The Moderating Role of Enterprise Risk Management on the Influence of Environmental Performance, Firm Size, and Managerial Ownership on Financial Performance: An Empirical Study in Indonesia

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ABSTRACT

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| This study aims to examine the effect of environmental performance, firm size, and managerial ownership on the financial performance of transportation and logistics companies listed on the Indonesia Stock Exchange (IDX), as well as to analyze the moderating role of Enterprise Risk Management (ERM) in these relationships.  The study employs a quantitative approach with a causal design, utilizing Moderated Regression Analysis (MRA) on panel data with a Fixed Effect Model (FEM).  The research is conducted using secondary data obtained from the annual reports and sustainability reports of transportation and logistics companies listed on the IDX, covering the period from January 2021 to December 2024.  The research sample consists of 30 transportation and logistics companies that meet the sampling criteria. Financial performance is measured using Return on Assets (ROA), environmental performance using the GRI 300 disclosure index, firm size using the natural logarithm of total assets, managerial ownership using the percentage of shares owned by management, and ERM using the COSO ERM 2017 disclosure index.  Firm size and managerial ownership have a positive and significant effect on financial performance, whereas environmental performance has a significant negative effect. ERM significantly strengthens the effect of environmental performance on financial performance but does not significantly moderate the effect of firm size. In addition, ERM negatively moderates the effect of managerial ownership on financial performance  ERM functions as a moderator that can enhance the financial benefits of environmental initiatives but may limit the positive effects of managerial ownership. Integrating ERM with sustainability practices can improve profitability, although its implementation should be balanced to avoid excessive constraints on managerial decision-making. |

*Keywords: Environmental Performance; Firm Size; Managerial Ownership; Enterprise Risk Management (ERM); Financial Performance.*

1. INTRODUCTION

The The transportation sector plays a crucial role in supporting Indonesia’s economic growth by facilitating trade, mobility, and infrastructure development. According to Statistics Indonesia (BPS, 2021), the transportation and warehousing sector contributed more than 4% to Indonesia’s Gross Domestic Product (GDP), underscoring its strategic importance. However, despite its significant potential, the sector has experienced substantial fluctuations in financial performance, particularly in Return on Assets (ROA), during the 2019–2024 period. This decline reflects problematic financial performance among firms.

Externally, the COVID-19 pandemic caused severe disruptions to supply chains, mobility restrictions, and a sharp decline in transportation demand (Ministry of Transportation, 2020). For instance, in 2020, the number of domestic air passengers fell by 55.7% compared to the previous year (BPS, 2021). Internally, companies faced rising operational costs such as fuel, fleet maintenance, and employee wages, as well as significant depreciation of fixed assets, all of which eroded profitability (Yusdianto & Ramadhoni, 2023).

In addition, the sector faces increasing pressure regarding environmental issues. Transportation is a major contributor to greenhouse gas emissions, which has triggered calls for greater environmental accountability and compliance with sustainability reporting standards such as the Global Reporting Initiative (GRI) (Ministry of Environment and Forestry, 2019). Studies by Fauziah et al. (2022), Limano et al. (2022), and Dita & Ervina (2021) reveal that strong environmental performance can attract sustainability-focused investors and reduce reputational risk, ultimately enhancing financial performance. However, Rahmawati et al. (2023) and Hanif et al. (2020) found no significant relationship, suggesting that the financial benefits of environmental initiatives may not be immediately apparent.

Firm size has also been identified as an important determinant of financial performance. Larger firms generally enjoy economies of scale, better market access, and greater bargaining power with suppliers and customers (Meiyana & Aisyah, 2019; Aziza et al., 2020). Nonetheless, some studies report insignificant or even negative effects of firm size on profitability, particularly when large organizations suffer from bureaucratic inefficiencies (Syah et al., 2021; Dita & Ervina, 2021).

Managerial ownership is another governance factor that aligns managerial decision-making with shareholder interests. Jaya et al. (2019) and Sutrisno & Riduwan (2022) found a significant positive relationship between managerial ownership and financial performance, indicating that managers with equity stakes are more motivated to enhance firm value. Conversely, Nilayanti & Suaryana (2019) and Malau et al. (2024) reported insignificant relationships, particularly when managerial ownership levels are too low to influence strategic decisions.

The inconsistencies in prior findings highlight the need for a moderating factor to better explain these dynamics. Enterprise Risk Management (ERM) is a strategic framework designed to identify, assess, and manage risks across the organization by integrating risk management into decision-making processes (COSO, 2017). Beasley et al. (2005), Farrell & Gallagher (2019), and Karina et al. (2023) demonstrated that ERM can strengthen organizational resilience, improve resource allocation, and potentially reinforce the relationship between corporate strategies such as environmental initiatives or governance structures and financial performance. However, the moderating effect of ERM remains underexplored in emerging market contexts, particularly in high-risk and asset-intensive industries such as transportation and logistics.

Against this background, this study aims to examine the influence of environmental performance, firm size, and managerial ownership on financial performance, with ERM as a moderating variable. This research contributes to the literature by addressing the empirical gap regarding ERM’s moderating role in emerging markets and offers practical insights for managers, investors, and regulators to enhance financial outcomes while advancing sustainability practices.

**2. LITERATURE REVIEW**

**Agency Theory**

Agency Theory explains the conflict of interest between principals (shareholders) and agents (managers), as well as governance mechanisms that align their objectives (Jensen & Meckling, 1976; Eisenhardt, 1989; Fama & Jensen, 1983). In the context of this study, managerial ownership serves as an incentive alignment mechanism, encouraging managers to focus on improving financial performance.

**Stakeholder Theory**

Stakeholder Theory emphasizes that companies are accountable not only to shareholders but also to a broader set of stakeholders, and that legitimacy is essential for sustaining business operations (Freeman, 1984 in Donaldson & Preston, 1995; Freeman & Dmytriyev, 2023). Environmental performance and sustainability disclosure are seen as tools to build trust and secure stakeholder support.

**Resource-Based View (RBV)**

The RBV posits that internal capabilities that are valuable, rare, inimitable, and non-substitutable (VRIN) can serve as a source of sustainable competitive advantage (Barney, 1991). Enterprise Risk Management (ERM) is viewed as an organizational capability that enhances resilience, improves decision-making, and optimizes resource allocation (Mikes & Kaplan, 2013; Hoyt & Liebenberg, 2011a).

**Legitimacy Theory**

Legitimacy Theory highlights that firms strive to ensure their operations are perceived as consistent with societal norms and values in order to secure public acceptance (Suchman, 1995; Dowling & Pfeffer, 1975; Deegan, 2002). Environmental disclosure (e.g., through the GRI framework) functions as a legitimacy tool that can ultimately enhance firm value and financial performance.

Financial performance reflects the efficiency and profitability of a company, commonly measured by Return on Assets (ROA) (Gitman & Zutter, 2012/2015; Brigham & Houston, 2019). In the transportation and logistics sector, ROA is highly sensitive to operational efficiency due to high fixed costs and asset depreciation. Environmental performance, typically assessed using the GRI 300 indicators (GRI 301–307), encompasses aspects such as energy, emissions, water/waste, and compliance (Ministry of Environment and Forestry, 2019; Epstein & Buhovac, 2014). Strong environmental performance is expected to reduce litigation and reputational risks and attract sustainability-oriented investors, although its financial benefits may take time to materialize.

Firm size, often measured using the natural logarithm of total assets, reflects the firm’s resource capacity, economies of scale, and access to capital, but may also create bureaucratic inefficiencies (Penrose in Aziza et al., 2020; Chen & Robert, 2020). Managerial ownership, measured by the percentage of shares owned by management, aligns managerial incentives with shareholder wealth maximization and reduces agency costs (Jensen & Meckling, 1976; Jaya et al., 2019; Sutrisno & Riduwan, 2022). Finally, Enterprise Risk Management (ERM), as defined by COSO (2017), is an integrated framework for identifying, assessing, and responding to risks in alignment with strategic objectives. Empirical evidence shows its association with improved firm value and financial performance, as well as its interaction with ESG and environmental practices (Beasley et al., 2005; Hoyt & Liebenberg, 2011a; Farrell & Gallagher, 2019; Chairani & Siregar, 2021; Karina et al., 2023).

**Hypotheses Development:**

**The Positive Effect of Environmental Performance on Financial Performance**  
Strong environmental performance has the potential to improve corporate reputation, reduce legal costs, and mitigate risks associated with environmental issues (Fauziah et al., 2022). Companies that actively manage their environmental impacts tend to attract sustainability-conscious investors, thereby contributing to better financial performance (Latifah & Nikmah, 2024). Moreover, strong environmental performance is often associated with Corporate Social Responsibility (CSR), which can enhance customer loyalty and strengthen market positioning (Angelina & Nursasi, 2021). Previous studies by Limano et al. (2022) and Dita & Ervina (2021) confirmed that environmental performance positively influences financial performance.  
**H1: Environmental Performance has a Positive Effect on Financial Performance**

**The Effect of Firm Size on Financial Performance**  
Firm size often indicates a company’s ability to access resources, raise capital, and achieve operational efficiency. Larger firms typically benefit from economies of scale, broader market access, and greater investment capacity, all of which can enhance financial performance (Meiyana & Aisyah, 2019). Aziza et al. (2020) found that larger firms exhibit better financial performance. However, Syah et al. (2021) noted that larger firm size does not always guarantee superior financial performance, as bureaucratic challenges and reduced flexibility may arise.  
**H2: Firm Size has a Positive Effect on Financial Performance**

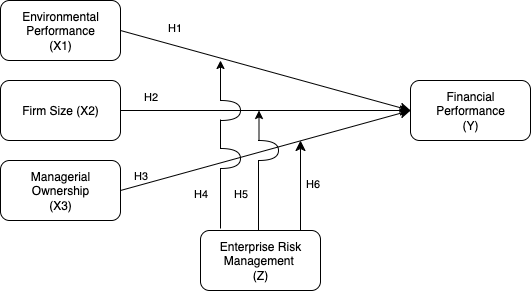
**The Effect of Managerial Ownership on Financial Performance**  
Managerial ownership, defined as the proportion of shares held by managers or executives, can reduce agency conflicts and align the interests of management with those of shareholders. According to Agency Theory (Jensen & Meckling, 1976), managers with ownership stakes are more motivated to improve firm performance, as they directly benefit from increases in firm value. Studies by Jaya et al. (2019) and Sutrisno & Riduwan (2022) demonstrated a positive effect of managerial ownership on financial performance, as managers become more cautious in making decisions that impact firm value.  
**H3: Managerial Ownership has a Positive Effect on Financial Performance**

**ERM as a Moderator of the Relationship between Environmental Performance and Financial Performance**  
ERM is a systematic approach to identifying, managing, and monitoring risks that may affect corporate objectives. In the context of environmental performance, ERM enables companies to manage environmental risks more effectively, thereby reinforcing the positive impact of environmental performance on financial performance. Karina et al. (2023) and Hakim & Suardi (2023) found that firms with strong ERM systems respond more efficiently to environmental risks, strengthening the link between environmental and financial performance. ERM thus improves transparency and risk governance, which in turn benefits financial performance (Pérez-Cornejo & de Quevedo-Puente, 2023).  
**H4: ERM Moderates the Effect of Environmental Performance on Financial Performance**

**ERM as a Moderator of the Relationship between Firm Size and Financial Performance**  
While larger firms possess greater resource capacity, they also face more complex risks. ERM helps large firms manage these risks more effectively, thereby reinforcing the positive effect of firm size on financial performance. Syafitri et al. (2023) argued that ERM strengthens firm performance by proactively managing larger-scale risks. Similarly, Yang et al. (2018) showed that large firms implementing ERM effectively achieve better financial performance, as ERM enables them to handle complex risks more efficiently.  
**H5: ERM Moderates the Effect of Firm Size on Financial Performance**

**ERM as a Moderator of the Relationship between Managerial Ownership and Financial Performance**  
Although managerial ownership can enhance financial performance, overly rigid or misaligned ERM implementation may restrict managerial flexibility in making strategic decisions, thereby weakening the positive effect of managerial ownership on financial performance. Dewanti et al. (2025) found that managers with higher ownership stakes have stronger incentives to improve firm performance. However, strict ERM practices may constrain managerial discretion, potentially reducing the positive influence of managerial ownership on financial performance (Al Matari & Hussein Mgammal, 2019).  
**H6: ERM Moderates the Effect of Managerial Ownership on Financial Performance**

“Based on the hypothesis development above, the research framework can be described as follows



**Figure 1. Research framework**

2. material and METHODS

This study employs a quantitative approach with a causal design to examine the influence of environmental performance, firm size, and managerial ownership on financial performance, with Enterprise Risk Management (ERM) as a moderating variable. The population consists of all transportation and logistics companies listed on the Indonesia Stock Exchange (IDX). The total population includes 57 companies in the transportation and logistics sector during the 2019–2024 period.

The research sample was determined using purposive sampling with the following criteria:

1. Companies consistently listed on the IDX during the 2021–2024 period.
2. Availability of complete annual reports and sustainability reports during the observation years.
3. Availability of data on environmental performance, firm size, managerial ownership, and Enterprise Risk Management (ERM).

Based on these criteria, 30 companies met the sample requirements.

**Operational Definition and Measurement of Variables**

**Financial Performance (ROA)**

Financial performance reflects a firm’s ability to generate profits from its total assets. It is measured using the Return on Assets (ROA) ratio, calculated by dividing net income by total assets. ROA is widely used as a profitability indicator because it measures how efficiently management utilizes assets to generate earnings (Gitman & Zutter, 2015).

**Environmental Performance (EP)**

Environmental performance represents the company’s achievement in managing environmental aspects and minimizing negative impacts. In this study, environmental performance is measured using the Global Reporting Initiative (GRI) 300 disclosure index, which includes indicators related to raw materials, energy use, water consumption, biodiversity, emissions, waste, and environmental compliance. The GRI framework ensures standardized and comparable measurement across firms (GRI, 2020; Epstein & Buhovac, 2014).

**Firm Size (SIZE)**

Firm size refers to the scale of a company’s operations and its resource capacity. It is measured using the natural logarithm of total assets. Larger firms generally have greater access to capital, economies of scale, and stronger market positions, although they may also face bureaucratic inefficiencies (Aziza et al., 2020).

**Managerial Ownership (MO)**

Managerial ownership measures the proportion of company shares held by management. This variable reflects the alignment of managerial and shareholder interests, as higher managerial ownership is expected to reduce agency conflicts and improve decision-making quality. MO is calculated by dividing the number of shares owned by management by the total outstanding shares, then multiplied by 100% (Sutrisno & Riduwan, 2022).

**Enterprise Risk Management (ERM)**

Enterprise Risk Management is an integrated framework used by firms to identify, assess, and manage risks in alignment with corporate strategy. In this study, ERM is measured using a disclosure index based on the COSO ERM 2017 framework, which covers governance and culture, strategy and objective-setting, performance, review and revision, and information, communication, and reporting. Effective ERM implementation is expected to enhance resilience and support the achievement of strategic and financial objectives (COSO, 2017; Hoyt & Liebenberg, 2011a).

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**Definitions of Variables**

Table 1 presents the operational definitions, measurement, scale, and references for each variable used in this study.

**Table 1. Operational Definitions and Measurement of Variables**

| **No** | **Variable** | **Definition** | **Indicator** | **Measurement Scale** |
| --- | --- | --- | --- | --- |
| 1 | Financial Performance (Dependent Variable) | The efficiency of a company in generating profits from its assets. | Return on Assets (ROA) = (Net Income / Total Assets) × 100% | Ratio |
| 2 | Environmental Performance (Independent Variable 1) | The company’s ability to manage the environmental impact of its operations in a sustainable manner. | Disclosure Index based on GRI 300 (GRI 301–307). Example items:  • Energy (GRI 302)  • Emissions (GRI 305)  • Waste and Water (GRI 303 & 306)  • Environmental Compliance (GRI 307)  • Material Use (GRI 301)  *Scoring: 1 = disclosed, 0 = not disclosed* | Ratio (Disclosure Index = number of items disclosed / total items) |
| 3 | Firm Size (Independent Variable 2) | The magnitude of a company based on total assets. | Natural Logarithm (Total Assets) | Ratio |
| 4 | Managerial Ownership (Independent Variable 3) | The proportion of company shares owned by management. | (Number of shares owned by management / Total outstanding shares) × 100% | Ratio |
| 5 | Enterprise Risk Management (ERM) (Moderating Variable) | A systematic approach to identifying and managing corporate risks based on the COSO framework. | Disclosure Index based on COSO ERM 2017, including:  • Governance & Culture  • Strategy & Objective-Setting  • Performance  • Review & Revision  • Information, Communication & Reporting  *Scoring: 1 = disclosed, 0 = not disclosed* | Ratio (Disclosure Index = number of items disclosed / total items) |

Source: Processed data by the author, 2024

3. results and discussion

**3.1 Equation I**

**Table 2. Model Selection Test Results – Equation I**

| **Test** | **Test Criteria** | **Prob.** | **Conclusion** |
| --- | --- | --- | --- |
| Chow | Cross-section F | 0.0347 | FEM |
| Hausman | Chi-square | 0.0139 | FEM |

*Source: Processed data, EViews 12 (2025)*

The Chow and Hausman tests indicate that the Fixed Effect Model (FEM) is the most appropriate for Equation I. The F-test is significant (Prob. = 0.0386), confirming that the model is fit for use.

**Table 3. Panel Regression Results – Equation I**

| **Variable** | **Coefficient** | **t-Statistic** | **Prob.** |
| --- | --- | --- | --- |
| C | −0.6715 | −3.392 | 0.0000 |
| EDI | −0.171 | −0.550 | 0.5837 |
| SIZE | 0.236 | 3.397 | 0.0000 |
| MOWN | 0.006 | 0.928 | 0.3559 |
|  |  |  |  |
| F-statistic |  | 1.630 | 0.0386 |
| R2 | 0.374 |  |  |

*Source: Processed data, EViews 12 (2025)*

The model explains 37.4% of the variation in ROA. Firm size (SIZE) has a positive and significant effect, while environmental performance (EDI) and managerial ownership (MOWN) are not significant.

**3.2 EQUATION II**

**Table 4. Model Selection Test Results – Equation II**

| **Test** | **Test Criteria** | **Prob.** | **Conclusion** |
| --- | --- | --- | --- |
| Chow | Cross-section F | 0.0000 | FEM |
| Hausman | Chi-square | 0.0000 | FEM |

*Source: Processed data, EViews 12 (2025)*

The Chow and Hausman tests confirm FEM as the most appropriate model for Equation II. The F-test is significant (Prob. = 0.0000), validating the model’s fit.

**Table 5. Panel Regression Results – Equation II**

| **Variable** | **Coefficient** | **t-Statistic** | **Prob.** | **Note** |
| --- | --- | --- | --- | --- |
| C | −0.938 | −1.128 | 0.2625 |  |
| EDI | −0.072 | −1.404 | 0.1638 |  |
| SIZE | 0.059 | 2.010 | 0.0476 | \*\* |
| MOWN | 0.002 | 1.920 | 0.0582 | \* |
| ERM | −1.253 | −2.190 | 0.0312 | \*\* |
|  |  |  |  |  |
| F-statistic |  | 1.630 | 0.0386 |  |
| R2 | 0.374 |  |  |  |

*Notes: \*\* = significant at 5%; \* = significant at 10%*  
*Source: Processed data, EViews 12 (2025)*

ERM included, the explanatory power of the model increases to 75.13%. Significant variables are SIZE (positive, 5%), MOWN (positive, 10%), and ERM (negative, 5%).

**3.3 EQUATION III**

**Table 6. Model Selection Test Results –Equation III**

| **Test** | **Test Criteria** | **Prob.** | **Conclusion** |
| --- | --- | --- | --- |
| Chow | Cross-section F | 0.0000 | FEM |
| Hausman | Chi-square | 0.0000 | FEM |

*Source: Processed data, EViews 12 (2025)*

The Chow and Hausman tests again confirm FEM as the most suitable model. The F-test is significant (Prob. = 0.0000), ensuring model validity.

**Table 7. Panel Regression Results – Equation III**

| **Variable** | **Coefficient** | **t-Statistic** | **Prob.** | **Note** |
| --- | --- | --- | --- | --- |
| C | −5.485 | −2.325 | 0.0225 | \*\* |
| EDI | −1.293 | −5.184 | 0.0000 | \*\*\* |
| SIZE | 0.130 | 1.579 | 0.1181 |  |
| MOWN | 0.049 | 8.463 | 0.0000 | \*\*\* |
| ERM | 6.704 | 2.089 | 0.0398 | \*\* |
| EDI × ERM | 1.515 | 4.326 | 0.0000 | \*\*\* |
| SIZE × ERM | −0.126 | −1.140 | 0.2575 |  |
| MOWN × ERM | −0.075 | −9.946 | 0.0000 | \*\*\* |
|  |  |  |  |  |
| F-statistic |  | 21.663 | 0.0000 |  |
| R2 | 0.903 |  |  |  |

*Notes: \*\*\* = significant at 1%; \*\* = significant at 5%*  
*Source: Processed data, EViews 12 (2025)*

The model explains approximately 90.3% of the variation in ROA. Significant variables include: EDI (negative), MOWN (positive), ERM (positive), EDI × ERM (positive), and MOWN × ERM (negative). SIZE and SIZE × ERM are not significant.

**3.3 Discussion**

**Hypothesis 1 – The Effect of Environmental Performance on Financial Performance**

The findings reveal that environmental performance (EDI) has a negative and significant effect on ROA in the baseline model. This indicates that efforts to improve environmental disclosure often require substantial costs, which reduce short-term profitability. This result is consistent with Hanif et al. (2020), who reported that environmental investments do not directly improve profitability due to the financial burden of implementation. However, when Enterprise Risk Management (ERM) is introduced as a moderating variable, the effect shifts to positive and significant. This suggests that firms with effective ERM integration are better able to mitigate risks arising from environmental initiatives and optimize their benefits. Karina et al. (2023) support this argument, highlighting that ERM strengthens the relationship between ESG practices and financial performance by minimizing environmental risks.

**Hypothesis 2 – The Effect of Firm Size on Financial Performance**

Firm size has a positive and significant effect on ROA in the baseline model, which implies that larger firms tend to have stronger capacities in resource management, capital market access, and economies of scale. This is consistent with Meiyana & Aisyah (2019), who found that larger firms are financially more stable and more capable of utilizing their assets for efficiency and profitability. Nevertheless, when the interaction with ERM is considered, the effect of firm size on ROA becomes insignificant. This indicates that while firm size contributes to profitability, ERM does not significantly enhance the relationship. This result aligns with Syafitri et al. (2023), who argue that large corporations already possess strong internal risk control mechanisms, thereby reducing the marginal value of ERM on profitability**.**

**Hypothesis 3 – The Effect of Managerial Ownership on Financial Performance**

Managerial ownership has a positive and significant impact on ROA, which supports Agency Theory (Jensen & Meckling, 1976) by suggesting that higher levels of managerial ownership align managers’ interests with shareholders, thus reducing agency conflict. However, the interaction with ERM shows a negative and significant effect, meaning that the implementation of ERM restricts managerial discretion in making profit-maximizing decisions. This finding is consistent with Malau et al. (2024), who demonstrated that strict risk management systems can reduce managerial flexibility, thereby weakening the positive effect of managerial ownership on firm performance.

**Hypothesis 4 – The Moderating Role of ERM on the Relationship between Environmental Performance and Financial Performance**

ERM has a positive and significant moderating role in strengthening the relationship between environmental performance and ROA. This suggests that firms that integrate ERM into their sustainability practices are able to control risks and costs effectively, resulting in improved profitability. The result is supported by Karina et al. (2023), who found that ERM assists firms in mitigating ESG-related risks while enhancing financial returns from environmental initiatives. Thus, ERM not only provides legitimacy benefits but also contributes to financial gains from sustainability practices.

**Hypothesis 5 – The Moderating Role of ERM on the Relationship between Firm Size and Financial Performance**

The results indicate that ERM does not significantly moderate the relationship between firm size and ROA. Although larger firms enjoy structural advantages in resources and efficiency, the presence of ERM does not provide additional value to their financial performance. This finding is in line with Syafitri et al. (2023), who stated that large firms generally have established risk management frameworks, making the incremental benefits of ERM less impactful. Hence, the role of ERM may be more critical in smaller or medium-sized firms where structured risk management systems are less developed.

**Hypothesis 6 – The Moderating Role of ERM on the Relationship between Managerial Ownership and Financial Performance**

The findings demonstrate that ERM negatively and significantly moderates the relationship between managerial ownership and ROA. While managerial ownership increases the alignment of interests and can boost performance, ERM appears to weaken this effect by restricting managerial flexibility in decision-making. Malau et al. (2024) also reported that strict ERM frameworks may limit managerial initiative in adopting aggressive strategies that could potentially increase profitability. This indicates that a balance between managerial ownership and decision-making flexibility is necessary to ensure that ERM does not diminish the potential benefits of managerial ownership for financial performance.

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