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Assessing the Linkage Between Sustainability Reporting and Indonesia's Firm Value: The Role of Firm Size and Leverage

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Abstract

Sustainability reporting is widely regarded as an essential factor in enhancing a firm's value. In light of its importance, this study examines the impact of three sustainability reporting indicators - sustainability reporting disclosure, sustainability reporting index, and sustainability reporting score - on firm value, as well as determining the role of firm size and leverage. Utilizing a sample of 200 companies listed on the Indonesia Stock Exchange (IDX) during the research period from 2013 to 2021, the results of panel data regression reveal that two of the three indicators have a significant impact on firm value. Specifically, the sustainability reporting index exerts a positive impact, while the sustainability reporting score has a negative effect on firm value. Furthermore, path analysis estimations reveal that sustainability reporting mediates the positive relationship between firm size and firm value. This study's empirical findings underscore that sustainability reporting plays a pivotal role in shaping a firm's value, and these insights can be valuable for businesses and investors seeking to understand the financial implications associated with sustainability reporting.

1. Introduction

Sustainability reporting can influence a firm's value through various channels, including the enhancement of its reputation and brand image, improved access to capital and reduced borrowing costs, better risk management, operational efficiency gains, compliance with regulations, increased employee engagement and retention, competitive advantage, and stronger stakeholder relations [1–3]. The extent of this impact can vary depending on factors such as the quality of reporting, industry context, and broader economic conditions. These effects may manifest over the long term as sustainability practices become increasingly

integral to a company's strategic framework and decision-making processes, while also contributing to a socially responsible business ecosystem [4–6].

Financial Services Authority (OJK) Regulation No. 51/POJK.03/2017 mandates the integration of sustainable finance principles into the business activities of financial institutions, including banks, insurance companies, and non-bank financial institutions in Indonesia. It requires these institutions to incorporate Environmental, Social, and Governance (ESG) considerations into their risk management and reporting processes [7]. The Indonesia Stock Exchange (IDX) has also issued regulations requiring listed companies to disclose their sustainability performance. Despite the IDX encouraging listed companies to submit sustainability reports voluntarily, there is no mandatory requirement. However, this could change in the future as Indonesia aligns its regulations with global sustainability reporting standards [8].

Sustainability reporting is the practice of organizations openly disclosing their environmental, social, and governance (ESG) performance, encompassing aspects such as carbon emissions, labor practices, community engagement, and ethical governance [9–12]. This transparent communication, guided by the frameworks of the Global Reporting Initiative (GRI), serves to inform investors, customers, and the public about an organization's commitment to ESG issues and its progress in addressing them [13–15]. Sustainability reporting facilitates improved risk management, enables the identification of opportunities, and supports long-term value creation. It also promotes responsible, clean management without corrupt behavior, enhancing the company's market competitiveness, and encouraging accountable business practices in an increasingly ESG-conscious world. Additionally, it helps prevent natural disasters that may occur as a result of mismanagement. [16–20].

This study uses stock price as a measure of firm value. Positive ESG performance disclosed through sustainability reporting can attract socially responsible investors, increasing demand for the stock and potentially driving up its price, while poor ESG performance can lead to stock price declines due to concerns about long-term risks, which, in turn, affects the firm’s value in general [21–23]. Moreover, it suggests that companies that engage in sustainability reporting may be better equipped to manage the impact of their asset size and leverage on their overall value because they are more transparent about their ESG practices [24–26].

Earlier investigations involving 97 prominent German publicly traded companies have established a noteworthy correlation between a company's value and its adherence to sustainability reporting following GRI guidelines [27]. Furthermore, research conducted on publicly listed firms in Singapore, along with empirical findings, indicate a positive connection between sustainability reporting and a company's market value [28]. Moreover, a study encompassing 200 listed companies in Australia has revealed a significant and favorable relationship between the anticipated future performance of a firm's value and the quality of its sustainability reporting [29].

Another study, involving 297 publicly traded Turkish companies, revealed an improving trend in report quality based on the GRI and confirmed the relevance of the relationship between sustainability reporting and firm value [30]. Moreover, a study conducted on 220 listed companies in Sri Lanka provided empirical results demonstrating a positive relationship between sustainability reporting and firm market value [31]. Furthermore, a study involving 223 listed manufacturing companies in India indicated a positive and significant association between sustainability disclosure and firm value [32].

Multiple studies have also explored the link between sustainability reporting and a firm's value in Indonesia. For instance, research involving 74 publicly traded companies on the IDX between 2014 and 2015, determined that the economic aspect of sustainability reporting significantly influences a firm's value. However, this study had a relatively short timeframe [33]. Another study, spanning the years 2010 to 2016 and encompassing 84 Indonesian and Malaysian listed companies, discovered a significant positive relationship between external assurance of sustainability reports and a firm's value. But, this study excluded the financial industry [34]. A different investigation, which covered the period from 2013 to 2017 and involved 37 firms, found that disclosing sustainability reports has a positive impact on a firm's value. Similarly, the study used a relatively small sample size [35].

This study aims to examine the relationship between sustainability reporting and firm value, as well as the role of sustainability reporting in moderating the impact of firm size and leverage on firm value, utilizing a sample of 200 listed Indonesian companies on the IDX spanning the period from 2013 to 2021. The objective of this study is to provide more comprehensive empirical evidence by incorporating a wider dataset and filling the gap that still exists in the literature regarding the importance of

Table 1. Variable synopsis.

Variable	Units (Sources)	Variable's detail
FIRM VALUE (FV)	Rupiah (YF)	The company's market value is determined by multiplying the number of shares outstanding by the current price at which the shares are selling on the applicable stock exchange.
SUSTAINABILITY REPORTING DISCLOSE (SRD)	Item (ESGI)	The number of items disclosed in sustainability reporting.
SUSTAINABILITY REPORTING INDEX (SRI)	Item (ESGI)	The total number of GRI items used as the basis for sustainability reporting.
SUSTAINABILITY REPORTING SCORE (SRS)	Percentage (ESGI)	The ratio of the number of items disclosed in sustainability reporting and total GRI items used.
FIRM SIZE (FS)	Rupiah (ESGI)	Total assets consist of fixed assets, current assets, and other assets held by the company.
LEVERAGE (LV)	Percentage (ESGI)	The debt-to-total assets ratio.

sustainability reporting, which is regarded as an essential factor in enhancing a firm's value.

2. Materials and Methods

The study's population encompassed all companies listed on the IDX as of December 31, 2021, totaling 766 firms. To determine the sample, a purposive sampling technique within the non-probability sampling category was employed. This technique is characterized by the specific selection of the sample based on the research objectives [36]. The criteria for selecting the sample in this study were companies that had published a sustainability report at least once during the period from 2013 to 2021. This study selected the period from 2013 because it corresponds to the release year of the latest sustainability disclosure standard by the GRI, namely GRI G4, published in 2013. Based on the data obtained, out of 766 IDX companies, 200 companies published sustainability reporting during the 2013-2021 study period. Due to some companies not publishing sustainability reports regularly during the data period, this study employed an unbalanced panel data approach to facilitate econometric estimation. The data used in this study were obtained from Yahoo Finance (YF) [37] and ESG Intelligence (ESGI) [38]. Detailed information about the variables used in this study is available in Table 1.

2.1. Panel Data Regression

Panel data regression is a statistical analysis method to study the relationships between variables in datasets that combine both time-series and cross-sectional data. This approach is essential for investigating how factors impact outcomes over time while considering individual variations [39].

To assess the relationship between firm value and the explanatory factors, this paper defines firm value as a function of firm size, leverage, and sustainability reporting indicators. Thus, the firm value function can be formulated as follows:

$$\mathrm{FV_{it}} = f(\mathrm{FS_{it}}, \mathrm{LV_{it}}, \mathrm{SR_{it}}) \quad (1)$$

Where FV represents firm value; FS represents firm size; LV stands for leverage; and SR stands for sustainability reporting indicators.

Therefore, the econometric model representing the relationship is given in equations 2, 3 and 4.

$$\mathrm{LnFV_{it}} = \beta_0 + \beta_1 \mathrm{LnFS_{it}} + \beta_2 \mathrm{LV_{it}} + \beta_3 \mathrm{LnSRD_{it}} + \varepsilon_{it} \quad (2)$$
$$\mathrm{LnFV_{it}} = \beta_0 + \beta_1 \mathrm{LnFS_{it}} + \beta_2 \mathrm{LV_{it}} + \beta_3 \mathrm{LnSRI_{it}} + \varepsilon_{it} \quad (3)$$
$$\mathrm{LnFV_{it}} = \beta_0 + \beta_1 \mathrm{LnFS_{it}} + \beta_2 \mathrm{LV_{it}} + \beta_3 \mathrm{SRS_{it}} + \varepsilon_{it} \quad (4)$$

Where SRD stands for sustainability reporting disclosure; SRI denotes sustainability reporting index; SRS signifies sustainability reporting score; β_0 represents the model intercept; β_1, β_2, and β_3 represent the variable coefficients; and ε represents the error term.

2.2. Path Analysis

Path analysis is a method used to examine causal connections by employing multiple linear regression techniques. In this approach, the impact of an independent variable of firm size and leverage on a dependent variable of firm value is assessed indirectly, mediated by an intermediate variable of sustainability reporting indicators [40].

The study's path analysis involves two sub-structural models, with the first sub-structural model written in equations 5 to 10, respectively.

$$\mathrm{LnSRD_{it}} = \beta_0 + \beta_1 \mathrm{LnFS_{it}} + \varepsilon_{it} \quad (5)$$
$$\mathrm{LnSRI_{it}} = \beta_0 + \beta_1 \mathrm{LnFS_{it}} + \varepsilon_{it} \quad (6)$$
$$\mathrm{SRS_{it}} = \beta_0 + \beta_1 \mathrm{LnFS_{it}} + \varepsilon_{it} \quad (7)$$
$$\mathrm{LnSRD_{it}} = \beta_0 + \beta_1 \mathrm{LV_{it}} + \varepsilon_{it} \quad (8)$$
$$\mathrm{LnSRI_{it}} = \beta_0 + \beta_1 \mathrm{LV_{it}} + \varepsilon_{it} \quad (9)$$
$$\mathrm{SRS_{it}} = \beta_0 + \beta_1 \mathrm{LV_{it}} + \varepsilon_{it} \quad (10)$$

Table 2 Results of Chow test.

Effect Test	Statistic			d.f.			Prob.		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Cross-section F	22.89	22.96	23.24	(198,37)	(198,37)	(198,37)	0.0000	0.0000	0.0000
Cross-section Chi-square	1479.14	1480.89	1487.13	198	198	198	0.0000	0.0000	0.0000

Table 3. Results of Hausman test.

Test Summary	Chi-Sq. Statistic			Chi-Sq. d.f.			Prob.		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Cross-section random	26.71	17.09	18.24	3	3	3	0.0000	0.0007	0.0004

Table 4. Results of panel data regression based on fixed effect model.

Variable	Model 1	Model 2	Model 3
C	5.0798 (2.48)**	1.2227 (0.46)	2.5927 (1.14)
LnFS	0.0787 (1.14)	0.1586 (2.05)**	0.1607 (2.09)**
LV	-0.3686 (-2.09)**	-0.3221 (-1.83)	-0.3433 (-1.96)**
LnSRD	-0.0509 (-0.71)	-	-
LnSRI	-	0.2627 (2.35)**	-
SRS	-	-	-0.3516 (-2.49)**
Adjusted R^2	0.9178	0.9189	0.9191
F-Statistic	32.7796 (0.00)*	33.2489 (0.00)*	33.3095 (0.00)*

Note: Significant *(1%), **(5%)

Subsequently, the second sub-structural model is denoted by equations 11 to 16, respectively.

$$\mathrm{LnFV_{it}} = \beta_0 + \beta_1 \mathrm{LnFS_{it}} + \beta_2 \mathrm{LnSRD_{it}} + \varepsilon_{it} \quad (11)$$
$$\mathrm{LnFV_{it}} = \beta_0 + \beta_1 \mathrm{LnFS_{it}} + \beta_2 \mathrm{LnSRI_{it}} + \varepsilon_{it} \quad (12)$$
$$\mathrm{LnFV_{it}} = \beta_0 + \beta_1 \mathrm{LnFS_{it}} + \beta_2 \mathrm{SRS_{it}} + \varepsilon_{it} \quad (13)$$
$$\mathrm{LnFV_{it}} = \beta_0 + \beta_1 \mathrm{LV_{it}} + \beta_2 \mathrm{LnSRD_{it}} + \varepsilon_{it} \quad (14)$$
$$\mathrm{LnFV_{it}} = \beta_0 + \beta_1 \mathrm{LV_{it}} + \beta_2 \mathrm{LnSRI_{it}} + \varepsilon_{it} \quad (15)$$
$$\mathrm{LnFV_{it}} = \beta_0 + \beta_1 \mathrm{LV_{it}} + \beta_2 \mathrm{SRS_{it}} + \varepsilon_{it} \quad (16)$$

Furthermore, once the estimation results for both sub-structural models are obtained, the study employs three path analysis tests: the Sobel test, Aroian test, and Goodman test, to assess the significance of the indirect influence of the independent variable on the dependent variable through the mediating variable. The Aroian and Goodman variants of the test distinguish themselves from the Sobel variant by incorporating the product of the variance estimates for the coefficients. However, in general, outcomes from all three tests tend to converge since the product of the variances tends to be of minor significance. The calculation formula is presented in equations 17-19.

$$Sobel: t = \frac{ab}{\sqrt{(b^2.SEa^2 + a^2.SEb^2)}} \quad (17)$$

$$Aroian: t = \frac{ab}{\sqrt{(b^2.SEa^2 + a^2.SEb^2 + SEa^2.SEb^2)}} \quad (18)$$

$$Goodman: t = \frac{ab}{\sqrt{(b^2.SEa^2 + a^2.SEb^2 - SEa^2.SEb^2)}} \quad (19)$$

Where t is the path analysis test value; a is the coefficient value of the LnFS and LV influence on LnSRD, LnSRI and SRS in the first sub-structural model; b is the coefficient value of the path of influence of LnSRD, LnSRI and SRS on LnFV in the second sub-structural model; SE is the standard error value.

3. Results and Discussion

3.1. Model Selection Test

The first step in panel data regression is to determine the most suitable model for the research data. The first assessment involves the Chow test, which aims to establish the superior model between the common effect model and the fixed effect model. Upon examining the results presented in Table 2, it becomes evident that the probability value of the cross-section chi-square is 0.00, which is below the significance level of 0.05. Therefore, it can be concluded that, according to the Chow test, the preferred choice is the fixed effect model.

The second assessment for identifying the superior panel data regression model involves the Hausman test, which seeks to determine whether the fixed effect model or the random effect model is more suitable. According to the

Table 5. Path analysis results of firm size effect on firm value mediated by sustainability reporting indicators.

Variable	Path Analysis 1		Path Analysis 2		Path Analysis 3	
	Coefficient	**Standard Error**	**Coefficient**	**Standard Error**	**Coefficient**	**Standard Error**
	Dependent Variable: LnSRD		Dependent Variable: LnSRI		Dependent Variable: SRS	
C	-1.0837	1.4788	14.8370	0.9530	-0.0070	0.0031
LnFS	0.1699	0.0490	-0.3382	0.0316	0.0201	0.0002
	Dependent Variable: LnFV					
C	4.9619	2.0675	0.7905	2.6322	2.3726	2.2894
LnFS	0.0759	0.0696	0.1639	0.0777	0.1623	0.0772
LnSRD	-0.0489	0.0723	-	-	-	-
LnSRI	-	-	0.2847	0.1113	-	-
SRS	-	-	-	-	-0.3666	0.1417
Results of Path Analysis	Sobel: t = -0.6638		Sobel: t = -2.4879*		Sobel: t = -2.5863*	
	Aroian: t = -0.6387		Aroian: t = -2.4777*		Aroian: t = -2.5862*	
	Goodman: t = -0.6921		Goodman: t = -2.4982*		Goodman: t = -2.5864*	

Note: Significant *(1%), **(5%)

Table 6. Path analysis results of leverage effect on firm value mediated by sustainability reporting indicators.

Variable	Path Analysis 4		Path Analysis 5		Path Analysis 6	
	Coefficient	**Standard Error**	**Coefficient**	**Standard Error**	**Coefficient**	**Standard Error**
	Dependent Variable: LnSRD		Dependent Variable: LnSRI		Dependent Variable: SRS	
C	4.0536	0.0693	4.7366	0.0500	0.0485	0.0047
LV	-0.0253	0.1288	-0.1858	0.0929	0.8166	0.0172
	Dependent Variable: LnFV					
C	7.3937	0.3026	6.5274	0.4737	7.3606	0.1163
LV	-0.3647	0.1764	-0.3356	0.1769	-0.3471	0.1761
LnSRD	-0.0364	0.0709	-	-	-	-
LnSRI	-	-	0.1517	0.0980	-	-
SRS	-	-	-	-	-0.2114	0.1250
Results of Path Analysis	Sobel: t = 0.1835		Sobel: t = -1.2241		Sobel: t = -1.6901	
	Aroian: t = 0.0884		Aroian: t = -1.1384		Aroian: t = -1.6898	
	Goodman: t = N/A		Goodman: t = -1.3327		Goodman: t = -1.6905	

Note: Significant *(1%), **(5%)

test results presented in Table 3, the probability value for the cross-section random is recorded as 0.00, which is less than the significance level of 0.05. Consequently, it can be deduced that, based on the Hausman test, the preferred model is also the fixed effect model.

3.2. Panel Data Regression

The impact of sustainability reporting on firm value, in the form of firm stock price can be complex and multifaceted. Effective and transparent sustainability reporting can have a positive influence on a firm's stock price by attracting socially responsible investors who may be willing to pay a premium for companies with strong ESG credentials. It can also enhance brand reputation and foster consumer loyalty, and these factors are essential for maintaining good firm value. On the other hand, larger firms often have a more established presence, access to resources, and diversified revenue streams, and these factors can contribute to higher stock prices, leading to an increase in firm value. Conversely, excessive leverage can significantly harm a firm's stock price. High levels of debt can increase financial risk, making investors nervous. If the company struggles to meet its debt obligations or if interest rates rise, it can lead to a decline in stock price as investors perceive higher risk, and this can harm firm value.

The results of the estimation of sustainability reporting's impact on firm value, as shown in Table 4, are statistically significant, especially in the decomposed form of sustainability reporting index and sustainability reporting score. Specifically, an increase in the sustainability reporting index by 1.0% can increase firm value by 0.2627%. Interestingly, findings show a negative effect on firm value for the sustainability reporting score, where an increase of 1.0% can potentially reduce firm value by

0.3516%. Despite the different coefficients found for both components of sustainability reporting, this study proves that sustainability reporting significantly affects firm value, aligning with theory and previous studies [27–32], providing more empirical evidence to the literature on firm value determinants.

Additionally, Table 4 also demonstrates the significant positive impact of firm size on firm value, and the significant negative impact of leverage on firm value. Specifically, an increase in firm size by 1.0% will positively affect firm value by 0.1586% when the sustainability reporting index variable is included in the model, and by 0.1607% when the sustainability reporting score variable is included in the model. These findings are in line with theory and supported by previous research [41–45]. Conversely, an increase in leverage by 1.0% will potentially decrease firm value by 0.3686% when the sustainability reporting disclosure variable is included in the model, and by 0.1607% when the sustainability reporting score variable is included in the model. This evidence is also in line with theory and is supported by previous studies [46–50].

3.3. Path Analysis

This study also delves into how sustainability reporting can mediate the relationship between firm size and leverage in impacting the firm value. The study employs the Path Analysis method, which includes the Sobel test, Aroian test, and Goodman test. This method assesses the statistical significance of the impact that independent variables have on the dependent variable while considering the mediating variable. It does so by analyzing the coefficients and standard error values derived from the regression outcomes.

Table 5 demonstrates the significance of Path Analysis 2 and Path Analysis 3, as confirmed by all test results. This implies that sustainability reporting plays a substantial mediating role in influencing the relationship between firm size and firm value. The finding gives this study a novelty and fills the gap in the literature regarding empirical evidence, which was lacking in some previous studies [51–53].

Conversely, Table 6 reveals that, according to all test results, there is no significance in any of the Path Analysis models. This suggests that sustainability reporting does not play a mediating role in impacting the relationship between leverage and firm value. By employing a more comprehensive data observation, this discovery also offers a similar empirical perspective as previous studies [54, 55], and can contribute more robust evidence to the literature.

4. Conclusions, Implications and Limitations

This study demonstrates that sustainability reporting plays a pivotal role and has a significant impact on firm value. Specifically, sustainability reporting index has a positive impact, while sustainability reporting score exerts a negative effect on firm value. Similarly, firm size exhibits a strong positive influence on firm value, while leverage is proven to have a negative impact on firm value. Additionally, sustainability reporting is also found to significantly mediate the positive relationship between firm size and firm value.

Implications from this study emphasize the need to invest more resources in the development of comprehensive sustainability reports as part of a company's strategic initiatives. Simultaneously, it highlights the strong influences of firm size and leverage on firm value, calling for the prudent management of these factors in corporate strategies. Furthermore, sustainability reporting emerges as a valuable mediator in the relationship between firm size and firm value, offering firms an avenue to differentiate themselves and gain competitive advantages. Policymakers must also consider taking a role in implementing mandatory reporting regulations to promote transparency and responsible practices.

On the other hand, it is also important to acknowledge the limitations of this study. The primary limitation is the use of unbalanced panel data, as not all companies issued sustainability reports each year during the study period. It is anticipated that the introduction of mandatory regulations, requiring companies to publish annual sustainability reports, will enable future researchers to utilize balanced panel data with either an equivalent or larger sample size, thereby yielding more robust research results.

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