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Environmental Sustainability, Production Cost Efficiency, and Financial Performance in Indonesian Manufacturing Firms Listed on the Indonesia Stock Exchange 2022–2024

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Abstract

The development of sustainable practices in industry manufacturing is becoming increasingly important amid growing pressure from regulations, environmental concerns, and stakeholder demands, while still safeguarding performance and finances. Research. This aims to analyze the influence of the performance sustainability environment on the performance of the finance company, considering the roles of mediation efficiency and production costs in the company's manufacturing operations in the Cirebon area, post-carbon tax regulations. Methods used are quantitative, with an associative design, using secondary data from the financial and sustainability reports for the 2020–2024 period, and analyzed using Structural Equation Modeling based on Partial Least Squares (SEM-PLS). The expected research results show that a sustainable performance environment has a positive influence on financial performance, directly, and no direct influence through improved efficiency in production costs. Efficient cost production serves as a mechanism that bridges operations and sustainability practices, improving the company's profitability. In conclusion, the implementation of sustainability strategies integrates environmental efficiency with operational No only does it help the company fulfill regulations, but it also sustainably increases performance, especially in the context of the manufacturing industry in the region develop like Cirebon

Keywords: *Environmental performance, financial performance, production cost efficiency, sustainability, manufacturing companies 5;*

A. Introduction

In the era of globalization and transformation, companies manufacturing especially in the basic materials sector are facing pressure on both sides from regulations and an increasingly complex and strict environment, and from market demands to still maintain healthy performance and finances. The company not only seeks to produce profit, but also is responsible for responding to social and environmental conditions around its operations (Komara et al., 2020) . In Indonesia, the existence of an instrument policy green shows that business activity can ignore the impact on the environment as part of operational and financial strategies. In manufacturing companies, especially in the basic materials sector, which is known as a contributor to greenhouse gas emissions, glass and its uses consume energy and materials intensively, creating a very real pressure. For example, Research Setiawan & Honesty, (2021) show that the disclosure cost environment in the manufacturing company

influences the performance of the finance company for the 2014-2018 period, confirming that the environmental aspect is not an additional variable but part of the company's cost structure. Further research Liu et al., (2022) Find that activity ESG (environmental, social, governance) has a positive influence on performance and financial performance through mediation of non-financial performance, such as reputation, image of the company, and satisfaction of stakeholders' interests. From the side operational, thinking theory like *Porter's Hypothesis* states that a strict regulatory environment, in fact, can push efficiency and innovation that ultimately increase Power competition company and performance finance (Mu et al., 2022) . Therefore, variable performance, sustainability, environmental performance, and financial performance become very important for analysis; moreover, in the context of changing regulations like policy green, which places a special focus on costs, production, and operational structures for companies.

The main issues faced are that, although Lots' company has adopted practices to sustain a sustainable environment by reducing emissions, improving energy efficiency, and managing waste, the effects on performance and finance are often neither direct nor significant. For example, in the study, Soemantri et al. (2023) found that the performance environment and the cost environment do not significantly influence performance finance. This raises the question of why adoption practice sustainability is not always reflected in the company's growth, profitability, or liquidity. Operational challenges arise when investment begins in technology, clean process replacement, or supply chain adjustment. Possible cause: burden, cost, term, short delay , benefit, finance, term length. On the other hand, variability in company size, industry, local regulations, and internal operational mechanisms, such as efficiency and production costs, also affects the results.

In the international and local literature, numerous studies have examined the relationship between environmental sustainability and financial performance. As an example, research You et al., (2024) show that activity *ESG* has a positive effect on performance finance through mediation of non-financial performance (*ESG* → non-financial → financial). Then Study Fauziah & Puspita, (2024) also shows that the disclosure performance environment has its own influence on performance finance. However, research still has necessary limitations that require attention. One of the main limitations is that many studies only examine a direct connection between environmental sustainability and financial performance, or mediation through non-financial variables such as reputation or disclosure, without explicitly including production efficiency costs as a direct operational mediator relevant to manufacturing companies, specifically in the basic materials sector. Efficiency cost production, for example, subtracting consumption energy per unit output, optimizing material standards, or minimizing waste production, can become an important mechanism that connects the practice environment with financial results, but is still seldom tested in a specific way. In addition, some large studies do not sufficiently highlight industrial areas specific to manufacturing companies, especially in the basic materials sector, on the Indonesia Stock Exchange (IDX) in 2022-2024. Therefore, there is a sufficient research gap that is not yet addressed by many studies that focus on the quantitative analysis of the efficiency of mediation costs on performance sustainability, environment, and performance finance, especially in manufacturing companies in the basic materials sector listed on the Indonesia Stock Exchange (IDX) in 2022-2024.

Study This will try to complete the gap by proposing a research model for quantitative testing , influencing the performance sustainability environment to performance finance company manufacturing specifically basic materials sector, with efficiency cost production as variables mediation, and special carried out in the company manufacturing in the basic materials sector on the Indonesia Stock Exchange (IDX) in 2022-2024. Scientific research. This will contribute by adding an empirical perspective on operational mechanisms (cost efficiency) that link environmental sustainability and financial performance, thereby enriching

the literature on sustainability and finance in the context of manufacturing and developing countries. In general, the study's practical results can help management companies in the manufacturing sector identify more effective strategies. This can help companies not only focus on environmental indicators in a general way but also ensure that sustainability translates into operational efficiency and impacts on production costs, thereby increasing financial performance. For makers' policies, findings. This can give input about how regulations like environmental green and incentives for efficient production can be designed to not only fulfill the objective of environmental protection but also maintain Power competitiveness and sustainability of the company's manufacturing, especially in the basic materials sector listed on the Indonesia Stock Exchange (IDX) in 2022-2024.

Main purpose study This is For test influence performance sustainability environment on performance finance company manufacturing especially in the basic materials sector on the Indonesia Stock Exchange (IDX) in 2022-2024, as well as analyze role mediation efficiency cost production in connection Theoretical benefits from study This is development of a mediation model that fills the literature gap about efficiency cost production as connector between environmental and financial, and contextualization in industry Indonesian manufacturing. The practical benefits are to help companies and stakeholders design sustainability strategies that are not only environmentally friendly but also cost-efficient and financially supported, as well as to help formulate policies that improve the policy environment and the economy and are effective and adaptive to the local industry context.

B. Research Question

1. Whether there is an influence of the performance sustainability environment on the performance of the finance company manufacturing, especially in the basic materials sector, listed on the Indonesia Stock Exchange (IDX) in 2022-2024?
2. Whether efficiency cost production mediates the connection between performance, sustainability, environment, and performance finance company manufacturing, especially in the basic materials sector listed on the Indonesia Stock Exchange (IDX) in 2022-2024?
3. How far does the performance sustainability environment influence efficiency, cost, and production in the company's manufacturing, especially in the basic materials sector listed on the Indonesia Stock Exchange (IDX) in 2022-2024?

C. Literature Review

Variable X (Independent): Sustainability Performance Environment based on the theory of *Stakeholder Theory* (Mahajan et al., 2023) : suggests that the organization does not quite have enough answers to various stakeholders' interests (stakeholders), including customers, communities, regulators, and the environment. Not only a shareholder.

Variable Y (Dependent): Financial Performance based on the theory of *Legitimacy Theory* (Valentinov et al., 2025) States that an organization must act in accordance with norms, values, and social expectations to remain socially accepted.

Variable Z (Mediation): Efficiency Cost Production based on theory *Resource-Based View (RBV)* (Portillo-Tarragona et al., 2025) Confirm that a superior competitive company was obtained because management sources valuable, rare, and difficult internal power, which is difficult to imitate and replace.

D. Research Methods

Study: This will use a quantitative, associative approach, namely, research that aims to understand the connection or influence between variables in a systematic and measurable way. The quantitative associative approach allows researchers to test hypotheses and analyze the direction and strength of connections among independent variables (X), mediating/moderating variables (Z), and dependent variables (Y). According to Sofwatillah et al., (2024) A research association is used to test causal intervariables so that it can explain the phenomenon more comprehensively.

Research design. This focus on testing:

- Influence the direct variable X on Y,
- influence the direct variable X against Z, and
- Influence No direct through variable Z against Y.

Population And Sample

The population that will be used in the study. All companies manufacturing basic materials on the Indonesia Stock Exchange (IDX) in 2022-2024 have published sustainability and financial reports annually during 2022–2024 and participate in PROPER (Property Assessment Program Management Environment). Election population. This is based on considerations that the company's manufacturing is the most intensive sector in terms of energy use and produces emissions (Pengaruh et al., 2025) So it is very relevant to the variables Efficiency, Cost, Production, Sustainability Performance Disclosure, Environment, and Financial Performance.

The research used purposive sampling, a technique that selects participants based on specific criteria to align with the research objective. The criteria sample is as follows:

- Manufacturing companies listed on the IDX consecutively during 2022–2024.
- Publish the report on sustainability (*ESG disclosure*) in general, complete.
- Have cost data, production and performance data, and financial data (ROA/ROE/NPM) available in the annual report.
- Not experiencing delisting during the period of observation.
- Participating in PROPER (Property Assessment Program Management Environment).

Data Types And Data Sources

Study this using secondary data obtained from the company's sustainability report and annual report, specifically the basic materials sector in the manufacturing sector on the Indonesia Stock Exchange (IDX) in 2022-2024. The data used to measure variable disclosure performance, sustainability environment (X), efficiency cost of production (Z), and financial performance (Y).

Data Collection Techniques

Data collection techniques will be used in the study. This involves using method documentation, with secondary data collection originating from a company report. Data collected through:

- *Sustainability Report* company: To obtain data regarding Environmental, Social, and Governance (ESG) Disclosure, which will be used as variable X.
- Company Annual Report For take data:
    a) Cost production (for count Efficiency Cost Production as variable Z).
    b) Report finance such as total assets, profit net, and equity (for count performance finance as variable Y).
- Official database such as the Indonesian Stock Exchange (BEI) website, the respective company websites.
- Literature supporters like Scopus Q1/Q2 journals, regulatory government, and reports on industry-related sustainability.

Documentation methods. This was chosen because all the variables in the study are nature accounting-related and based on the company's report, so they can be more accurately analyzed using publicly available secondary data.

E. Results And Discussion

Research Sample Description

In this study, the population comprises companies in the basic materials manufacturing sector on the Indonesia Stock Exchange (IDX) for 2022-2024. The number of manufacturing companies in the basic materials sector listed on the IDX from 2022 to 2024 was 103. Total sample in the study. This study will use *purposive sampling*. After completing his sample selection in accordance with the determined criteria, he identified 20 companies that met them. Here table 4.1, which presents the retrieval process sample study:

NO	Sample Criteria	Tidal Escapes	Passed
1	Manufacturing company basic materials sector listed on the Indonesia Stock Exchange (IDX) 2022-2024		103
2	Manufacturing company in the basic material sector that publishes a report on finance from 2022 to 2024	-13	90
3	Manufacturing company in the basic material sector that publishes its annual financial report from 2022 to 2024	-38	52
4	Companies Participating in PROPER (Property Assessment Program) Management Environment)	-32	20
	Number of Companies Selected sample		20
	Amount of observation for 3 years (20x3)		60

Table 4.1 Sample Selection Process in Research

Analysis Results Statistics Descriptive

Descriptive statistical methods were used in the study. This can be seen from the mean value used. To determine the average value (mean) of the data and the standard deviation, used to assess how large a portion of the data was analyzed. The following is the results Analysis Statistics Descriptive as follows:

Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
X	60	.85	.15	1.00	42.11	.7018	.20269	.041
Y	60	1.32	-.43	.89	35.03	.5838	.21343	.046
Z	60	.58	.54	1.12	47.37	.7895	.13757	.019
Valid N (listwise)	60							

Table 4.2 .1 Statistical Results Descriptive Before Outlier

Descriptive statistics are used to describe the characteristics of research data, including the minimum, maximum, mean (average), and standard deviation for each variable. Based on the data processing results, the sample size (N) for the study is 60.

1. Variable X

Variable X has a minimum value of 0.15 and a maximum value of 1.00, so that produces a data range of 0.85. The average value (mean) of variable X is 0.7018 with a standard deviation of 0.20269. This shows that the distribution of data for variable X is classified as low because the standard deviation is smaller than the average value. Thus, the data for variable X are relatively homogeneous and exhibit little variation between samples.

2. Variable Y

Variable Y has a minimum value of -0.43 and a maximum value of 0.89, with a data range of 1.32. The average value of variable Y is 0.5838, while the standard deviation is 0.21343. Standard deviation is small from the mean, showing that the data for variable Y is sufficiently stable and not spread far from the average value. However, the presence of a negative minimum value indicates that a number of companies experience conditions that are not good enough on this variable.

3. Variable Z

The variable Z has a minimum value of 0.54 and a maximum of 1.12, with a range of 0.58. The average value of the Z variable is 0.7895, and the standard deviation is 0.13757. This shows that variable Z has the smallest variation among the variables, indicating that the

data are very homogeneous.

In a way, the third variable's own mark standard has a smaller mean and standard deviation than the mean. This shows that the data in the study is classified as good because it has no high deviation. In addition, the results statistics are descriptive. This is the data before outlier testing, so an extreme value could still influence the analysis of the results. Therefore, a further stage requires an outlier test to ensure the quality of the data used in the study.

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
x	48	.85	.15	1.00	.7160	.21112	.045
y	48	.49	.40	.89	.6158	.11564	.013
z	48	.58	.54	1.12	.7652	.13102	.017
Valid N (listwise)	48						

Table 4.2.2: Statistical Results Descriptive After Outlier Removal

Table 4.2.2 presents descriptive statistics from the variables studied after outlier data removal. Descriptive statistics are used to describe data characteristics, including the number of data points (N), the minimum and maximum values, the mean (average), the standard deviation, and the variance. Based on the data processing results, the number of observations used in the study is 48 for each of the variables X, Y, and Z. This indicates that the data have undergone outlier removal, making them more representative.

- Variable X

Variable X has a minimum value of 0.15 and a maximum value of 1.00, with a range of 0.85. The mean value of variable X is 0.7160, which indicates that, in a way, the general mark variable X is at a relatively low level. Standard deviation of 0.21112 and variance of 0.045 indicate that the relative distribution of variable X data is small, so the data tends to be homogeneous.

- Variable Y

Variable Y has a minimum value of 0.40 and a maximum value of 0.89, with a range mark of 0.49. The average value (mean) of variable Y is 0.6158, indicating that the average level of performance for variable Y is in the medium category. Standard deviation of 0.11564 and variance of 0.013 indicate that data variation in variable Y is classified as low, so the data is sufficiently stable.

- Variable Z

The variable Z has a minimum value of 0.54 and a maximum value of 1.12, with a range mark of 0.58. The mean value of the Z variable is 0.7652, indicating that, in general, it is in the high category. A standard deviation of 0.13102 and a variance of 0.017 indicate a relatively low spread, so the data is relatively homogeneous.

Overall, the descriptive statistics after outlier removal indicate that the research data have a relatively small and stable distribution, as reflected in the means, standard deviations, and variances across all variables. Thus, the data used have met the conditions for advanced statistical analysis, such as assumption testing and classical hypothesis testing.

Assumption Test Classic

The assumption test for classical linear regression is a crucial step before analyzing multiple linear regression. To ensure that the data are free from problems of normality, multicollinearity, autocorrelation, and heteroscedasticity, so that the resulting regression model is valid.

1. Normality Test

The normality test assesses whether the error term (residual) follows a normal distribution in the regression model. Research this using the Kolmogorov-Smirnov test for testing data normality, where data is considered normal if the Mark-Asymp*. Sig. (2-tailed)* more big from 0.05.

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		60
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.21035626
Most Extreme Differences	Absolute	.171
	Positive	.110
	Negative	-.171
Test Statistic		.171
Asymp. Sig. (2-tailed)		.000[c]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.

Table 4.3.1.1 Results of normality test (before outlier removal)

The normality test aims to determine whether the residuals in the regression model are normally distributed. In this research, a normality test was done using the One-Sample Kolmogorov-Smirnov Test.

Based on the test results, the number of data points (N) is 60, with Asymp. mark. Sig. (2-tailed) of 0.000.

The criteria for taking a decision on the normality test are as follows:

- If the value significance > 0.05 → data is normally distributed
- If the value significance < 0.05 → data not normally distributed

Test results show that the significance value is 0.000<0.05, so it can be concluded that the residual data is not normally distributed.

This data is an abnormal possibility due to the presence of extreme marks (outliers) that influence the data distribution. Therefore, the next thing you need to do is to detect and remove outliers so that the data distribution becomes more normal and fulfills the assumptions of classic regression analysis

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		48
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.10520166
Most Extreme Differences	Absolute	.079
	Positive	.079
	Negative	-.062
Test Statistic		.079
Asymp. Sig. (2-tailed)		.200[c,d]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.

Table 4.3.1.2 Normality Test Results (After Outlier Removal)

After outlier removal and carrying out the transformation, the obtained mark *Asymp. Sig (2-tailed)* of 0.200, which is marked as a significant difference from the level of significance, which is 0.05. It can be concluded that the data in the research is normally distributed.

2. Multicollinearity Test

The multicollinearity test aims to determine whether the regression model exhibits correlation among the independent variables. A good regression model should have no correlation among the independent variables. There is a question of whether multicollinearity can be detected using the Mark Tolerance and the Variance Inflation Factor (VIF). If the value *tolerance* > 0.10 and the VIF < 10, then multicollinearity is not present.

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	.445	.102		4.379	.000		
	x	.226	.075	.413	3.019	.004	.982	1.019
	z	.012	.121	.013	.096	.924	.982	1.019

a. Dependent Variable: y

Multicollinearity test result

Based on the multicollinearity test, all variables have tolerance values> 0.10 and Variance Inflation Factor (VIF) values < 10. This indicates that the regression model is free of multicollinearity.

3. Heteroscedasticity Test

The heteroscedasticity test aims to determine whether the residual variance varies across observations in the regression model. A good regression model is a model that does not contain symptom heteroscedasticity (homoscedasticity).

In this research, a heteroscedasticity test was conducted using the Scatterplot method, namely by examining the distribution of the relationship between the Regression Standardized Predicted Value and the Regression Studentized Residual. The basis for taking decision is as follows:

- If the dots are spread in a random, non-patterned form, and are spread above and below the number zero, then no heteroscedasticity occurs.
- On the other hand, if a dot, dot, dot form pattern is certain (for example, wavy, narrow, or wide), then heteroscedasticity occurs.

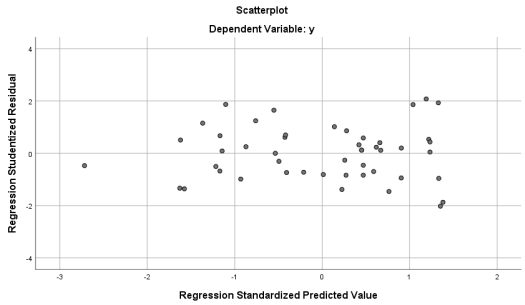

Table 4.3.3.1 Results of Heteroscedasticity Test

Based on the scatterplot in Table 4.3.3.1, it can be seen that the data points are spread out in a random and non-patterned way, as well as spread above or below zero on the Y axis. Conclusion of the Heteroscedasticity Test: Based on the scatterplot analysis, the regression model does not exhibit heteroscedasticity for the No experience symptom; therefore, the assumptions of homoscedasticity are satisfied, and the regression model is suitable for further analysis.

4. Autocorrection Test

The autocorrelation test aims to determine whether there is a correlation between the error residual disturbance in period one observation and the period observation in the regression model. A good regression model is a model that does not contain symptom autocorrelation.

In this research, the autocorrelation test was done using the Durbin-Watson (DW) test. The basis for taking a decision in the Durbin-Watson test is as follows:

- If the Durbin-Watson value is around 2, then there is no autocorrelation.
- If the Durbin-Watson value is close to 0, then there is positive autocorrelation.
- If the Durbin Watson value is close to 4, then there is negative autocorrelation.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.415[a]	.172	.136	.10751	2.171

a. Predictors: (Constant), z, x

b. Dependent Variable: y

Table 4.3.4.1 Autocorrelation test results

Based on the Model Summary output, the Durbin–Watson value is 2.171. This value is around number 2, so it can be concluded that there is no symptom autocorrelation in the

regression model. Based on the Durbin-Watson test results, the regression model shows no autocorrelation, so the assumption of no autocorrelation has been satisfied, and the model is suitable for further analysis.

Analysis Regression

Linear regression analysis is used to test relationships and influence intervariable research. The regression model used in the study is as follows:

1. Simple Linear Regression

Multiple linear regression was used to determine the influence of performance, sustainability environment (X), and efficiency cost production (Z) on performance finance (Y), in both simultaneous and partial models.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.445	.102		4.379	.000		
	x	.226	.075	.413	3.019	.004	.982	1.019
	z	.012	.121	.013	.096	.924	.982	1.019

a. Dependent Variable: y

Table 4.4.1.1 Analysis results Multiple Linear Regression

Based on the results, data processing using SPSS, an equality regression was obtained as follows:

KU= 0.445+0.226 KBL+0.012 EB

Equality can be explained as follows:

- The constant (α) is 0.445

Constant value indicates that if the variables performance, sustainability, environment (X), and efficiency, cost, production (Z) are set to zero, then performance finance (Y) has a value of 0.445.

1. Influence performance sustainability environment (X) towards performance finance (Y)

Variable X has a mark coefficient regression of 0.226 with a mark significance of 0.004 (< 0.05). This shows that a performance sustainability environment is influential, positive, and significant to performance finance. This means that every improvement in one unit's performance, sustainability, or environmental performance will increase the performance finance by 0.226, assuming other variables are constant.

2. Influence efficiency cost production (Z) against performance finance (Y)

The variable Z has a coefficient of 0.012 in the regression, with a significance of 0.924 (> 0.05). This shows that efficiency costs production has no significant influence on performance finance.

Hypothesis Testing

1. Significance Test of Individual Parameters (t-Test)

The t-test is used to assess the effect of each independent variable on the dependent variable while controlling for the effects of the other independent variables. The basis for taking a decision in the t-test is as follows:

- If the value significance (Sig.) < 0.05, then the hypothesis is accepted
- If the value significance (Sig.) > 0.05, then the hypothesis is rejected

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.445	.102		4.379	.000		
	x	.226	.075	.413	3.019	.004	.982	1.019
	z	.012	.121	.013	.096	.924	.982	1.019

a. Dependent Variable: y

Table 4.5.1.1 t-Test Results

Based on the output coefficients from SPSS, it is obtained results as following:

1. Impact of Sustainability Performance Environment (X) on Financial Performance (Y)

Variable performance sustainability environment (X) has a mark:

- Coefficient regression (B) of 0.226

- - value amounting to 3,019
- Significance value of 0.004

The significance value is 0.004 < 0.05, so it can be concluded that the performance sustainability environment (X) has a positive and significant influence on performance finance (Y). Thus, the hypothesis posits that a performance-sustainability environment influences acceptance of performance finance.

2. Influence Efficiency Cost Production (Z) on Financial Performance (Y)

Variable efficiency cost production (Z) has a mark:

- Coefficient regression (B) of 0.012
- - value of 0.096
- Significance value of 0.924

The significance value is 0.924 > 0.05, so it can be concluded that efficiency cost production (Z) has no significant influence on performance finance (Y). Thus, the hypothesis states that efficiency cost production is influential to performance finance and is rejected. Based on the results of the individual parameter significance test (t-test), it can be concluded that:

1. Sustainability performance environment (X) has a positive and significant influence on performance finance (Y).
2. Efficiency cost production (Z) has no significant influence on performance finance (Y).

2. F Statistical Test

The F-test is used to assess the influence of independent variables on dependent variables. In this study, the F test aims to test whether the performance sustainability environment (X) and efficiency cost production (Z) together influence the performance finance (Y). The basis for taking a decision in the F test is as follows:

- If the Sig. value < 0.05, then the variables are independent and simultaneously influential on the dependent variables.
- If the Sig. value > 0.05, then the variables are independent in a simultaneous way; there is no significant influence on the dependent variables.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.108	2	.054	4.689	.014[b]
	Residual	.520	45	.012		
	Total	.629	47			

a. Dependent Variable: y

b. Predictors: (Constant), z, x

Table 4.5.2.1 Results of the F Statistical Test

Based on the results testing using SPSS, shown in the ANOVA Table, the obtained mark:

- F count amounting to 4,689
- significance value (Sig.) is 0.014

The significance value is 0.014 < 0.05, so it can be concluded that the performance sustainability environment (X) and the efficiency cost production (Z) are simultaneously significantly influential on the performance finance (Y).

Based on the results of the F-statistic test, it can be concluded that the variables' performance sustainability environment (X) and efficiency cost production (Z) together have a significant influence on performance finance (Y). Thus, the regression model used in the study is suitable for testing the hypothesis.

3. Coefficient Test Determination (R^2)

The coefficient of determination (R^2) is used to assess how much variation in the dependent variable is explained by the independent variables. In this study, coefficient

determination is used to assess how well the performance sustainability environment (X) and efficiency cost production (Z) explain the performance finance (Y).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.415[a]	.172	.136	.10751	2.171

a. Predictors: (Constant), z, x

b. Dependent Variable: y

Table 4.5.3.1 Results Coefficient Test Determination ($R^{2)}$

Based on the SPSS output in the Model Summary table, the mark is obtained:

- R Square (R^2) is 0.172
- Adjusted R Square of 0.136

The R Square value of 0.172 indicates that 17.2% of the variation in performance finance (Y) can be explained by the variables performance sustainability environment (X) and efficiency cost production (Z). Meanwhile, the remaining 82.8% explained by other variables outside the research model.

The Adjusted R-Square value of 0.136 indicates that, after adjusting for independent variables, the model explains the dependent variable by 13.6%. This value more reflects the actual capability of the regression model. Based on the coefficient test results determination (R^2), it can be concluded that:

- Variables performance sustainability environment (X) and efficiency cost production (Z) have contributed by 17.2% in explain performance finance (Y).
- Most of the variation in performance finance is influenced by other factors outside the research model.

Mediation Test

Mediation test in the study. This aims to determine the role of efficiency cost production (Z) in the mediating connection between performance sustainability environment (X) and performance finance (Y). Testing mediation using Baron and Kenny's (1986) approach requires four stages of regression testing.

1. Test of the Influence of Sustainability Performance (X) on Financial Performance (Y)

This test is stage one in testing mediation according to Baron and Kenny. The aim is to determine whether the performance sustainability environment (X) significantly influences performance finance (Y). Testing was done using simple linear regression with performance finance as the dependent variable and performance sustainability environment as the independent variable. Based on the SPSS data processing, the following results were obtained.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.453	.055		8.266	.000		
	x	.227	.073	.415	3.094	.003	1.000	1.000

a. Dependent Variable: y

Table 4.6.1.1 Results of the Test of the Influence of Sustainability Performance (X) on Financial Performance (Y)

The regression coefficient shows that the variable performance sustainability environment (X) has a coefficient of 0.227, a t-value of 3,094, and a level of significance of

0.003. A smaller significance value is better; values of 0.05 or less indicate that the performance sustainability environment is influential and has a positive and significant effect on performance finance.

The standardized beta coefficient of 0.415 indicates that improvements in the sustainability environment will be followed by improvements in finance. Thus, the hypothesis posits that a performance-sustainability environment influences acceptance of performance finance.

Test results. This fulfills the first Baron and Kenny's mediation test, namely, the existence of a significant influence of the independent variables (X) on the dependent variables (Y). Therefore, testing can be continued to stage further in the analysis mediation.

2. Sustainability Performance Influence Test Environment (X) towards Efficiency Cost (Z)

This test is stage two in testing mediation according to Baron and Kenny; the aim is to determine whether the performance sustainability environment (X) influences efficiency cost production (Z). Testing was conducted using simple linear regression, with efficiency and cost of production as dependent variables and performance, sustainability, and environment as independent variables.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.705	.068		10.423	.000		
	x	.084	.091	.136	.931	.357	1.000	1.000

a. Dependent Variable: z

Table 4.6.2.1 Results of 4.6.2 Sustainability Performance Influence Test Environment (X) towards Efficiency Cost (Z)

Based on the results of data processing, the obtained mark coefficient for the regression variables performance, sustainability, and environment (X) is 0.084, with a t value of 0.931 and a level of significance of 0.357. A larger significance value is better; with a value of 0.05 or greater, it can be concluded that the performance sustainability environment has no significant influence on production cost efficiency.

The standardized beta coefficient of 0.136 indicates a positive directional connection between performance, sustainability, environmental, and efficiency cost production nature, but it has a weak and not statistically significant influence.

Thus, the test results show that the second condition in the Baron and Kenny mediation test was not met because the independent variables had no significant influence on the mediated variables. Therefore, efficient cost production cannot yet be considered a mediating variable in the relationship among performance, sustainability, the environment, and performance finance.

3. Influence Test Efficiency Cost Production (Z) on Financial Performance (Y)

This test is stage three in testing mediation, according to Baron and Kenny; the aim is to determine whether efficiency cost production (Z) affects performance finance (Y). Testing was done using simple linear regression with performance finance as the dependent variable and efficient cost production as the independent variable.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.569	.101		5.647	.000		
	z	.061	.130	.069	.471	.640	1.000	1.000

a. Dependent Variable: y

Table 4.6.3 Results of the Influence Test: Efficiency Cost Production (Z) to Financial Performance (Y)

Based on the SPSS results, the coefficient of the regression variable efficiency cost production (Z) is 0.061, with a t-value of 0.471 and a level of significance of 0.640. The significance value is larger the better; a value of 0.05 or greater indicates that the efficiency

cost of production has no significant influence on performance finance.

The standardized beta coefficient of 0.069 indicates a positive, directional connection between efficiency cost production and performance finance nature, but its influence is very weak and not statistically significant. Thus, the test results show that condition three in the mediation test was not met because the mediating variable had no significant influence on the dependent variable. This is a stronger conclusion that efficiency-cost production can serve as a variable mediating the relationships among performance, sustainability, the environment, and performance finance.

4. Test the Influence of Sustainability Performance (X) on Financial Performance (Y) with Efficiency Cost Production (Z) As Variables Mediation

Testing. This is stage four in the mediation test, according to Baron and Kenny. The aim is to determine whether efficiency cost production (Z) mediates the influence of performance sustainability environment (X) on performance finance (Y). At this stage, this variable performance, sustainability environment, and efficiency cost production entered simultaneously in the regression model with performance finance as the dependent variable.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.445	.102		4.379	.000		
	x	.226	.075	.413	3.019	.004	.982	1.019
	z	.012	.121	.013	.096	.924	.982	1.019

a. Dependent Variable: y

Table 4.6.4.1 Results of the Test of the Influence of Sustainability Performance (X) on Financial Performance (Y) with Efficiency Cost Production (Z) As Variables Mediation

Based on the SPSS data processing, the following results were obtained. Variable performance sustainability environment (X) has a coefficient of 0.226 in the regression, with a t-value of 3.019 and a significance level of 0.004.

The significance value is 0.05, so it can be concluded that the performance sustainability environment remains significantly influential and positive for performance finance, even after the efficiency cost of production is included in the model.

Temporary, variable-efficiency cost production (Z) has a mark coefficient regression of 0.012, with a t-value of 0.096 and a level of significance of 0.924. The significance value is greater than 0.05, which indicates that the efficiency cost of production has no significant influence on financial performance. Test results. This shows the influence of the performance sustainability environment on performance finance. There is no experience decline after the variables' efficiency, cost, and production are entered into the regression model. In addition, variable-efficiency cost production does not significantly influence financial performance.

F. Conclusion

Based on statistical test results, the performance sustainability environment has proven to be influential, positive, and significant for the performance of the finance company in the manufacturing of basic materials sector. This shows that companies with a greater commitment to sustainability, such as managing emissions, improving energy efficiency, and managing waste, tend to have better financial performance.

Findings: This indicates that a practice-sustainability environment provides direct economic benefits, particularly by enhancing legitimacy, company reputation, and stakeholder trust. Thus, the formulation problem was first addressed and confirmed empirically.

-The Role of Efficiency Cost Production as Variables Mediation

Research results show that efficiency costs production. There is no clear mediating connection among performance, sustainability, the environment, and performance finance. Although the performance sustainability environment is influential and significant to performance finance, efficiency cost production is not influential and significant to

performance finance to any great extent, so the condition of mediation is not fulfilled.

Cost production does not play an intermediary role in the connection between performance, sustainability, and the environment, and financial performance benefits from sustainability and the environment during the period of study. This is more natural, not through tracking savings, but production costs in the short term. Therefore, the formulation problem was addressed second, with results indicating that mediation does not occur.

Based on the regression test results, the performance sustainability environment does not have a significant influence on production cost efficiency. Findings. This indicates that the practice sustainability environment implemented by the company manufacturing in the basic materials sector during the 2022–2024 period has not yet directly enabled lower cost production.

Condition: This can be caused by characteristics of the capital- and energy-intensive basic materials sector, as well as by high investment in a technology-friendly environment, so that the benefits of cost reduction can be felt in the long term. Thus, the formulation problem is addressed third, which is not yet empirically significant.

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