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Environmental Performance and Firm Value: Profitability as a Moderator

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Abstract

The objective of this study was to ascertain how the firm's value is influenced by environmental performance, using profitability as a moderating factor. Additionally, it sought to compare firm value, profitability, and ecological before, during and after Covid-19. The study used secondary data for a sample size of 50 manufacturing companies and participants in PROPER from 2019 to 2022. The results show no discernible relationship between firm value and environmental performance. The correlation between firm value and environmental performance is strengthened by the noteworthy positive moderation effect of probability. The firm value continued to drop both during and after the Covid-19 era. Environmental performance and profitability during COVID-19 show a decrease, but after 2022, both tend to be able to increase again, similar to the pre-COVID-19 period. The originality of this research lies in examining the comparisons before, during and after COVID-19 on environmental performance, firm value and profitability. Future research ideas include utilizing additional independent variables (e.g., CSR, company size, board of commissioners) that can impact firm value, as well as using alternative environmental performance measurements other than PROPER.

JEL Classification: L25, O13, P18

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Introduction

Climate change and global warming have been the most important environmental issues over the past two decades (Daradkeh et al., 2023). The issue of climate change was also discussed at the annual World Bank and International Monetary Fund conference to strengthen countries' resilience to climate change (IMF, 2023). Climate change threatens human existence in the world today, leading various stakeholders to continuously pressure companies to disclose information about their actions impacting climate change (Daradkeh et al., 2023). This pressure is one of the consequences of various cases of environmental impacts by industries.

One case of environmental pollution by companies is the case of PT. Maju, PT. Wahana Sumber, PT. Pindo, and PT Unitama. In August 2023, the Ministry of Environment and Forestry stopped industrial operations activities because they caused air pollution in the Jakarta area (Setiawan, 2023). The Ministry is also monitoring five other companies, including two metal smelting companies, two paper mills, and one cement plant suspected of causing environmental pollution in their operational activities (Setiawan, 2023). These manufacturing companies produce sulfur dioxide, nitrogen oxide, particulate matter, and mercury pollution that spread in the earth's atmosphere and endanger human health (Setiawan, 2023).

These cases of environmental pollution have led to a decrease in firm value (Kodriyah et al., 2023). The decrease in firm value is due to public assessment and the competitiveness of competitor companies whose operational activities are environmentally friendly. A decrease in firm value will lead to investment doubts by shareholders. Firm value aligns with the welfare of shareholders (Purbawangsa et al., 2020). Stakeholder perceptions of a company's success in managing environmental resources will increase the company's value (Asiaei et al., 2022).

Companies' efforts to increase firm value by implementing environmental policies measured through environmental performance achievements. The relationship between firm value and environmental performance can link economic and environmental aspects (Damas et al., 2021). Environmental performance includes steps taken by companies to protect and maintain environmental sustainability (Damas et al., 2021). The government also supports the environmental performance of companies, as stipulated in Minister of Environment and Forestry Regulation Number One of 2021 (Damas et al., 2021).

According to previous studies, firm value can be influenced by several factors, including culture (D' Costa & Habib, 2024; Fang et al., 2023), innovation (Choi & Yoo, 2022; J. Li et al., 2024; Pasirayi & Fennell, 2021; Poretti et al., 2024), financial instruments (Das & Kumar, 2023; Ji & Wei, 2023; Kim, 2023), taxes (Dyussembina & Park, 2024; Khaoula & Moez, 2019; Na et al., 2021), marketing strategies (Andersson et al., 2023; Bardos et al., 2020; Kumar et al., 2021; Xiao et al., 2024). However, besides the aforementioned factors, firm value can also be influenced by environmental performance (Basse Mama & Mandaroux, 2022; Zhang et al., 2020). On one hand, the research by Asnita and Wahidahwati (2019); Goldie Kelly and Deliza Henny (2023) indicates that environmental performance does not affect firm value. On the other hand, Apriandi and Hexana Sri Lastanti (2023); Kurnia et al. (2021); Mardiana and Wuryani (2019) found a positive relationship between them, while the research by Aydoğmuş et al. (2022); Kurnia et al. (2021); Li et al. (2020) found a negative relationship. The study by Kurnia et al. (2021) resulted in different findings, with positive results obtained from data on Indonesian companies while negative results were obtained from data on Australian companies. Based on this, the inconsistency of research results related to environmental performance with firm value can be seen.

The inconsistency of previous study findings creates a gap in the study, so this study plans to fill that gap by using profitability as a moderating variable. Not only the inconsistency of previous studies, but there is also a debate regarding environmental policies towards firm value. The debate over the cause of the decline in firm value is due to high environmental costs such as cost of goods sold, company operational costs, which

affect the decrease in company profitability (Apriandi & Hexana Sri Lastanti, 2023). Another difference from previous research is that this research data uses data from 2019 to 2022 where the Covid-19 pandemic hit the world in 2020, therefore, this study will compare before, during, and after Covid-19 on firm value, profitability, and environmental performance. Firm value, profitability, and environmental performance are vulnerable to the impact of Covid-19 due to the large-scale social restriction policy that can disrupt company operational activities and the consumption level of society.

Legitimacy theory according to Dowling and Pfeffer (1975) It is a theory that states that companies' search for legitimacy from the public is done by maintaining the alignment of social norms and values with firm values. The legitimacy theory can explain the influence between firm value and environmental performance. The performance of the company related to the environment reflects the company's role in the environment in its operational activities. In Indonesia, environmental performance is assessed by the Ministry of Environment and Forestry according to the PROPER rating, which indicates the company's image in terms of the environment. Companies that receive a black rating indicate abysmal environmental performance, while companies that receive a gold rating mean that the company's environmental performance is excellent. Companies that receive a black rating are usually subject to reprimands and sanctions from the relevant Ministry, and the public can access this through news or the Ministry's official website. This causes public assessment of a company's environmental performance to affect the company's value. As a result, the public may switch consumption from companies with poor environmental performance to companies with good environmental performance.

According to several studies, firm value is influenced by environmental performance Basse Mama and Mandaroux (2022); Zhang et al. (2020), but other studies have found that firm value is not affected by environmental performance (Asnita & Wahidahwati, 2019; Goldie Kelly & Deliza Henny, 2023). Further studies have found a positive relationship between firm value and environmental performance Apriandi and Hexana Sri Lastanti (2023); Kurnia et al. (2021); Mardiana and Wuryani (2019), while the research by Aydoğmuş et al. (2022); Kurnia et al. (2021); Li et al. (2020), found a negative relationship. From the explanation above, the following hypothesis can be drawn:
H1: *Firm value is influenced by environmental performance*

Legitimacy theory according to Dowling and Pfeffer (1975) is a theory that states the search for legitimacy from the public by companies is done by maintaining alignment of social norms and values with firm values. Signaling theory according to Spence (1973) explains that company management provides data to investors as a signal that the company stands out in competition with competitors. Investors use this information as a basis for deciding to invest.

Based on these two theories, companies will engage in environmental activities to comply with environmental policies. More companies present environmental disclosures to survive in business competition with competitors. The public responds positively to this by improving environmental performance by not polluting the environment. The government also plays a role in company policies related to the environment. The public, the government, and investors or shareholders pay special attention to companies related to these policies by assessing companies mitigating environmental impacts from company operational activities. Environmental performance can affect firm value because of shareholder pressure, causing companies to incur high costs to measure, report, and monitor pollution levels. These costs can also affect profitability. Not only are environmental policies given special attention, but shareholders will also definitely look at the profitability of a company in making investments, and this is related to the value of a company.

Several studies have stated that environmental performance affects firm value with profitability moderation (Fitriani & Purnamasari, 2023; Goldie Kelly & Deliza Henny, 2023). The study conducted by Goldie Kelly and

Deliza Henny (2023) found profitability can moderate, while the study by Fitriani and Purnamasari (2023) cannot moderate. Based on this explanation, the following hypothesis can be drawn:
H2: *Firm value is influenced by environmental performance with profitability moderation*

Based on the problems related to the environment that have attracted the attention of various parties and have an impact on firm value, as well as some inconsistencies from previous studies that become the background of this study. How environmental performance affects firm value with profitability is the goal of this study. This study uses the following theoretical framework:

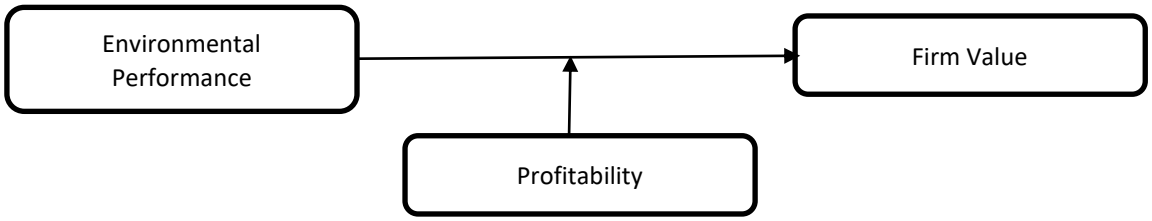

Figure 1. Theoretical Framework

Research Methodology

This causal study uses a quantitative approach with secondary data in the form of annual reports and PROPER ratings. The subjects of this study are business entities listed on the Indonesia Stock Exchange during the years 2019 – 2022, with sample selection criteria using purposive sampling. The research sample calculation is shown in Table 1:

Table 1. Calculation of Research Sample

Criteria	Number
Manufacturing business entities listed on the IDX in 2019-2022 Manufacturing business entities are selected because in the production process the use of hazardous materials can significantly affect the environment (Tawalbeh et al., 2021).	311
Manufacturing business entities not participating in the Ministry of Environment and Forestry's PROPER in 2019-2022	(252)
Manufacturing business entities that did not disclose complete financial statements during 2019-2022	(9)
Total Samples	50
Total observations (4 x 50)	200

Source: data processed 2023

Environmental performance is the independent variable, firm value is the dependent variable, and profitability is the moderating variable in this study.

Table 2. Operational Definitions of Study Variables

Variable	Indicator	Operational Definitions	Measurement
Environmental Performance	PROPER Rating	Environmental performance is the performance of a company in contributing to the preservation and conservation of the environment	Criteria for PROPER rating: 1 = Black 2 = Red 3 = Blue 4 = Green 5 = Gold (Ramadhani, Saputra, & Wahyuni, 2022)

Firm Value	Tobin's Q	Firm value describes the level of success in conducting its business	Tobins Q = $\frac{\text{MVE} + \text{PS} + \text{Total Liabilitas}}{\text{Total Assets}}$ MVE= Price per share multiplied by the number of outstanding shares PS= Liquidation value of outstanding preferred shares
Profitability	ROA	Profitability is used to see the company's success in achieving effective profits in a period	ROA = $\frac{\text{Net Profit}}{\text{Total Assets}}$

Source: data processed 2023

Descriptive statistical analysis, regression modeling, classic assumption testing, and hypothesis testing are used in this research methodology.

Result and Discussion

Descriptive Data Analysis

Statistical data summary includes the most diminutive, maximum, and average values to determine the evaluation of changes in each average on the research variables. Environmental performance is measured using a Likert scale, referring to the PROPER from 2019-2022, which has been modified, showing an average value of 3.200000 and a median value of 3.000000, which are relatively close, indicating that the majority of companies have consistent and not overly extreme environmental performance. The range from the lowest value of 3.000000 to the highest value of 5.000000 suggests variations in environmental performance among companies. Still, the majority of companies have fairly good environmental performance. The relatively small spread size of 0.425329 indicates that the variability of environmental performance among companies is manageable, with most companies having relatively similar environmental performance.

The Tobin's Q formula measures the value of the company, there is a significant difference between the average value (2.084921) and the median (1.458415), indicating that there are some companies with very high Tobin's Q values, which may be outliers and have a significant influence on the average. The range from the lowest value of 0.174959 to the highest value of 17.16556 indicates considerable variation in Tobin's Q values among companies, indicating the possibility of some companies having very high Tobin's Q values due to factors such as good financial performance or attractive growth prospects. The spread size in firm value is quite large at 1.954107, indicating significant variation in Tobin's Q values among companies, which may reflect essential differences in market value.

The return on assets (ROA) formula measures profitability; the average value is 0.040387, and the median is 0.035350, with a relatively small difference indicating a fairly symmetric distribution. The positive average value suggests that the sample companies generate profits based on ROA. The range from the lowest value of -0.409700 to the highest value of 0.416700 indicates variation in profitability among companies, with the negative lowest value indicating some companies experiencing losses. The relatively large spread size of 0.096286 indicates significant variation in company profitability, with substantial differences between companies with high and low profitability levels.

The table of descriptive statistical analysis above represents the overall data from 2019 to 2022. Among these years, in 2020, Covid-19 hit the world, causing many losses in various aspects of life. Based on this description, this study divides the research data into data before Covid-19, during Covid-19, and after Covid-19.

Table 3. Summary of Statistical Data

	Firm Value	Environmental Performance	Profitability
Mean	2.084921	3.200000	0.040387
Median	1.458415	3.000000	0.035350
Highest	17.16556	5.000000	0.416700
Lowest	0.174959	3.000000	-0.409700
Spread Size	1.954107	0.425329	0.096286
Observations	200	200	200

Source: Data processed in Eviews

Table 4. Mean Value Statistical Analysis

Period	Environmental Performance	Firm Value	Profitability
2019	3.22	2.127772	0.038318
2020-2021	3.18	2.089714	0.034264
2022	3.22	2.032485	0.054702

Source: Data processed in Eviews

In the table above, it can be seen that the company's value has been continuously decreasing since the onset of Covid-19 until 2022. The decline in the company's value can be attributed to various factors, including the large-scale social restrictions during Covid-19, which resulted in limitations in operational activities and a decrease in consumer consumption or purchasing power. In the data, environmental performance experienced a decline during Covid-19, but after Covid-19 passed, environmental performance was able to return to the same level as before Covid-19. Profitability also followed a similar pattern as environmental performance, but the difference lies in the profitability value after Covid-19 exceeded the value before Covid-19. The increase in profitability after Covid-19 is due to the absence of restrictions on public activities, leading to an increase in consumer purchasing power or consumption.

Regression Model Test

After conducting descriptive statistical tests, a model test was performed to determine the regression model in this study.

Chow Model Test

To calculate the regression estimation of panel data, the Chow model test is used to determine the best regression model between common effects and fixed effects. Fixed effects will be used if the Chi-square probability of a specific period is less than 0.05; otherwise, if the Chi-square probability of a specific period is greater than 0.05, common effects will be used.

Table 5. Chow Model Test Results

Effect Test	Statistic	d.f.	Probability
Chi-square for specific period	372,269829	49	0,0000

Source: Eviews data processing

In Table 5, the Chi-square probability for a specific period is not more than 0.05, which is 0.000, so the fixed effects model (FEM) is chosen. Thus, the selected Chow model test is the fixed effects model, and the data testing continues to the Hausman model test.

Hausman Model Test

The Hausman model test is conducted to compare and determine the optimal model between fixed effects and random effects. The choice between fixed effects or common effects is based on the cross-section

probability being less than 0.05; therefore, the fixed effects model will be chosen. Conversely, if the cross-section probability is greater than 0.05, the common effects model will be chosen

Table 6. Hausman Model Test Results

Test Summary	Chi-square Statistic	Chi-square d.f.	Probability
Random specific period	3,921199	2	0,1408

Source: Eviews data processing

From the test results in Table 6, the probability is not more than 0.05, which is 0.1408, so the common effects model (CEM) is chosen. If the common effects (CEM) are selected, then the data testing continues to the LM model test.

LM (*Lagrange Multiplier*) Model Test

The LM model test is conducted to determine whether the random effects model is more optimal than the common effects method. Additionally, this test is performed to verify the consistency of the model generated from fixed effects and random effects in the previous tests. Random effects are used if the probability is not more than 0.05; otherwise, if the probability is more than 0.05, the common effects model will be used.

Table 7. LM Model

	Chi-Square Statistic	Chi-square d.f.	Probability
Breusch-Pagan	178,2188	0,836020	179,0548
	(0,0000)	(0,3605)	(0,0000)

Source: Eviews data processing

From the test in Table 7, the Breusch-Pagan probability is not more than 0.05, which is 0.0000, so the random effects model (REM) is chosen. Based on this data, the regression model test is conducted by applying the random effects model (REM).

Classical Assumption Test

The classical assumption test is necessary as a determinant step when applying linear regression analysis. In this study, the classical assumption test has been conducted to test the validity of the linear regression model. The results indicate that the research model meets the classical assumptions. The multicollinearity test shows no multicollinearity issues among the independent variables. The residual variance graph does not show a clear pattern, indicating no heteroscedasticity in the model. Additionally, the Durbin-Watson statistic indicates no autocorrelation in the model. Since the total observations in this study are more than 30, normality testing is not required. Thus, the research model has met the classical assumptions.

Hypothesis Testing

F, t, and R2 (R square) tests were conducted in this study to analyze.

F Test

Table 8. F Test Results

Durbin-Watson	F-Statistic	Probability
1,541386	14,00446	0,00002

Source: Eviews data processing

From Table 8, it can be seen that the F-statistic is 14.00446 and the probability is 0.00002. The probability indicates significance < 0.01, indicating that the regression model is appropriate.

t Test

In the regression model, the effect of independent variables on the dependent variable is partially measured through t-testing. If the t-test results in a significant t-statistic value, indicating the significance of the effect of independent variables on the dependent variable, the t-statistic is < 0.5.

Table 9. t and MRA Test Results

Variable	Coefficient		Error Standard		t-Statistic		Probability	
	Before	After Moderation	Before	After Moderation	Before	After Moderation	Before	After Moderation
Firm Value	1.363	2.203	0.633	0.659	2.151	3.342	0.0326	0.001
Environmental Performance	0.157	-0.112	0.185	0.194	0.852	-0.578	0.3952	0.563
Profitability	5.369	-16.623	1.044	6.282	5.139	-2.646	0.000	0.008
Environmental Performance x Profitability		6.945		1.961		3.541		0.000

Source: Eviews data interpretation

From the data in Table 9, the probability of environmental performance is 0.3952, and the probability value of profitability, in this case, the moderating variable, is 0.0000. The probability value of environmental performance, 0.3952 > 0.1, indicates that this variable does not affect the dependent variable. Therefore, (H1) is rejected, and the firm's value is not influenced by environmental performance.

The t-test results also indicate that profitability contributes positively to firm value. The probability value of profitability, in this case, the moderating variable, is 0.0000 < 0.01.

Moderation Test (MRA)

The MRA test can show the environmental performance variable and the firm value variable moderated by profitability. In the MRA test in Table 9, the probability of environmental performance x profitability is 0.0005, indicating that profitability can moderate the relationship between environmental performance and firm value. Therefore, it can be concluded that H2 = Firm Value is influenced by environmental performance with profitability moderation.

Coefficient of Determination (R2) Test

Table 10. Coefficient Determination (R2) Test

	Adjusted R-square		F-Statistic		Probability	
	Before	After Moderation	Before	After Moderation	Before	After Moderation
Environmental Performance, Firm Value and Profitability	0,115591	0,163566	14,00446	13,97162	0,00002	0,000000

Source: Eviews data processing

From the test in Table 10, the adjusted R-squared is 0.115591, which when expressed as a percentage is 11%. This means that the firm value influenced by environmental performance and profitability is only 11%, indicating that the remaining 89% is the effect of other variables.

Table 10 shows that the moderation of profitability weakens or strengthens the relationship between environmental performance and firm value. Table 10 shows an adjusted R-Squared before moderation of 0.003172 and after moderation of 0.163566. Profitability, the moderating variable, strengthens the moderation between environmental performance and firm value.

Firm Value Influenced by Environmental Performance

The test data above shows that the firm value is not influenced by environmental performance. The first hypothesis (H1) argues that the company's value is influenced by environmental performance, but this hypothesis is rejected by the test results. This study does not show that environmental performance affects the company's value. On the contrary, previous studies by Asnita (2019); Kelly and Henny (2023) found that environmental performance does not affect the company's value. Other studies by Basse Mama and Mandaroux (2022); Zhang, Qin, and Liu (2020) found that environmental performance affects the company's value.

Basse Mama and Mandaroux (2022) found a relationship between firm value and environmental performance, but the research sample used European companies, and the environmental performance proxy used carbon emissions. In contrast, this study uses Indonesian companies and proxies for environmental performance with the PROPER ratings from the Ministry of Environment and Forestry. Zhang et al. (2020) research also found this influence using a sample of companies listed in China, with the environmental performance proxy using green innovation.

Firm Value Influenced by Environmental Performance with Profitability Moderation

Based on the above tests, it can be concluded that profitability can moderate the relationship between environmental performance and firm value. The second hypothesis in this study states that the company's value is influenced by environmental performance with profitability moderation, and based on the test results, this hypothesis is accepted. This research result is in line with Goldie Kelly and Deliza Henny (2023), where environmental performance affects firm value with profitability moderation. Although, Goldie Kelly and Deliza Henny (2023) used a sample of companies in the food and beverage sub-sector in Indonesia and the environmental performance proxy was ISO 14000/14001 certification, they found the same test results as this study. This indicates that a company's profitability is key in moderating environmental performance and firm value. The profitability of Indonesian manufacturing industry companies listed on the IDX in 2019-2022 can cover the costs incurred for the environment. From the tests conducted above, it can also be found that profitability can strengthen the moderating effect between environmental performance and Firm value. High profitability can cover the environmental costs incurred by companies, so that a strengthening effect can be generated from profitability moderation.

Conclusions and Recommendations

From the testing and discussion using a sample of Indonesian manufacturing companies and following PROPER from 2019-2022, it can be summarized that environmental performance not disclosed in annual reports and companies that have implemented environmental policies and participated in the PROPER program cannot affect firm value. Companies that already have environmental policies that seek to obtain legitimacy from society have yet to be able to increase/improve firm value because the value/image of the Company consists of various complex components. Profitability has been proven effective in moderating firm value with environmental performance, and not only that, profitability can also strengthen the moderation of firm value with environmental performance. With evidence of moderation's influence and strengthening effects on firm value, company management or managers can create policies or strategies to increase company profitability. Companies with good or high values and profitability can attract shareholders to invest in the Company.

The limitation of this research is **t**he independent variable in this study is only 11%, while other variables influence the remaining 89%. Data on environmental performance is measured by the PROPER rating with five criteria. Still, it should be noted that several companies have factories or production sites in more than one place. It is not uncommon for these factories or production sites to receive different criteria even though they are still within the same Company, causing differences in interpretation. Suggestions for future studies can use other independent variables such as CSR, company size, and board of commissioners. The second

suggestion is for environmental performance to use different measurements besides the PROPER from the Ministry of Environment and Forestry.

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