The Influence of Green Accounting, MFCA, and Environmental Performance on Sustainable Development

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Abstract: *The purpose of this study is to examine how green accounting, material flow cost accounting (MFCA), and environmental peformance affect sustainable development in food and beverage manufacturing firms listed on the Indonesia Stock Exchange between 2022-2024. A quantitative research design was applied. The study population consisted of 95 companies, from which 50 were selected as samples using purposive sampling. Data were analyzed through descriptive statistics, classical assumption testing, multiple linear regression, and hypothesis testing using SPSS 20. The results show that all three variables positively and significantly affect sustainable development. These findings demonstrate that adopting environmental accounting practices, optimizing material flow efficiency, and enhancing environmental performance substantially contribute to strengthening corporate sustainability efforts. Overall, the study underscores the strategic role of environmental management and sustainability-oriented accounting in improving sustainability outcomes within the food and beverage manufacturing industry.*

Key Words*:* Green Accounting; MFCA; Environmental Performance; Sustainable Development.

INTRODUCTION

Sustainable development is increasingly a global concern as the environmental impact of industrial activity increases. In Indonesia, the manufacturing sector remains a key driver of economic growth, with the food and beverage subsector recorded as the largest contributor to national manufacturing output in 2023. However, this increased production also drives increased resource consumption and waste generation, including increasingly worrying plastic pollution (Kemenperin, 2023). The gap between the sustainability commitments stated by companies and their implementation in the field is still found, as shown by the continued dominance of plastic waste from major brands such as ICBP, INDF, and MYOR in various waters and coastal areas of Indonesia (Report, 2024). This emphasizes the need to strengthen green industrial practices that the government has emphasized as an effort to realize environmentally conscious economic growth (WRI Indonesia, 2024).

The gap between sustainability claims and actual environmental impacts highlights the need to strengthen sustainability-oriented accounting and management practices. The implementation of Green Accounting is a crucial tool for identifying and transparently reporting environmental costs, enabling companies to improve efficiency and accountability in their operations (Dewi, 2025). In addition, Material Flow Cost Accounting (MFCA) helps companies reduce resource waste by evaluating material flow and non-product output costs, so that cost efficiency and environmental performance can be increased (Pratiwi &

Kusumawardani, 2023). On the other hand, Environmental Performance is an indicator of the extent to which a company is able to carry out environmental responsibilities in a measurable manner and in accordance with applicable regulations, one of which is through the PROPER assessment by the Ministry of Environment and Forestry (Razak, Wahyuni, and Azizah, 2023).

A number of prior studies have reported inconsistent findings regarding the relationship between environmentally friendly practices and sustainable development. (Kurnianingtyas and Trisnawati, 2024) found that green accounting positively affects sustainable development, whereas (Trisnaningsih, 2024) reported that green accounting does not significantly influence sustainable development. Similar discrepancies appear in studies examining the effect of material flow cost accounting, where (Dewi 2025) concluded that MFCA positively influences sustainable development, while (Pratiwi and Kusumawardani 2023) observed no significant effect. Furthermore, (Dkhili and Ben 2020) revealed that environmental performance positively contributes to sustainable development, yet (Pratiwi and Kusumawardani 2023) identified no such relationship.

Given the inconsistent findings of previous studies and the rising sustainability demands in the food and beverage subsector an industry with substantial contributions and notable environmental impacts this research offers novelty through its empirical focus on three key sustainability components: green accounting, MFCA, and environmental performance. The study specifically examines these factors within the most recent context of food and beverage manufacturing companies listed on the IDX during 2022–2024. This approach is intended to deliver a more holistic understanding of how accounting practices and environmental management contribute to advancing sustainable development in industrial sectors prioritized by the government.

Building on the identified phenomena and inconsistencies in prior studies, this research aims to examine the effects of green accounting, material flow cost accounting, and environmental performance on sustainable development in food and beverage manufacturing companies listed on the Indonesia Stock Exchange during the 2022–2024 period. The study is expected to offer empirical insights and academic contributions that support the enhancement of sustainability practices within Indonesia’s food and beverage industry.

METHOD

This study adopts a quantitative approach, which involves the use of numerical data in the form of measurable values for analytical purposes (Sugiyono 2019) This study was conducted to analyze the effects of Green Accounting, Material Flow Cost Accounting, and Environmental Performance on Sustainable Development in food and beverage manufacturing companies listed on the IDX for the 2022–2024 period. A quantitative approach was selected because the data consist of numerical values that are statistically processed to generate objective results. The study makes use of secondary data from sustainability reports and annual reports that can be found on the official websites of the relevant firms and IDX. The study's population comprises all 95 food and beverage manufacturing companies that are listed on the IDX. Purposive sampling was used to choose

the sample based on the following standards, (1) Food and beverage manufacturing companies listed on the IDX during 2022–2024. (2) Companies that publish downloadable annual and sustainability reports for 2022–2024. (3) Companies that participate in PROPER activities in 2022–2024. Applying these criteria, a sample of 50 companies was obtained, resulting in 150 observations over the three-year period.

Table 1. Operational Variabel

Variabel	Indicator	Reference Source
Green Accounting	$\frac{\text{Number of disclosure items green accounting}}{\text{Number of indicator items}}$	(Soraya 2022)
Material Flow Cost Accouting	Ln = (BBB + BTKL + BOP)	(Juliani, Lasmini, and Puspitasari 2025)
Environmental Performance	Color Grading: (1) Black, (2) Red, (3) Blue, (4) Green, (5) Gold	https://proper.mnlhk.go.id
Sustainable Development	$\frac{\text{Number of indicators disclosed by the company}}{\text{Number of indicator items}}$	(Trevanti & Yuliati, 2023)

Source: Processed by the Author, 2025

Several data analysis methods are used in this study, including t-tests, coefficient of determination tests, multiple linear regression analysis, descriptive statistical analysis, and classical assumption testing. All of these methods are processed using SPSS 20 software. This study employed the following multiple linear regression model:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

Information:

Y = Sustainable Development

A = Constanta

$\beta_1, \beta_2, \beta_3$ = Regression coefficient of each independent variable

X1 = Green Accounting

X2 = Material Flow Cost Accounting

X3 = Environmental Performance

e = Error

RESULTS AND DISCUSSION

Descriptive Statistical Test

Based on the descriptive statistical results for the sustainable development variable, the total number of observations (n) is 150. From these data, the mean value is 0.5337 with a standard deviation of 0.20467. This indicates that the sustainable development data are relatively dispersed (heterogeneous), as the standard deviation is higher than the mean. The green accounting variable shows a mean of 0.5000 and a standard deviation of 0.50168, suggesting that the data distribution is more concentrated (homogeneous). For the MFCA variable, the mean is 17.7943 with a standard deviation of 1.52213, while the environmental performance variable has a mean of 3.5067 and a standard deviation of 1.12176. The distributions of both MFCA and environmental performance tend to be more varied (heterogeneous), as the standard deviation values are lower than their respective means.

Classical Assumption Test

To ensure that the regression model meets the required validity criteria and that the analysis that results is reliable and consistent, the classical assumption test is carried out (Ghozali, 2018), There are four types of classical assumptions that are made, namely:

a) Normality Test

Table 1. Normality Test Results

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		150
Normal Parameters[a,b]	Mean	0E-7
	Std. Deviation	.01778815
Most Extreme Differences	Absolute	.083
	Positive	.051
	Negative	-.083
Kolmogorov-Smirnov Z		1.017
Asymp. Sig. (2-tailed)		.252

a. Test distribution is Normal.
b. Calculated from data.

Based on the information in Table 1, the Kolmogorov–Smirnov normalcy test produces a significance value of 0.252, which is more than the 0.05 limit. As a result, the residuals can be considered to have a normal distribution.

b) Multicolinearity Test

Tabel 2. Multicollinearity test results

Coefficients[a]

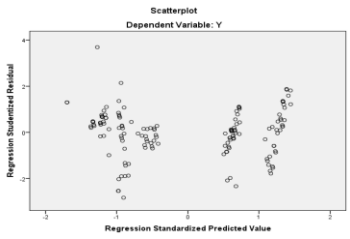
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.674	.038		-17.824	.000		
	GA	.112	.007	.274	16.356	.000	.184	5.441
	MFCA	.051	.003	.380	19.881	.000	.141	7.075
	EP	.069	.003	.378	19.853	.000	.143	7.009

a. Dependent Variable: SD

Based on table 2, the results of the multicollinearity test show that the green accounting variable shows no multicollinearity, this is evidenced by the tolerance value at 0.184 which is higher than 0.10 and the VIF value at 5.441 which is still below 10. The MFCA variable shows no multicollinearity, this is evidenced by the tolerance value at 0.141 which is higher than 0.10 and the VIF value at 7.075 which is still below 10. The Environmental Performance variable shows no multicollinearity, this is evidenced by the tolerance value at 0.143 which is higher than 0.10 and the VIF value at 7.009 which is still below 10.

c) Heteroscedasticity Test

Table 3. Heteroscedasticity Test Result



The results of the scatterplot indicate that the data points are randomly distributed above and below the Y-axis at zero and that there is no obvious pattern. This distribution pattern demonstrates that the regression model has no heteroscedasticity issues.

d) Autocorrelation Result

Tabel 4. Autocorrelation Test Results

Runs Test

	Unstandardized Residual
Test Value[a]	.00207
Cases < Test Value	75
Cases >= Test Value	75
Total Cases	150
Number of Runs	81
Z	.819
Asymp. Sig. (2-tailed)	.413

a. Median

The Asymp. Sig. (2-tailed) value is 0.413, which is higher than 0.05, according to the autocorrelation test results using the Run Test in Table 4. Therefore, it may be said that autocorrelation has no effect on the regression model.

Multiple Linear Regression Test

Based on Table 2, it can be seen that the constant α is -0.674 and the coefficients β1 = 0.112; β2 = 0.051; β3 = 0.069, so the regression equation is:

SD = -0.674 + 0.112GA + 0.051MFCA + 0.069EP + e

The following is an interpretation of the regression equation. The sustainable development score is 0.674 when all independent variables are kept constant, according to the constant's negative value of –0.674. The GA coefficient is positive at 0.112, meaning that a 1-unit increase in GA, while other variables remain unchanged, will raise the sustainable development (SD) value by 0.112. The MFCA coefficient is also positive at 0.051, implying that a 1-unit increase in MFCA, assuming other variables are constant, will increase the SD value by 0.051. Likewise, the EP coefficient is positive at 0.069, suggesting that a 1-unit rise in EP, with other variables unchanged, will result in a 0.069 increase in the SD value.

T Test

In table 2, the variables green accounting, MFCA, Environmental Performance sig 0.000 < 0.050, so GA, MFCA, EP a significant effect on sustainable development so that the first, second, and third hypotheses are accepted.

Coefficient of Determination Test (*Adjusted R Square*)

Tabel 5. Coefficient of Determination Results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.996[a]	.992	.992	.01797

a. Predictors: (Constant), GA, MFCA, EP

b. Dependent Variable: SD

The percentage of variance in sustainable development described by green accounting, MFCA, and environmental performance is shown by the Adjusted R Square value of 0.992 < 1. These three variables account for 99.2% of the variance in sustainable development, with the remaining proportion being impacted by factors not included in the model, according to the R Square value of 0.992. The degree to which GA, MFCA, and EP together explain the sustainable development variable is thus represented by the Adjusted R Square of 0.992, or 99.2%.

The Influence of Green Accounting on Sustainable Development

The test findings demonstrate that green accounting significantly improves sustainable growth, supporting the acceptance of H1. This indicates that greater advancements in sustainable development are linked to higher levels of green accounting, as reflected by the average green accounting value of 0.5000 and the average sustainable development value of 0.5337. Green accounting provides transparency regarding expenditures related to waste management, energy efficiency, and resource conservation, enabling companies to design more effective sustainability strategies. Consistent with stakeholder theory, it also helps evaluate the company's level of commitment to environmental management. This is in consistent with research showing that green accounting promotes sustainable development (Kurnianingtyas & Trisnawati, 2024).

The Influence of Material Flow Cost Accounting on Sustainable Development

The test findings indicate that material flow cost accounting significantly promotes sustainable development, indicating that H2 is accepted. This means that as MFCA increases, its impact on sustainable development also becomes stronger, supported by the average MFCA value of 17.7943 and the average sustainable development value of 0.5337. MFCA functions as an internal tool that helps companies achieve sustainability by improving resource efficiency, minimizing waste, and enhancing economic performance through cost management. Consistent with stakeholder theory, MFCA also reflects the company's commitment to responsible environmental management. This is in consistent with research (Dewi, 2025) which states that MFCA has a positive effect on sustainable development, that manufacturing companies that implement MFCA experience increased efficiency and contribute positively to achieving sustainable development.

The Influence of Environmental Performance on Sustainable Development

The test findings demonstrate that environmental performance significantly improves sustainable development. indicating that H3 is accepted. This means that higher environmental performance leads to greater improvements in sustainable development, as reflected by the average environmental performance score of 3.5067—classified as green—and the average sustainable development value of 0.5337. This finding demonstrates that companies with strong environmental performance prioritize not only financial gains but also environmental preservation and community well-being. This aligns with legitimacy theory, which emphasizes organizational compliance with environmental regulations. This is in line with research (May, S.P., Zamzam, I., Syahdan, R., & Zainuddin, 2023) It claims that firms with

a high PROPER rating outperform those with a low grade in terms of sustainability and that environmental performance has a favorable impact on sustainable development.

CONCLUSION

This study looks at how environmental performance, material flow cost accounting, and green accounting affect sustainable development. Selected food and beverage manufacturing businesses listed on the Indonesia Stock Exchange for the years 2022–2024 were used in the study. A total of 50 firms were included based on the predetermined criteria, yielding 150 observational data points. The results complement H1 by showing that green accounting significantly improves sustainable development. H2 is confirmed by the substantial favorable effect of material flow cost accounting. Environmental performance also shows a strong beneficial impact, supporting H3.

Given these findings, the researcher recommends that future research expand the scope of analysis to include businesses outside of the food and beverage manufacturing subsector, lengthen the study period, and include other variables that might have an impact on sustainable development, like green intellectual capital, the effectiveness of internal corporate governance, and other pertinent factors.

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