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MANAGERIAL OWNERSHIP MODERATES MATERIAL FLOW COST ACCOUNTING AND RISK MANAGEMENT WITH FINANCIAL PERFORMANCE

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Abstract
This study aims to analyze the influence of material flow cost accounting and risk management on financial performance in companies, with managerial ownership as a moderating variable. This research was conducted on energy and industrial sector companies listed on the Indonesia Stock Exchange (IDX) from 2019 to 2023. The method used is quantitative, utilizing secondary data sourced from company annual reports. From a total of 149 registered companies, 27 companies were selected as samples through purposive sampling techniques, resulting in 135 data points for analysis. The results show that material flow cost accounting has a significant positive influence on financial performance, while risk management does not have a significant effect. Furthermore, managerial ownership significantly moderates the relationship between risk management and financial performance, but not for material flow cost accounting. These findings provide insights for investors and academics regarding factors influencing financial performance and serve as a reference for further research in business and finance.

Keywords: Managerial Ownership, Material Flow Cost Accounting, Risk Management, Financial Performance

1. Introduction

A company is a business organization whose primary purpose is to generate profit, adhering to economic principles that emphasize achieving maximum results with minimal resources (Andarsari, 2019). Beyond profit-seeking, companies must also consider environmental sustainability and community welfare, as their activities directly or indirectly impact the surrounding environment. Evaluating a company's success often involves assessing its financial performance, which reflects the condition of all business activities. Financial performance is crucial for investors in making investment decisions, as it indicates the company's achievements and its ability to generate profits—key indicators of its long-term viability. A healthy company can prepare financial statements regularly, resulting from an accounting process that provides a comprehensive picture of its financial status.

An example of financial performance can be observed in PT. Baramulti Suksessarana Tbk (BSSR), which reported revenue of US$482.50 million (IDR 7.91 trillion), an 18.72% decline from the previous year, indicating a profit decrease that could influence investor decisions (Source: www.marketbisnis.com). Besides internal and external factors, this study highlights the roles of Material Flow Cost Accounting (MFCA) and risk management as factors influencing financial performance. MFCA implementation enhances material and energy cost efficiency and profitability, while risk management functions to identify and control risks, ensuring long-term financial stability.

Additionally, managerial ownership moderates the influence of both factors on financial performance by increasing management commitment and oversight.

Previous research by Ardina et al. (2020), Agatha & Widoretno (2023), and Mitahurrohman (2022) identifies factors affecting financial performance, including MFCA and risk management. MFCA is an accounting method that monitors costs related to material and energy flows in the production process, improving operational efficiency, reducing waste, and potentially increasing profitability. Meanwhile, risk management plays a vital role in identifying, evaluating, and controlling risks that affect organizational sustainability and financial performance, with studies showing a positive relationship between risk management and company performance (Sibarani & Lusmeida, 2021; Sugiyanto & Rahayu, 2018).

Managerial ownership, where managers also hold company shares, can strengthen management commitment and oversight, thereby enhancing the influence of MFCA and risk management on financial performance (Burhanuddin et al., 2022; Himawan & Andayani, 2020). Various studies indicate that effective disclosure and implementation of risk management and MFCA practices positively contribute to company sustainability and financial performance, though some studies show conflicting results due to understanding and implementation factors (Permatasari et al., 2024; Rakesa & Werastuti, 2022; Asti, 2021). Therefore, this study aims to analyze the influence of MFCA and risk management on financial performance and examine the moderating role of managerial ownership in these relationships.

2. Theoretical Background

2.1 Stakeholder Theory

Introduced by R. Edward Freeman in 1984, stakeholder theory posits that internal and external groups influencing and influenced by the company are crucial for business success and continuity, emphasizing the importance of providing benefits to all related parties (Latifah & Nikmah, 2023).

2.2 Financial Performance

Financial performance represents the results of a company's operational activities, demonstrated through accurate financial data, to provide a clear picture of its condition and health over a specific period (Nasihin, 2023). According to Kaat & Sofian (2023) and Rizkiyahh (2022), financial performance is an indicator of financial success essential for management to design improvement strategies. It reflects the company's effectiveness in managing assets over time, based on various operational outcomes.

2.3 The Influence of Material Flow Cost Accounting on Financial Performance

Material Flow Cost Accounting (MFCA) integrates physical and financial data to assess material flow and inventory during production, aiming to reduce environmental impact and costs, thereby improving financial performance (Lestari & Alim, 2021). MFCA implementation enhances operational efficiency, productivity, and supports sustainability and environmental risk management, aligning with stakeholder theory by considering the interests of parties like the government and community (May et al., 2023). Research by Kartika (2020) and Afra (2022) indicates that MFCA positively influences profitability by saving raw material usage without compromising product quality, reducing costs, increasing revenue, and strengthening long-term competitiveness and reputation. Thus, the hypothesis is:

H1: Material flow cost accounting has a significant effect on financial performance.

2.4 The Influence of Risk Management on Financial Performance

Enterprise Risk Management (ERM) is a strategic process designed to identify, evaluate, and manage risks affecting company performance, increasing success chances and maintaining shareholder value (Pangestuti et al., 2023). Effective ERM practices align with stakeholder theory, emphasizing the importance of benefiting stakeholders through risk management disclosure (Damayanti & Venusita, 2022). Studies generally show a positive relationship between ERM and company performance (Hoyt & Liebenberg, 2011; Li et al., 2014), though some find no significant effect (Eikenhout, 2015; Agustina & Baroroh, 2016). Thus, the hypothesis is:

H2: Risk management has a significant effect on financial performance.

2.5 Managerial Ownership Moderates the Relationship of Material Flow Cost Accounting to Financial Performance

Previous research indicates that MFCA application can increase profits, production efficiency, and reduce environmental impact (Mitahurrohman, 2022). High managerial ownership strengthens MFCA's positive influence on financial performance, as share-owning managers are more motivated to optimize resources, while low ownership reduces motivation and impact (Sembiring, 2020; Wiariningsih et al., 2019). High ownership encourages managers to maximize shareholder wealth through performance improvements like Return on Assets (ROA) and supports MFCA data use for enhancing manufacturing processes (Marota, 2017). Thus, managerial ownership moderates the MFCA-financial performance relationship, with high ownership optimizing benefits and low ownership diminishing effects. The hypothesis is:

H3: Managerial ownership moderates the relationship between material flow cost accounting and financial performance.

2.6 Managerial Ownership Moderates the Relationship of Risk Management to Financial Performance

Effective risk management, measured by system efficiency, can improve financial performance through enhanced risk governance and accountability, especially under high risk (Halimah, 2020; Supriyadi & Setyorini, 2020). High managerial ownership strengthens managers' motivation to manage risk proactively, positively affecting financial performance, while low ownership reduces this influence (Al-Dubai & Abdelhalim, 2021; Damayanti & Venusita, 2022; Ardina & Novita, 2023). Transparent risk disclosure demonstrates good risk management implementation, improving performance through efficient response to unexpected situations and better operational management (Chen et al., 2020; Adissa & Septiani, 2022). Thus, managerial ownership moderates the risk management-financial performance relationship, with share-owning managers being more responsible and oriented toward optimal risk management. The hypothesis is:

H4: Managerial ownership moderates the relationship between risk management and financial performance.

3. Methods

3.1 Types of Research

This study employs a quantitative approach, with the population consisting of energy and industrial companies listed on the Indonesia Stock Exchange (IDX) from 2019 to 2023. The variables analyzed include the dependent variable (Y) for financial

performance, independent variables (X1 and X2) for material flow cost accounting and risk management, and managerial ownership (Z) as the moderating variable. Data were obtained from company financial statements accessed via the IDX official website and respective company websites.

3.2 Population and Sampling Techniques

The population comprises energy and industrial companies listed on the IDX from 2019 to 2023. Sampling was done using purposive sampling based on specific criteria (Nukholis, 2018). Based on these criteria, 27 companies were selected, with a five-year research period, resulting in 135 observational data points.

3.3 Operational Research Variables

According to Sugiyono (2019), research variables are attributes or values of individuals, objects, or activities with certain variations, studied to draw conclusions. The relationship between independent (X) and dependent (Y) variables, including the moderating variable (Z), is expected to be unaffected by external factors not studied.

Table 1. Variable Operationalization

Variable	Symbol	Indicator	Measurement Scale
Financial Performance	Y	Return on Assets (ROA)	Ratio
Material Flow Cost Accounting	X1	Efficiency ratio of material costs to total production costs	Ratio
Risk Management	X2	Disclosure index based on COSO ERM framework	Ordinal
Managerial Ownership	Z	Percentage of shares owned by management	Ratio

Source: Processed by researchers (2025)

3.4 Data Analysis Techniques

Data analysis used statistical methods with EViews-9 software. The analysis stages included descriptive statistics, panel data regression model selection (Random Effect Model, Fixed Effect Model, Common Effect Model), best model selection tests (Chow, Hausman, Lagrange Multiplier), classical assumption tests (normality, multicollinearity, heteroscedasticity, autocorrelation), multiple linear regression analysis, and hypothesis testing (coefficient of determination, F-test, t-test).

4. Results and Discussion

After purposive sampling, 27 industrial and energy company samples were obtained. With a five-year observation period (2019-2023), the total processed data amounted to 135 points.

Table 2. Research Sample Criteria

No.	Sample Selection Criteria	Violation	Accumulation
1	Energy and Industrial Sector Companies Listed on IDX (2019-2023)	-	149
2	Companies publishing full, audited financial statements (2019-2023)	(51)	98
3	Profitable companies (2019-2023)	(54)	44
4	Companies with managerial ownership (2019-2023)	(17)	27
	Total companies meeting criteria		27

No.	Sample Selection Criteria	Violation	Accumulation
	Research years		5
	Total research samples (5 years × 27)		135

Source: Processed data (2025)

4.1 Classical Assumption Tests

Table 3. Classical Assumption Test Results

Test Type	Test Method	Test Statistic / Result	Critical Value / Benchmark	Conclusion
Normality Test	Jarque-Bera	Probability Value = 0.188727	α = 0.05	H_0 Accepted. The residual data is normally distributed.
Multicollinearity Test	Correlation Matrix	All correlation coefficients < 0.90	Threshold: 0.90	No multicollinearity. The independent variables are not highly correlated.
Heteroscedasticity Test	White Test	Prob. Chi-Square (ObsR-squared) = 0.6546	α = 0.05	H_0 Accepted. No heteroscedasticity exists (constant variance of errors).
Autocorrelation Test	Durbin-Watson Test	Durbin-Watson stat = 2.11908	dU = 1.6877; 4-dU = 2.3123 dL = 1.7482; 4-dL = 2.2518	No autocorrelation. The value falls within the acceptable range (2.2518 ≤ 2.11908 ≤ 2.3123).

Source: Processed data with EViews 9 (2025)

Prior to conducting hypothesis testing, a series of classical assumption tests were performed to ensure the validity of the regression model and the reliability of the estimated parameters. The results of these tests are summarized in Table 1.

1) Normality Test

The Normality test aims to determine whether the residuals of the regression model are normally distributed. This test was conducted using the Jarque-Bera test. The result shows a probability value (p-value) of 0.188727, which is significantly greater than the α = 0.05 significance level. Therefore, the null hypothesis (H_0) is accepted, concluding that the residual data is normally distributed. The fulfillment of this normality assumption indicates that the model is appropriate for statistical inference testing.

2) Multicollinearity Test

The Multicollinearity test detects the presence of high correlations between the independent variables in the regression model, which can distort the estimated coefficients and their standard errors. The test was performed by analyzing the correlation matrix between all independent variables. The results indicate that all

correlation coefficients between independent variables are below the 0.90 threshold. As no coefficient reached or exceeded this critical value, it is concluded that there is no multicollinearity in the model. This confirms that each independent variable provides unique information and is not linearly dependent on others.

3) Heteroscedasticity Test
   The Heteroscedasticity test examines whether the variance of the regression model's error term is constant (homoscedasticity), a key assumption for obtaining efficient estimators. The test was carried out using the White test. The decision is based on the Prob. Chi-Square (ObsR-squared) value of 0.6546. Since this value exceeds $\alpha = 0.05$, the null hypothesis (H_0) is accepted. This indicates that no heteroscedasticity problem exists in the model, confirming that the error variance is constant and the model estimates are efficient and reliable.
4) Autocorrelation Test
   The Autocorrelation test detects whether there is a correlation between error terms across different time periods, which is a common issue in time-series and panel data. This test was conducted using the Durbin-Watson test. The calculated Durbin-Watson statistic is 2.11908. This value falls within the acceptable range defined by the upper (dU) and lower (dL) limits ($2.2518 \leq 2.11908 \leq 2.3123$), specifically in the zone indicating no autocorrelation. Therefore, it is concluded that the error terms are not serially correlated, and the model is well-specified.

Overall Conclusion: Based on the results of all four classical assumption tests, the regression model is deemed valid, reliable, and robust. It fulfills all the necessary criteria for Best Linear Unbiased Estimators (BLUE), providing a solid foundation for the subsequent hypothesis testing and interpretation of the results.

4.2 Panel Data Regression Analysis (Fixed Effect Model without Moderation)

Table 4. Fixed Effect Model Regression Results (Without Moderation)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.985711	3.561594	-0.838308	0.4037
MFCA_X1	0.123182	0.027813	4.428946	0.0000
MR_X2	0.006221	0.039047	0.159314	0.8737

Source: Processed with EViews 9 (2025)

The regression equation is:

$$Y = -2.985711 + 0.123182X1 + 0.006221X2 + e$$

1) The constant (-2.985711) indicates that if X1 and X2 are zero, financial performance is -2.99%.
2) X1 coefficient (0.123182) shows a positive effect: a 1-point increase in MFCA increases financial performance by 12.32%.
3) X2 coefficient (0.006221) shows a positive but insignificant effect.

4.3 Panel Data Regression Analysis (Fixed Effect Model with Moderation

Table 5. Fixed Effect Model Regression Results (With Moderation)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.552811	3.415786	-0.747357	0.4565
MFCA_X1	0.107283	0.027105	3.958078	0.0001
MR_X2	0.004610	0.037423	0.123190	0.9022
KM_Z	0.308693	0.095627	3.228096	0.0017

Source: Processed with EViews 9 (2025)

The regression equation is:

$$Y = -2.552811 + 0.107283X1 + 0.004610X2 + 0.308693Z + e$$

Managerial ownership (Z) has a significant positive effect (coefficient 0.308693, prob. 0.0017).

4.4 Hypothesis Testing

Table 6: Results of Hypothesis Testing (F-Test, T-Test, and Coefficient of Determination)

Test Type	Hypothesis	Coefficient	(p-value)	Critical Value	Conclusion
F-Test (Simultaneous)	H_0: $\beta1 = \beta2 = 0$	F-statistic = 8.150	0.000000	$\alpha = 0.05$	Reject H_0. MFCA and Risk Management jointly have a significant effect on Financial Performance.
T-Test (Partial)					
MFCA (H1)	H_0: $\beta1 = 0$	Coefficient = 0.123	0.0000	$\alpha = 0.05$	Reject H_0. Material Flow Cost Accounting has a significant positive effect on Financial Performance.
Risk Management (H2)	H_0: $\beta2 = 0$	Coefficient = 0.006	0.8737	$\alpha = 0.05$	Fail to Reject H_0. Risk Management does not have a significant effect on Financial Performance.
Coefficient of Determination	-	Adjusted R-squared = 0.599	-	-	The independent variables (MFCA & Risk Management) explain 59.9% of the variation in the Financial Performance variable.

Source: Processed data with EViews 9 (2025)

The results of the hypothesis testing, comprising the F-test (simultaneous), t-test (partial), and the coefficient of determination, are presented in Table 1. These tests were conducted to determine the significance of the influence of the independent variables on the dependent variable, both collectively and individually.

1) F-Test (Simultaneous Significance)

The F-test evaluates whether the independent variables, Material Flow Cost Accounting (MFCA) and Risk Management, jointly have a significant effect on Financial Performance. The results show an F-statistic of 8.150 with a corresponding probability value (p-value) of 0.000000. Since this p-value is significantly less than the 0.05 significance level (α), the null hypothesis (H_0) is rejected. This leads to the conclusion that MFCA and Risk Management together exert a statistically significant influence on a company's Financial Performance. The model is therefore considered fit for explaining this relationship.

2) T-Test (Partial Significance)
The t-test assesses the individual (partial) effect of each independent variable on the dependent variable.
   a. Effect of Material Flow Cost Accounting (H1): The test for H1 yields a coefficient of 0.123 and a p-value of 0.0000. As the p-value is less than $\alpha = 0.05$, H_0 is rejected. This indicates that Material Flow Cost Accounting has a significant positive effect on Financial Performance. A coefficient of 0.123 suggests that for every one-unit increase in MFCA implementation, Financial Performance is expected to increase by 0.123 units, holding other variables constant.
   b. Effect of Risk Management (H2): The test for H2 shows a coefficient of 0.006 and a p-value of 0.8737. This p-value is far greater than $\alpha = 0.05$, leading to a failure to reject the null hypothesis (H_0). Therefore, it is concluded that Risk Management does not have a statistically significant effect on Financial Performance within the context of this study. The very low coefficient further confirms its negligible individual impact.
3) Coefficient of Determination (Adjusted R^2)
The Adjusted R-squared value measures the proportion of the total variation in the dependent variable (Financial Performance) that is explained by the independent variables included in the model, while adjusting for the number of predictors. The model's Adjusted R^2 value is 0.599. This means that approximately 59.9% of the variance in Financial Performance can be explained by the combined variations in Material Flow Cost Accounting and Risk Management. The remaining 40.1% is attributed to other factors not included in this regression model.

In summary, the hypothesis testing reveals that while the combined model is significant, only Material Flow Cost Accounting individually proves to be a significant driver of Financial Performance. Risk Management, in this specific model and sample, does not demonstrate a significant individual impact. The model demonstrates a strong explanatory power, accounting for nearly 60% of the changes in Financial Performance.

4.5 Moderated Regression Analysis (MRA) Test

Table 7. MRA Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.335312	3.375117	-0.691920	0.4905
MFCA_X1	0.122918	0.027903	4.405183	0.0000
MR_X2	-0.001450	0.037060	-0.039135	0.9689
MFCA_X1KM_Z	-0.075901	0.038811	-1.955642	0.0532
MR_X2KM_Z	0.022681	0.009872	2.297515	0.0236

1) H3: Interaction term MFCAZ has prob. 0.0532 > 0.05 → H3 rejected. Managerial ownership does not moderate the MFCA-financial performance relationship.
2) H4: Interaction term MRZ has prob. 0.0236 < 0.05 → H4 accepted. Managerial ownership moderates the risk management-financial performance relationship.

4.4 Discussion

4.4.1 The Significant Effect of Material Flow Cost Accounting (H1 Accepted)

The acceptance of H1 confirms that Material Flow Cost Accounting (MFCA) has a significant positive effect on financial performance. This result strongly aligns with the findings of Kartika (2020) and Afra (2022), who posit that MFCA enhances profitability by systematically identifying and quantifying material losses and inefficiencies within the

production process. By converting waste into a visible cost, MFCA provides management with a powerful tool to initiate corrective actions, leading to more efficient resource utilization, reduced production costs, and consequently, improved bottom-line results. This outcome underscores the practical value of adopting environmental management accounting techniques not merely for regulatory compliance or ethical reasons but as a strategic tool for achieving tangible financial gains. It validates the stakeholder theory perspective, demonstrating that operational efficiency can simultaneously benefit the company's finances and its broader environmental responsibilities.

4.4.2 The Non-Significant Effect of Risk Management (H2 Rejected).

Contrary to the initial hypothesis and studies such as those by Hoyt & Liebenberg (2011), H2 was rejected, indicating that risk management, as measured in this study, does not have a significant direct effect on financial performance. This discrepancy may be attributed to several factors. Firstly, the "tick-box" compliance nature of risk management implementation in some companies, where the process is treated as a formality rather than an integrated strategic framework, can dilute its effectiveness. Secondly, there is often a significant time lag between the implementation of robust risk management and its observable impact on financial statements; the benefits may manifest in risk avoidance and enhanced resilience over the long term rather than in short-term profitability. Lastly, the method of measurement—often based on disclosure in annual reports—may not accurately capture the depth and quality of Enterprise Risk Management (ERM) implementation, potentially leading to a misclassification of its true effectiveness.

4.4.3 The Moderating Role of Managerial Ownership

1) H3 Rejected: MFCA and Financial Performance
   The rejection of H3 suggests that managerial ownership does not act as a significant moderator in the relationship between MFCA and financial performance. This implies that the adoption and financial benefits of MFCA are likely driven by other compelling factors, such as competitive pressures, regulatory demands, or a strong organizational culture focused on operational excellence, rather than by the level of ownership held by managers. The technical and process-driven nature of MFCA means its success is perhaps more dependent on operational expertise and company-wide commitment than on the financial incentives provided by equity ownership.
2) H4 Accepted: Risk Management and Financial Performance
   Conversely, the acceptance of H4 provides compelling evidence that managerial ownership significantly strengthens the relationship between risk management and financial performance. This finding strongly supports the principal-agent theory and aligns with research by Damayanti & Venusita (2022). When managers have a substantial ownership stake, their interests become more closely aligned with those of shareholders. This alignment reduces agency costs and incentivizes managers to move beyond mere compliance in risk management. Instead, they are motivated to implement a more robust and effective ERM system as a means to protect and enhance their personal wealth, which is tied to the company's long-term value and stability. This proactive approach to risk governance ultimately translates into superior financial performance, demonstrating that ownership structure is a critical contingency factor for the effectiveness of risk management practices.

In conclusion, this study demonstrates that the pathways to improving financial performance are multifaceted. While MFCA provides a direct operational lever, the

effectiveness of broader governance mechanisms like risk management is highly dependent on the alignment of interests ensured by ownership structures.

5. Conclusion

Based on research that has been conducted on managerial ownership, material flow cost accounting and risk management with financial performance in energy and industrial companies listed on the IDX in 2019 – 2023. So, it can be concluded as follows:

1) The results of the hypothesis test show that the Material flow cost accounting variable is empirically proven to have an effect on financial performance variables in energy and industrial companies.
2) The results of the hypothesis test show that risk management has no effect on the financial performance of energy and industrial companies.
3) The results of the hypothesis test show that managerial ownership has no effect as a variable that moderates the relationship between material flow cost accounting and financial performance in energy and industrial companies.
4) The results of the hypothesis test show that managerial ownership is influential as a variable that moderates the relationship between risk management and financial performance in energy and industrial companies.

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