills will be able to dominate market share. This fact implies that companies that do more R&D will have greater potential for innovation opportunities and can affect firm value. This study results support the results of research [58] which provide empirical evidences that R&D has a positive impact on the value of pharmaceutical companies. R&D can improve product quality and new patents so that it has an impact on customer satisfaction, increased profits, and investor confidence.

Researchers [59] stated that R&D has a strong correlation with high-growth companies and high-technology sectors. It is hoped that investment in R&D will always be maintained, especially in the high-tech sector, even when facing a recession. In contrast to the findings, [60] indicates that R&D in developing countries has a positive effect on less competitive companies. However, in developed countries, R&D has a positive influence on firm value in all industries. The findings of this study show that companies that carry out R&D activities can produce innovative products according to

market demand and technological developments compared to companies that do not carry out these activities.

9.3. Analysis of the effect of intellectual capital on firm value

Referring to the results of multiple linear regression analysis in Table 1, the regression coefficient value is 0.270 and the t-value is 2.801 (p = 0.006). This reveals that intellectual capital has significant impacts on firm value statistically at α= 2%. These results agree with previous research Sumedrea [12], Nuryaman [14], Zeghal et al. [33], Salvi A et al. [46], Kalkan A [48] which asserts that intellectual capital has a significant positive effect on firm value and is relevant to stakeholder theory. Research [46] states that disclosure of intellectual capital is considered very significant in evaluating company performance to improve financial performances in the long and medium term.

Research [33] states that intellectual capital plays a main role in reducing the production costs of a company and has a significant positive relations to financial performance which can increase firm value. Research [61] provides evidence that intellectual capital affects firm value proxied using ROA, ROE and implies that companies must focus on improving employee skills, maintaining relationships with stakeholders, and financial expenditures for both policies and other matters must be managed effectively to provide efficient benefits. Research [44] utters that intellectual capital has more value for a company than physical assets. Intellectual capital is a company's knowledge resources. The achievement of a company depends on the creation, discovery, and dissemination of knowledge. The company has a sustainability value if it increases knowledge because knowledge never ends and always changes, this is the basis of innovation.

This research confirms that intellectual capital is considered the main driving force in increasing productivity and the Indonesian economy because creativity, innovation, expertise, and brands come from knowledge. Knowledge supported by good systems and good relationships will be able to help encourage economic growth in Indonesia. Remembering that long-term economic growth depends on human resource productivity. The five elements of M-VAIC (CEE, HCE, SCE, RCE, InCE) have different influences on firm value. Capital employed and innovation capital has the highest significance value for firm value, then relational capital. In the meantime, structural capital and human capital have no statistical influence on firm value.

9.3.1. Analysis of the effect of capital employed on firm value

The following are the results of the regression test of capital employed on firm value.

TABLE 3: Capital employed regression test results.

Variable	Regression Coefficient	Standard Error	t-value	p-value
CEE	0.437	1,233	5,044	0.001
Dependent Variable: Tobin's Q				

Source: SPSS processed data, 2023.

Capital employed regression test to the firm value above, it is seen that the regression coefficient is 0.437 and the tvalue is 5.044 (p = 0.001). Reveals that capital utilized has a statistically significant impact on firm value at α= 0.1%. This shows that the efficiency and effectiveness of the business in managing financial capital will greatly impact the firm value. This study results are relevant to research [33] showing that capital employed is the main determinant of a firm's financial and share market performances. Capital employed is seen as a strategic resource, where companies gain superior financial performance and competitive advantage through the acquisition, ownership and management of efficiently used capital.

Research also supports research [24] and supports the statement [35] when the VAIC method was first introduced which states that a company's intellectual ability is built by physical capital or capital employed. Research [37] also shows that capital employed affects company performance. [61] Also stated that CEE has a positive and significant impact on firm value which is proxied by ROA, the use and effective management of financial capital can have a good affect on firm value.

9.3.2. Analysis of the effect of innovation capital on firm value

The following are the results of the innovation capital regression test on firm value.

TABLE 4: Innovation capital regression test results.

Variable	Regression Coefficient	Standard Error	t-value	p-value
lnCE	0.742	3,563	11,493	<0.001
Dependent Variable: Tobin's Q				

Source: SPSS processed data, 2023.

Referring to the outcomes of the regression test of innovation capital on company value above, it is realized that the regression coefficient is 0.742 and the t value is 11.493

(p = <0.001). This revelas that innovation capital has a significant affect on firm value statistically at α= 0.1%. This reveals that the higher the business's ability to innovate both process innovation and product innovation increases the firm's capability to create quality products and encourages the company's excellence not only in Indonesia but also in the global market. In the era of digitalization, without innovation, the company will not last long because the needs, wants and demands of customers change. This study results are related to researchs [48] which shows that innovation capital affects firm value. Research [61] also provides the same empirical results, where innovation capital affects firm value proxied by ROA. Research [43] states that innovation can produce an acceleration in catching up with developing countries.

9.3.3. Analysis of the effect of relational capital on firm value

Relational capital regression test on firm value.

TABLE 5: Relational capital regression test results.

Variable	Regression Coefficient	Standard Error	t-value	p-value
RCE	0.189	2,601	2,000	0.048
Dependent Variable: Tobin's Q				

Source: SPSS processed data, 2023.

As the outcomes of the relational capital regression test on company value above reveal that the regression coefficient value is 0.189 and the t-value is 2.601 (p=0.048). Reveals that relational capital has a statistically significant impact on firm value at α= 4.8%. This means that the company maintains its relationship with stakeholders to increase firm value. This finding is by research [61] which shows that relational capital affects firm value. Businesses that have good relations with stakeholders can create competitive advantages and enhance the value of the firm's market share. The empirical outcomes of this study contradict research [62] state that from several elements of intellectual capital, Relational capital is considered to have no influence on business performance compared to other elements of intellectual capital. Because increasing employee networks can be a cause of decreased performance.

9.3.4. Analysis of the effect of human capital on firm value

The following are the results of the human capital regression test on firm value.

Table 6: Human capital regression test results.

Variable	Regression Coefficient	Standard Error	t-value	p-value
HCE	0.096	0.078	1,001	0.319
Dependent Variable: Tobin's Q				

Source: SPSS processed data, 2023.

As the outcomes of the human capital regression test regarding the firm value above, the regression coefficient value is 0.096 and the t value is 1.001 (p=0.319). Indicates that human capital has no statistical impact on firm value. These results reveal that companies listed on the IDX ESG leaders have not utilized and maximized the expertise, abilities, knowledge, and ideas of their employees to increase competitive advantage in achieving value for the company. These results are in accordance with research in South Africa which shows the association between human capital and company value as measured using ROA is negative, meaning that business pay more focused attention to efforts to maximize the utilization of tangible assets rather than human capital development [63].

This study is different from the research results [24] which reveals human capital in banking companies affects firm value. This research is also different from research [62] which provides empirical evidence that human capital affects business performance, however, companies avoid investing in employees because economists state that human capital is not wholly owned by companies. Research [37] confirms that human capital influences company performance. This study results are also different from research [12] which provides empirical evidence that human capital as reflected in human abilities, knowledge, skills, and experience is an explicit factor of company growth, especially in times of crisis. Human capital can adapt to changing circumstances and survive unfavorable conditions to increase firm value. Research [61] provides empirical evidence that human capital has a significant and positive affect on firm value proxied by ROE and ROA, indicating that companies must focus on improving employee skills to increase firm value.

Human capital has no impact on firm value representing that revenue (salary, training costs, etc.) has not been able to maximize employees in generating added value for the company. There needs to be interaction between managers or directors and employees to deliver opportunities to explore the knowledge, abilities, and ideas of employees towards the company. Because knowledge that is not explored will not affect business performance positively. These results confirm research performed by [36] where human

capital does not significantly influence business performance through structural capital in service companies.

9.3.5. Analysis of the effect of structural capital on firm value

The following are the results of the structural capital regression test on firm value.

TABLE 7: Structural capital regression test results.

Variable	Regression Coefficient	Standard Error	t-value	p-value
SCE	-0.012	0.176	-0.128	0.899
Dependent Variable: Tobin's Q				

Source: SPSS processed data, 2023.

As the outcomes of the structural capital regression test regarding the firm value above, revealed that the regression coefficient value is -0.012 and the t value is -0.128 (p = 0.899). This reveals that structural capital has no statistical effect on firm value. These results indicate that companies listed on IDX ESG Leaders have not utilized structural capital optimally to increase company profits. This study results are related to researchs [37] which shows that structural capital does not affect teh value of firm. Though, it is dissimilar from the research results [14,48] which show that structural capital influences firm value. Research [12] also provides different empirical evidence, which states that structural capital influences improving company performance and company growth in the future.

Structural capital, which is reflected in databases, organizational processes, culture, information technology, and the capabilities of the company's structural system, has not been maximized so it cannot be an added value for the company. Artificial intelligence which can support structural capital has not been used properly, this could be because human resources are not ready to keep up with the increasingly rapid and unavoidable development of AI technology. Maximizing structural capital requires support from other intellectual capital components.

9.4. Analysis of the effect of leverage on firm value

Results show that the regression coefficients for the leverage variable is 0.168 and the t-value is 1.936 (p = 0.056) indicating that it has no statistical effect. The results of this studi are related to [64] which reveals that leverage has no impact on firm value. Though, it is different from research [37] which provides evidence that leverage has a

significant and negative affect on business performance. Leverage is a ratio employed to assess how much a business is financed by debt. If a business has a high level of leverage, it means that the business's capital is very dependent on debt. Though, it turns out that this is not one of the aspects that investors pay attention to, because investors see the stock returns obtained without looking at the size of the firm's debt. When a business's returns are large, investor confidence is high. This can be seen in the company PT Tower Bersama Infrastruktur Tbk. in 2018 when the company's DER ratio was high (6.91), but the share price remained high, namely at Rp. 3,600 compared to the share price in the following year, decreased from Rp. 1,230 to Rp. 950, which means investors do not pay attention to the company's DER value.

Leverage in Indonesia serves to build an economic ecosystem. The government provides support for debt loans, this can be seen from the government's policy of providing banking support to debtors affected by the spread of Covid-19. However, the decision in the selection of sources and is important because the use of high debt will add to the company's burden in the future and affect the business's financial structure and company performance. High leverage increases the risk of a company going bankrupt.

10. Conclusion

This research analyzes the influence of environmental social governance, research and development, intellectual capital, and leverage on firm value. Firm age, firm size, and firm type as control variables. The study uses panel data on companies listed on IDX ESG leaders from 2018 to 2022. The analysis results reveal that R&D and intellectual capital are established to be able to drive and increase firm value. Meaning that the size of the value R&D and intellectual capital causes the rise and fall of firm value. Intellectual capital in this study was modified from previous studies using five elements, namely structural capital, human capital, innovation capital, employed capital, and relational capital. Environmental social governance does not affect corporate value as measured using Tobin's Q, this is due to the low awareness of stakeholders on ESG. Likewise, leverage does not impact firm value, this is because changes in leverage tend not to affect stock prices in the market.

Suggestions and Recommendations

As is common in empirical research, this study results have limitations, where the selection of research objects is limited to companies listed on the IDX as ESG leaders. It would be advisable for future researchers to expand the scope of ESG variable research literature by adding samples from several other developing countries and several developed countries.

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