



The Effect of the Implementation of Green Accounting and Material Flow Cost Accounting on Company Profitability (in Manufacturing Sector Companies Listed on the Indonesia Stock Exchange)

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Abstract. This study examines the influence of Green Accounting (GA) and Material Flow Cost Accounting (MFCA) implementation on the profitability of manufacturing companies listed on the Indonesia Stock Exchange (IDX) for the period 2020–2024. The manufacturing sector faces significant pressure to balance competitiveness with growing environmental responsibility demands. Using a quantitative causal-associative approach with panel data from 35 purposively selected companies, this study employs Fixed Effect Model (FEM) regression via EViews 13. Profitability is measured by Return on Asset (ROA), while GA is measured through environmental cost disclosure index and PROPER score, and MFCA through Material Efficiency Ratio and waste reduction percentage. Results

show that GA has a significant positive effect on ROA ($\beta = 3.87$; $p = 0.012$) and MFCA also has a significant positive effect ($\beta = 0.29$; $p = 0.028$). Simultaneously, both variables significantly affect profitability ($F\text{-prob} = 0.000$) with $R^2 = 0.462$. The findings confirm that environmentally responsible accounting practices are not merely regulatory burdens but strategic investments that enhance financial performance in the manufacturing sector.

Introduction

The current phenomenon shows that Indonesia's post-pandemic economy is recovering, but the manufacturing sector is facing great pressure to remain competitive amid global demands for sustainable practices (Loen, 2018). Data from the Indonesia Stock Exchange (IDX) for the 2020–2024 period recorded fluctuations in Return on Assets (ROA) among manufacturing companies, which on average only ranged from 4% to 9%. Several issuers even experienced significant declines of up to 30%, primarily driven by rising operational costs, inefficiencies in production processes, increased raw material prices, and the growing burden of industrial waste management. In addition, stricter environmental regulatory requirements imposed by the government have further pressured companies to allocate more resources toward compliance, environmental protection systems, and sustainable production practices. These factors collectively reduce profitability and operational

efficiency, thereby impacting overall financial performance in the manufacturing sector (Husna et al., 2025).

Manufacturing industry waste generation in Indonesia has reached more than 2.3 million tons per year, according to data from the Ministry of Environment and Forestry (2024). A large proportion of this waste consists of plastic, chemical, and solid materials, which together dominate up to 45% of total industrial waste. The improper handling and disposal of such waste contribute significantly to environmental degradation, including river contamination, soil damage, and air pollution, particularly in major industrial areas such as West Java and East Java. These environmental challenges not only pose risks to public health and ecosystems but also increase the potential for regulatory sanctions and reputational damage for companies (Ardika et al., 2024).

As a result, there is growing pressure from both domestic communities and international stakeholders, including foreign investors, who are increasingly attentive to Environmental, Social, and Governance (ESG) aspects. Investors are now more likely to evaluate companies not only based on financial performance but also on their environmental responsibility, sustainability initiatives, and transparency in reporting ESG practices (Himawan et al., 2025). Consequently, manufacturing firms are required to integrate sustainability into their business strategies, improve waste management systems, and adopt greener technologies in order to maintain competitiveness, attract investment, and ensure long-term business continuity in an increasingly sustainability-driven global market (Hadriyani & Dewi, 2022).

The main problem faced is the imbalance between manufacturing companies' efforts to increase profitability and increasingly urgent environmental responsibilities (Jasman et al., 2025). Many companies still consider the implementation of environmentally friendly practices as an additional cost burden that can reduce net profit, even though without proper management, companies risk government sanctions, lawsuits for compensation from the public, declining image in the eyes of investors, and difficulties in obtaining financing from financial institutions that apply green principles (Mujahidi et al., 2025). This condition is further exacerbated by fluctuations in global raw material prices and pressure from stakeholders who demand transparency in environmental reporting, so manufacturing companies must find a balance between cost efficiency and operational sustainability.

The indicators used to measure this phenomenon are the level of implementation of Green Accounting as measured through the disclosure of environmental costs, participation in the Corporate Performance Assessment Program (PROPER), as well as the volume of waste management reported in the annual report (Sulistiyana et al., 2023). Meanwhile, Material Flow Cost Accounting (MFCA) is seen from the efficiency of using raw materials, energy, and production systems calculated through the separation of positive costs (finished products) and negative costs (waste) (AL-mashkoor & AL-maliki, 2024). These two indicators are then associated with profitability which is measured using the Return on Asset (ROA) ratio as a measure of the company's ability to generate profits from the total assets owned.

The variables studied in this study consist of two independent variables and one dependent variable. Green Accounting is an accounting system that integrates environmental aspects into financial statements, including identifying, measuring, acknowledging, and reporting pollution prevention costs, waste handling costs, and environmental information disclosure to stakeholders (Rahayu et al., 2025). Material Flow Cost Accounting (MFCA) is a management accounting method that separates the cost of raw materials, energy, and production systems into positive parts (products produced) and negative parts (waste and material losses) to improve efficiency and reduce waste (Rachman et al., 2024). Meanwhile, profitability is measured by Return on Asset (ROA) which is calculated as net profit divided by total assets, showing how effectively the company utilizes all its resources to generate profits.

The purpose of this study is to analyze the effect of the implementation of Green Accounting and Material Flow Cost Accounting partially or simultaneously on the profitability of manufacturing sector companies listed on the Indonesia Stock Exchange for the 2020–2024 period. Specifically, this study aims to find out how much each independent variable contributes to ROA, as well as see if the two variables together are able to explain variations in company profitability in the midst of increasingly high sustainability demands (Sherina & Astrini, 2023).

Previous empirical studies have shown that findings are still diverse and not fully aligned with each other. Selenita et.al (2025) in a quantitative study on mining companies on the IDX for the 2019–2023 period revealed that green accounting measured through the PROPER score was proven to have a real impact on profitability partially, while Material Flow Cost Accounting (MFCA) did not show a significant influence individually, even though both were simultaneously able to affect profitability as measured by Return on Asset (ROA). These findings underscore that the benefits of MFCA for profitability are more long-term and are not always reflected in short-term financial performance (Selenita et al., 2025).

On the other hand, Sirait & Sitorus (2024) who researched energy sector companies on the IDX in 2018–2022 found that green accounting has a positive effect although not always significant on various measures of profitability, such as Net Profit Margin (NPM) and Return on Equity (ROE), while the ratio of activities proxied with Total Asset Turnover (TATO) consistently has a positive and significant influence on ROA. ROE, as well as NPM. The study also places intellectual capital as a moderation variable that is able to strengthen the relationship between activity ratio and profitability, although moderation towards green accounting tends to weaken (Sirait & Sitorus, 2024).

Meanwhile, Trenggono & Trisnaningsih (2025) who analyzed manufacturing companies on the IDX for the 2021–2023 period found that green accounting actually has a negative and significant effect on company value, while Corporate Social Responsibility (CSR) has a significant positive effect. These findings reflect that in the Indonesian capital market, investors tend to view expenses recorded in green accounting as a cost expense rather than a long-term strategic investment (Trenggono & Trisnaningsih, 2025). From a management perspective, Giang (2022) stated that the implementation of MFCA integrated into the Management Control System (MCS) has proven to be effective in improving the efficiency of resource utilization. Companies that have adopted MFCA have a much higher average ROA and ROE than companies that have not implemented it, as well as company characteristics, supply chain pressures, and accounting system capabilities are the main determinants in the success of MFCA adoption in manufacturing companies (Nguyen Phu Giang, 2022).

Similar findings in a more specific context were also conveyed by Safitri et al. (2021) who examined companies in the chemical industry sub-sector listed on the Indonesia Stock Exchange (IDX) for the 2021–2023 period. The study revealed that environmental costs have a negative and significant effect on profitability, as measured by Return on Assets (ROA), with a coefficient of -0.169. This indicates that any increase in environmental costs has the potential to reduce profitability by 16.9%. This result suggests that, in the short term, higher environmental expenditures may place pressure on company earnings, particularly when such costs are not yet offset by efficiency gains or operational improvements.

On the other hand, environmental performance—measured through the PROPER score—was found to have a positive and significant effect on ROA. This finding demonstrates that companies with strong environmental management practices and higher PROPER ratings tend to achieve better financial performance. It implies that good environmental performance can enhance company reputation, strengthen stakeholder trust, and potentially attract more investment, all of which contribute to improved profitability over time (Endiana et al., 2020).

Simultaneously, the two variables were able to explain 68% of the variation in profitability, indicating a relatively strong explanatory power. This highlights the practical relevance of green accounting practices in influencing financial performance, particularly in sectors that are highly exposed to environmental risks such as the chemical industry. Overall, the findings suggest that while environmental costs may initially reduce profitability, strong environmental performance can offset these effects and create long-term financial benefits, emphasizing the importance of balancing cost management with sustainable business practices (Safitri et al., 2021).

Complementary to the various findings above, a study on pharmaceutical sector companies listed on the IDX for the 2019–2023 period found interesting results. Partially, green accounting does not have a significant impact on financial performance (ROA), as the majority of pharmaceutical companies still treat environmental spending as a mere operational expense and not as a long-term strategic investment. On the other hand, MFCA has proven to have a significant and positive effect on financial performance, as its application helps companies identify and reduce costs that do not generate added value, improve production process efficiency, and optimize revenue. Simultaneously, green accounting and MFCA together have a significant effect on financial performance, with an Adjusted R² value of 36% (Al, 2021).

The difference in direction and significance of the findings from these previous studies indicates that there are still notable research gaps that require further investigation, particularly within the context of manufacturing companies in Indonesia. These inconsistencies may arise from differences in research methods, measurement variables, observation periods, and the specific characteristics of the samples used, thereby creating opportunities for more comprehensive and contextualized analysis. Moreover, the increasing relevance of Environmental, Social, and Governance (ESG) issues, along with stricter environmental regulations and shifting investor preferences, suggests that prior findings may not fully capture the current conditions faced by manufacturing firms (Fatimah et al., 2023).

The companies examined in this study are manufacturing sector firms listed on the Indonesia Stock Exchange (IDX) for the 2020–2024 period and have met predetermined purposive sampling criteria. These criteria include companies that consistently disclose environmental information in their annual reports, possess a PROPER (Program Penilaian Peringkat Kinerja Perusahaan) rating issued by the Ministry of Environment and Forestry, and provide complete and consecutive financial data over a five-year period. This ensures that the selected samples have sufficient transparency and data reliability to support robust analysis.

A total of 35 manufacturing companies were selected as the research sample, encompassing various subsectors such as automotive, electronics, textiles, and basic chemicals. These subsectors were deliberately chosen as they represent the diverse operational characteristics and environmental impacts within the broader manufacturing industry. By including companies with varying levels of environmental performance and financial outcomes, this study aims to provide a more comprehensive understanding of the relationship between environmental responsibility and financial performance, as well as to address the inconsistencies identified in previous research.

The title of this research is "The Effect of the Implementation of Green Accounting and Material Flow Cost Accounting on Company Profitability (In Manufacturing Sector Companies Listed on the Indonesia Stock Exchange)". This title was chosen because it reflects the urgency of sustainability issues in the manufacturing sector which is increasingly strategic for the Indonesian economy, while making an empirical contribution to future management and investor decision-making.

Method

This study employs a quantitative approach using a causal associative method. This approach was selected because the primary objective is to empirically test and analyze the extent to which two independent variables—Green Accounting and Material Flow Cost Accounting (MFCA)—influence the dependent variable, namely company profitability. By applying this method, the study seeks to identify both the direction and magnitude of the relationship between environmental accounting practices and financial performance in a measurable and statistically reliable manner. In addition, the causal associative design allows for hypothesis testing to determine whether the implementation of these practices significantly contributes to profitability improvements.

The research focuses specifically on manufacturing sector companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. The manufacturing sector was deliberately chosen due to its intensive use of raw materials, high energy consumption, and significant potential for generating production waste. These characteristics make it a highly relevant context for examining the practical implications and effectiveness of green accounting and MFCA. Furthermore, manufacturing companies are often subject to stricter environmental regulations and greater scrutiny from stakeholders, making them ideal subjects for analyzing the relationship between environmental responsibility and financial outcomes.

The data utilized in this study consist of secondary data in the form of panel data, which combines time series data (across multiple years) and cross-sectional data (across multiple companies). This approach enables a more comprehensive analysis by capturing both temporal dynamics and differences between firms. The primary data sources include annual financial statements published on the official website of the Indonesia Stock Exchange (IDX), sustainability reports issued by each company, and data from the Corporate Performance Assessment Program (PROPER) provided by the Ministry of Environment and Forestry. The use of multiple data sources enhances the validity and reliability of the research findings.

The selection of the 2020–2024 research period is particularly important, as it represents the post-COVID-19 economic recovery phase, during which sustainability and environmental responsibility have gained increasing attention from investors, regulators, and the broader public. During this period, companies are not only expected to recover financially but also to demonstrate resilience and accountability in managing environmental impacts. As a result, this timeframe provides a relevant and timely context for assessing how the adoption of green accounting and MFCA contributes to both financial performance and sustainable business practices (Ulupui et al., 2020).

The study population includes all manufacturing sector companies that are listed as active on the Indonesia Stock Exchange during the observation period. The sampling technique used is purposive sampling, which is the selection of samples based on certain criteria that are tailored to the purpose of the research.

The sample criteria included:

- (1) The company presented complete and audited financial statements for five consecutive years.
- (2) The company actively disclosed environmental-related information and costs in its annual report.
- (3) The company had an officially recorded PROPER score.
- (4) The company did not experience delisting, mergers, or acquisitions during the study period.

By applying these criteria, 35 manufacturing companies were obtained as a final sample representing various subsectors such as automotive, electronics, textiles, basic chemicals, and food-beverages.

The dependent variable in this study is profitability as measured using Return on Asset (ROA). ROA is calculated by the following formula:

$$\text{ROA} = (\text{Net Profit after Tax} / \text{Total Assets}) \times 100\%$$

This ratio was selected because it provides a clear and comprehensive picture of how effectively a company utilizes all of its assets to generate profits. Return on Assets (ROA) reflects the efficiency of management in converting total assets into net income, making it a crucial indicator for evaluating overall financial performance. In addition, ROA is widely used in financial accounting literature as a primary measure of company performance because it is considered more comprehensive and relatively unaffected by differences in capital structure, unlike other profitability ratios such as Return on Equity (ROE). Therefore, ROA allows for more objective comparisons across companies with varying financing policies.

The first independent variable in this study is Green Accounting. This variable is measured using two straightforward and easily interpretable indicators. The first is the environmental cost disclosure index, which is assessed using a scoring system ranging from 0 to 1, depending on the number of environmental cost components disclosed in the company's annual report. This index reflects the level of transparency and commitment of a company in reporting its environmental expenditures. The second indicator is the company's PROPER score, which ranges from 1 to 5 and is based on official government evaluations.

The PROPER score is determined by the Ministry of Environment and Forestry (KLHK) through a comprehensive assessment of a company's environmental management performance. This evaluation includes several key aspects, such as water pollution control, air emission management, hazardous and toxic waste (B3) handling, and the implementation of an Environmental Management System (SML). By combining these two indicators, the Green Accounting variable is able to capture both the qualitative and quantitative dimensions of a company's environmental responsibility, thereby providing a more robust measure for analyzing its impact on financial performance.

The second independent variable is Material Flow Cost Accounting (MFCA). The MFCA indicators used in this study consist of two main measures that directly reflect the application of the method in the company:

1. Material Efficiency Ratio = (Positive raw material cost / Total raw material cost) $\times$ 100%. This indicator shows how efficiently a company uses raw materials to produce finished products compared to the total raw materials that go into the production process. The higher this ratio, the better the efficiency of the raw materials.
2. Waste Reduction Percentage = [(Previous year's amount of waste – Current year's amount of waste) / Previous year's amount of waste] $\times$ 100%. This indicator measures how much the volume of production waste has decreased from year to year as a result of the implementation of the MFCA.

These two MFCA indicators are obtained directly from the company's sustainability reports and production records, thus reflecting the real and measurable implementation of MFCA in the field. The use of two indicators for each independent variable aims to capture a more comprehensive dimension of each constructed being measured.

Data analysis was carried out using panel data regression through EViews 13 software. The panel data regression method was chosen because it can combine data between time (2020–2024) and data between companies at the same time, so that the results of the analysis become more accurate, stable, and can control the differences in characteristics owned by each company. The selection of the best model is carried out through a series of statistical tests, namely the Chow test,

the Hausman test, and the Lagrange Multiplier test, to determine whether the Common Effect, Fixed Effect, or Random Effect model best matches the characteristics of the research data.

Before testing the hypothesis, a classical assumption test was first carried out which included the normality test, the multicollinearity test, the Durbin-Watson autocorrelation test, and the heteroscedasticity test. This classic assumption test is very important to ensure that the regression model used is qualified for the Best Linear Unbiased Estimator (BLUE), so that the results of the study are reliable and unbiased. After the selected model and the classical assumptions are met, hypothesis testing is carried out using the t-test to see the partial influence of each independent variable, the F-test to see the simultaneous influence of the two variables, and the determination coefficient (R^2) to find out how much Green Accounting and MFCA contribute in explaining the variation in the profitability of manufacturing companies.

The methodology of this research is designed to remain simple, easy to understand, but still scientifically rigorous. Thus, the results of the study are expected to provide a clear and practical picture of the relationship between green accounting practices and the financial performance of companies in the Indonesian manufacturing sector.

Results And Discussion

This study analyzes panel data derived from 35 manufacturing sector companies listed on the Indonesia Stock Exchange (IDX) over the 2020–2024 observation period. The use of panel data allows for a more comprehensive analysis, as it captures both cross-sectional variations between companies and time-series dynamics across multiple years. Overall, the average Return on Assets (ROA) of the sampled companies is recorded at 7.82%, with a minimum value of 2.14% and a maximum value of 14.67%. These figures indicate that, on average, manufacturing companies are still capable of generating profits from their total assets, reflecting a relatively stable level of financial performance. However, the fairly wide range between the minimum and maximum values also suggests disparities in managerial effectiveness, operational efficiency, and the ability of firms to respond to external pressures.

These fluctuations in ROA can be attributed to several factors, including the economic impact of the COVID-19 pandemic, volatility in raw material prices, supply chain disruptions, and the increasing burden of environmental costs. In particular, companies that are less efficient in managing resources or slower in adapting to sustainability practices tend to experience lower profitability levels. Conversely, firms that are able to optimize asset utilization, control costs effectively, and integrate environmental considerations into their operations generally demonstrate stronger financial performance. Therefore, ROA not only reflects profitability but also serves as an indicator of how well companies manage both economic and environmental challenges.

Results

Table 1 presents the descriptive statistics of the research variables, providing an overview of the distribution and central tendencies of each variable used in the study. The average Green Accounting score of 0.68 (on a scale of 0–1) indicates that most companies have achieved a relatively good level of transparency in disclosing environmental costs and participating in environmental performance assessments such as PROPER. This suggests that awareness of environmental accountability among manufacturing firms is gradually increasing, driven by regulatory demands, stakeholder expectations, and the growing importance of sustainability reporting. Nevertheless, the score also implies that disclosure practices are not yet fully optimal, as some companies may still provide limited or inconsistent environmental information in their annual reports.

Meanwhile, the implementation of Material Flow Cost Accounting (MFCA) is reflected in an average Material Efficiency Ratio of 76.4%, indicating that a significant portion of raw materials used in the production process is successfully converted into final products. In addition, the average annual waste reduction rate of 11.2% shows that companies have made tangible efforts to minimize production waste over time. These findings suggest that, to some extent, manufacturing firms have begun to adopt more efficient and environmentally conscious production practices. However, the fact that the material efficiency ratio has not yet reached optimal levels indicates that inefficiencies and material losses still occur within the production process.

These descriptive results highlight that while manufacturing companies in Indonesia have made progress in implementing green accounting practices and improving material efficiency, there remains considerable room for further enhancement. By strengthening environmental cost disclosures, optimizing resource utilization, and reducing waste more effectively, companies can not only improve their environmental performance but also enhance operational efficiency and long-term financial sustainability.

Table 1.1 Descriptive Statistics of Research Variables

Variable	Average	Minimum	Maximum	Std.Deviation
ROA (%)	7,82	2,14	14,67	3,45
Green Accounting (skor)	0,68	0,32	0,95	0,19
MFCA – Material Efficiency Ratio (%)	76,4	58,9	89,3	8,72
MFCA – Waste Reduction (%)	11,2	3,1	24,6	6,14

Results of panel data regression showed that Fixed Effect Model (FEM) was best model based on Chow, Hausman, and Lagrange Multiplier Tests. Results of Chow Test showed statistically significant F-value, indicating Fixed Effect Model was more appropriate than Common Effect Model. Fixed Effect Model is able to capture differences in characteristics between companies that cannot be observed directly. These differences are considered important in influencing dependent variable so they need to be accommodated in model. Hausman Test yielded significant chi-square value ($p < 0.05$), confirming that Fixed Effect Model is more appropriate than Random Effect Model. This result indicates that there is correlation between individual effects of company and independent variables. Assumption of Random Effect Model is not fulfilled under these conditions. Lagrange Multiplier Test also supports use of panel data models compared to Common Effect Model. Fixed Effect Model allows control over constant characteristics in each company. Estimation results become more accurate and consistent in explaining relationship between variables. The regression equations obtained are:

$$\text{ROA} = 4.21 + 3.87 \text{ Green Accounting} + 0.29 \text{ MFCA} + \epsilon$$

Partially, Green Accounting has a positive and significant effect on ROA (coefficient = 3.87; prob. = 0.012). This means that every increase in the Green Accounting disclosure score by 1 point will increase the ROA by 3.87%. These results show that companies that are more transparent in reporting environmental costs and activities tend to gain higher investor trust, which in turn increases profitability. This increased investor confidence is closely related to a perception of better risk management, where companies that actively disclose environmental information are considered better prepared for future environmental regulations and less likely to be subject to sanctions that could harm financial performance.

Material Flow Cost Accounting (MFCA) also had a positive and significant effect on ROA (coefficient = 0.29; prob. = 0.028). Any increase in material efficiency and a 1% reduction in waste will increase the ROA by 0.29%. These findings prove that the implementation of MFCA is able to reduce the waste of raw materials and energy, so that production costs decrease and net profit

increases. This mechanism works through MFCA's ability to map material flows thoroughly, identify points of waste in the production process, and provide more accurate cost information to management for more efficient decision-making.

Simultaneously, Green Accounting and MFCA have a positive and significant effect on profitability (prob. $F = 0.000$). An R^2 value of 0.462 indicates that the two variables are able to explain 46.2% of the variation in ROA, while the remaining 53.8% is influenced by other factors such as company size, leverage, capital intensity, macroeconomic conditions, and industry-specific factors that are not included in this study model.

Discussion

These results are in line with a number of relevant previous studies. Selenita et al. (2025) in a study on mining companies on the IDX found that simultaneously green accounting and MFCA together have a significant positive influence on profitability, with an R^2 value of 35.6% indicating the contribution of both variables in explaining ROA variations. The research confirms that integrated environmental accounting practices can be a business strategy that supports financial performance, not just the fulfillment of regulatory obligations.

The results were also put forward by Sirait & Sitorus (2024) who found that operational efficiency consistently contributes positively to various dimensions of company profitability, while also emphasizing the critical role of effective and productive asset management in driving higher net income. These findings highlight that companies capable of optimizing resource utilization and minimizing inefficiencies tend to achieve better financial outcomes, as operational improvements directly translate into cost savings and enhanced profit margins. Giang (2022) reinforces these results by demonstrating that companies that integrate Material Flow Cost Accounting (MFCA) into their management control systems achieve higher average Return on Assets (ROA) and Return on Equity (ROE) compared to firms that do not adopt MFCA practices. The study further explains that the primary mechanisms linking MFCA implementation to improved financial performance are increased efficiency in material usage and the reduction of waste-related costs. By identifying and quantifying material losses within the production process, MFCA enables companies to make more informed managerial decisions, ultimately leading to better resource allocation, reduced operational costs, and stronger overall profitability.

However, there are nuances that need to be observed. Trenggono & Trisnaningsih (2025) found that manufacturing sector investors in the Indonesian capital market tend to respond negatively to the increase in green accounting disclosure because it is perceived as an increase in cost burden. This difference can be explained by the difference in the proxies used: Tobin's Q as a measure of market value versus ROA as a measure of operational profitability, where operational efficiency through MFCA is more quickly reflected in ROA. In the raw material-intensive manufacturing sector, waste savings and material efficiency provide real financial benefits, resulting in measurable increase in ROA.

Safitri et al. (2025) in their study on the chemical industry sector provide a more nuanced perspective: environmental costs have been shown to suppress profitability in the short term because they are treated as an operational burden, but good environmental performance – which is reflected in a high PROPER rating – actually drives a significant increase in ROA. This combination of two directions of influence illustrates that the success of green accounting in increasing profitability depends heavily on how the company manages the balance between environmental investment and efficient operational strategy.

A more specific sectoral perspective is offered by Al (2021) in his study on the pharmaceutical sector on the IDX. The results of the study indicate that Material Flow Cost Accounting (MFCA) has a positive and significant influence on financial performance. This relationship can be explained by MFCA's ability to systematically identify inefficiencies in production processes, particularly in the form of wasted material flows such as waste, emissions, and non-value-added by-products. These inefficiencies are then translated into detailed cost

information, enabling management to better understand where resources are being lost and to implement more effective cost control and efficiency improvement strategies. As a result, companies can reduce unnecessary expenses, optimize resource utilization, and ultimately enhance profitability.

Furthermore, when MFCA is implemented alongside green accounting practices, both approaches complement each other in creating a more comprehensive framework for environmental and financial management. This integration not only improves internal decision-making but also strengthens the company's sustainability image in the eyes of stakeholders, including investors, regulators, and the public. Increased transparency and accountability in managing environmental impacts contribute to higher levels of stakeholder trust, which can enhance corporate reputation and attract long-term investment.

Ultimately, the synergy between MFCA and green accounting demonstrates that environmental responsibility and financial performance are not mutually exclusive. Instead, they can reinforce one another, where improved environmental management leads to greater operational efficiency and stronger financial outcomes. This finding supports the view that adopting environmentally oriented accounting practices is a strategic move that can generate both economic and non-economic benefits for manufacturing companies.

These cross-sectoral findings—spanning industries such as mining, energy, chemicals, and pharmaceuticals—further reinforce the relevance of green accounting and Material Flow Cost Accounting (MFCA) as adaptive accounting instruments that can be applied across various industry characteristics. Despite differences in production processes, resource intensity, and environmental impact, both approaches have demonstrated flexibility in capturing environmental costs and improving resource efficiency. This highlights that environmental accounting is not limited to a specific sector but is broadly applicable as a tool for enhancing both sustainability and economic performance.

The managerial implication of this study is that manufacturing companies should no longer perceive environmental investment as merely an additional cost or regulatory obligation. Instead, it should be viewed as a strategic, long-term investment that can generate multiple benefits. By adopting green accounting and MFCA, companies can improve their corporate reputation, strengthen stakeholder trust, minimize regulatory and compliance risks, and enhance transparency in reporting. Furthermore, these practices enable firms to identify inefficiencies in resource usage, reduce waste, and optimize production processes, which ultimately contributes to cost savings and improved financial performance.

Overall, the findings of this study confirm that the implementation of green accounting and MFCA is no longer just a cost burden, but rather a strategic investment capable of increasing the profitability of manufacturing companies. Firms that consistently apply these practices tend to demonstrate stronger competitiveness, not only in terms of their image in the eyes of investors and the public but also in achieving higher levels of operational efficiency at the production level. In addition, these companies are generally better prepared to respond to environmental regulations and market demands that increasingly prioritize sustainability.

In the context of intensifying global competition, where sustainability has become a key consideration for investors, regulators, and consumers, a company's ability to integrate environmental aspects into its accounting systems and managerial decision-making processes serves as a critical differentiating factor. Companies that proactively embed sustainability into their core strategies are more likely to achieve long-term business resilience, maintain competitive advantage, and secure sustainable growth in an evolving global market.

Conclusion

This study concludes that the implementation of Green Accounting and Material Flow Cost Accounting together has a positive and significant influence on the profitability of manufacturing companies listed on the Indonesia Stock Exchange for the 2020–2024 period. Partially, Green Accounting had a significant positive effect on ROA, which means that the higher the level of disclosure of environmental costs and activities and the OWN score, the higher the profitability obtained. Similarly, MFCA had a significant positive effect, proving that the efficiency of raw materials and the reduction of waste contributed significantly to the increase in the company's net profit. Companies that consistently disclose environmental costs and activities and implement material flow efficiency are able to increase the ability to generate profits from their assets. These findings confirm that green accounting practices are not a mere cost burden, but rather a strategic investment that supports better financial performance amid increasing sustainability demands. Green Accounting and MFCA together account for 46.2% variation in the profitability of the sample firms, which is a fairly substantial contribution in determining financial performance. Based on these findings, there are several recommendations that can be submitted. First, manufacturing companies are advised to more intensively integrate Green Accounting and MFCA in their accounting systems and operational decision-making, given that both practices have been proven to contribute positively to profitability. Second, regulators and exchange authorities can encourage more comprehensive disclosure of environmental information through more standardized sustainability reporting policies. Third, investors and financial analysts should include environmental indicators in their fundamental analysis of companies, given their positive correlation with long-term profitability.

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