

Company Age, Environmental Performance, and Financial Performance of Indonesia–Malaysia Manufacturing Companies

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ABSTRACT

This research investigates how firm age and environmental performance influence the financial performance of manufacturing firms listed in Indonesia and Malaysia over the 2021–2025 period, with Return on Assets (ROA) used as the proxy for financial performance. A panel data regression approach with a purposive sampling method was applied, and the Hausman test identified the Fixed Effect Model as the most appropriate estimation technique. Diagnostic checks confirm that the model satisfies normal distribution, is free of multicollinearity, and shows no autocorrelation, though heteroscedasticity was detected and corrected using robust standard errors clustered at the firm level. Finding show that environmental performance does not have a major impact. affect financial performance, while firm age has a significant negative impact influence on financial performance. These results are interpreted using Legitimacy Theory, which views environmental initiatives as a means of compliance rather than a short-term profit motive, and Firm Life Cycle Theory, which links older firms to organizational inertia and rigid structures that diminish profitability. This research offers comparative evidence on the links between environmental performance and financial outcomes. performance, as well as the relationship between firm age and financial performance. drawn from two manufacturing markets in ASEAN.

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INTRODUCTION

Sustainability has risen to the forefront of strategic priorities for manufacturing companies across numerous nations, including Indonesia and Malaysia. This shift occurs as regulators, investors, and the general public increasingly demand responsibility regarding the environmental effects of corporations. Consequently, manufacturers find themselves in a dilemma: they need to maintain their profitability, which continues to be the primary measure of financial success, all while demonstrating that their dedication to environmental sustainability is credible enough to gain societal acceptance. The challenge lies in the fact that previous research presents conflicting views on the connection between environmental performance and financial success, leaving the issue unresolved and deserving a fresh investigation, especially within the emerging economies of ASEAN.

Several previous studies suggest a positive connection between the environment. Performance and financial performance. Le & Nguyen-Phung, (2024) reports that heavier greenhouse gas emission intensity depresses African firms' ROA and ROE, an effect that grows sharper after the Paris Agreement. Along similar lines, Ali et al., (2022) shows that environmental management practices lift both environmental and financial performance in Malaysia, with ESG disclosure serving as the channel through which this happens. Pramdya, (2025); Rahayu et al., (2026) add further support, finding that PROPER-based environmental performance raises ROA among manufacturing firms on the Indonesia Stock Exchange. Not every study agrees, however. Kore & Prasasyaningsih, (2023) find that PROPER-based environmental performance has no bearing on Net Profit Margin, and Evatriana, (2024) reach a similar conclusion, reporting no significant effect of PROPER-based green accounting on ROA. This split in the evidence leaves room for closer scrutiny, particularly through a side by side look at Indonesia and Malaysia, the two largest manufacturing economies in ASEAN.

Firm age is a second determinant of financial performance whose empirical record is just as unsettled. Garba, (2026) finds a significant negative effect of firm age on the ROE of Nigerian consumer goods companies, a result Riswan & Martha, (2024) also arrive at among manufacturing firms on the Indonesia Stock Exchange. Nurahman & Hersugondo, (2026) reports that firm age moderates the ESG financial performance relationship, most visibly for ROE. Simanjuntak et al., (2022), on the other hand, identify a positive association between firm age and financial performance that runs through financial inclusion as a mediator, while Putra, (2021) finds no significant influence of firm age on either ROA or ROE in a case study of Islamic banking. Given how far these findings diverge, further testing is warranted using cross border panel data drawn from the more recent 2021–2025 window, a period that captures both the post-COVID-19 recovery and mounting environmental regulatory pressure across ASEAN.

Beyond environmental performance and firm age, several recent studies in the Indonesian capital market further underscore that financial performance and corporate risk are shaped by a wide array of firm-level mechanisms. Yusra et al., (2025) show that CSR disclosure, viewed within a green finance framework, significantly reduces information asymmetry among Indonesian listed firms, although its effect on firm risk

itself remains statistically insignificant. In a related vein, Risqullah & Asmadewa, (2025) demonstrate that cash holdings and export value directly improve the financial performance of Indonesian manufacturing firms, while the KITE import facility affects performance only indirectly through export activity. From a governance perspective, Luthan & Ritonga, (2026) find that Shari'ah Supervisory Board characteristics, namely financial expertise and doctoral education, do not significantly influence underwriting risk in Islamic insurance companies, suggesting that risk-related outcomes are often driven more by operational and market conditions than by oversight structures alone. Taken together, these findings reinforce the view that financial performance and risk in emerging ASEAN markets are contingent on a combination of disclosure practices, liquidity management, and governance quality, factors that, alongside environmental performance and firm age, warrant continued empirical attention.

Legitimacy Theory offers one theoretical account of the environmental performance financial performance relationship: firms engage in environmental activities mainly to keep their operations in step with prevailing societal norms and values and to protect their social license to operate, not primarily to chase short-term profit (Muslichah, 2020; Sugitan & Kapojos, 2026; Widyastuti, 2022). Firm Life Cycle Theory addresses the firm age financial performance link from a different angle, holding that each stage of a firm's life cycle introduction, growth, maturity, and decline brings its own organizational demands that in turn shape financial strategy and performance (Al Rasyid et al., 2022). Therefore, this study aims to examine the effects of environmental performance and firm age on the financial performance of manufacturing companies in Indonesia and Malaysia during the 2021–2025 period. The novelty of this study lies in its comparative examination of manufacturing firms across Indonesia and Malaysia using panel data over a recent five-year period, while simultaneously integrating Legitimacy Theory and Firm Life Cycle Theory to explain the relationships between environmental performance, firm age, and financial performance. Unlike previous studies that predominantly examine these relationships within a single country or focus on the variables separately, this study provides comparative evidence from two major ASEAN manufacturing markets. By combining these perspectives, the study seeks to provide a more comprehensive understanding of how environmental performance and firm age are associated with financial performance across different national and institutional contexts.

METHOD

This research utilizes a quantitative, causal-comparative framework to examine the influence of company age (FIRMAGE) and environmental performance (ENV) on financial performance (ROA) among manufacturing enterprises listed on the Indonesia Stock Exchange (IDX) and Bursa Malaysia from 2021 to 2025. The sample consists of all manufacturing companies on these exchanges; a purposive sample was formed based on three specific criteria: (1) the firm was continually listed throughout the entire observation timeframe, (2) it provided detailed financial reports along with sustainability or environmental disclosures, and (3) all necessary data for each research

variable was accessible. Following these stipulations, the resultant sample included 35 companies monitored over a span of five years, culminating in a total of 175 firm year observations.

The financial performance, captured as the dependent variable, is represented by Return On Assets. ROA is determined by dividing net profit by total assets. The first independent variable, environmental performance (ENV), is denoted by the environmental disclosure or rating score allocated to each firm, as per the PROPER evaluation for Indonesian businesses and its corresponding measure for Malaysian firms. The second independent variable, firm age (FIRMAGE), is illustrated as the natural logarithm of the gap between the observation year and the year the company was established or first listed on its corresponding exchange.

Panel data regression was run in Stata, with the Chow and Hausman tests guiding the choice among the Common Effect, Fixed Effect, and Random Effect specifications. Before testing the hypotheses, the classical assumptions were checked: normality via Shapiro Wilk, multicollinearity via the Variance Inflation Factor, autocorrelation via the Wooldridge test, and heteroscedasticity via the Modified Wald test. Since heteroscedasticity turned out to be present, the model was re-estimated with robust standard errors clustered by firm to keep the coefficients efficient and consistent. All hypotheses were tested at the 5% significance level ($p < 0.05$), based on the panel regression model shown below:

$$ROA_{it} = a + b1 \text{ ENV}_{it} + b2 \text{ FIRMAGE}_{it} + e_{it}$$

ROA_{it} represents firm i's financial performance in year t, ENV_{it} represents firm i's environmental performance score in year t, and FIRMAGE_{it} represents the natural logarithm of firm i's age in year t; α is the intercept, β_1 and β_2 are the slope coefficients, and ε_{it} is the error term.

RESULT AND DISCUSSION

This segment articulates and analyzes the results from the panel data regression in a framework designed for straightforward comprehension. the Results section, empirical data is showcased progressively through descriptive statistics, results of traditional assumption tests, options for model selection, and hypothesis evaluations, all directed at addressing the research inquiries concerning the influence of environmental performance and company age on financial outcomes. Subsequently, the Discussion segment interprets these findings in relation to Legitimacy Theory and Corporate Life Cycle Theory, comparing them with earlier studies to highlight the unique contributions and innovations of this research.

RESULTS

The analysis begins with descriptive statistics summarizing how the research data are distributed, as reported in Table 1.

Table 1. Descriptive Statistics of Research Variables

Variabel	Observations	Mean	Std. Dev.	Minimum	Maximum
ROA	175	0.0924	0.0686	- 0,0019	0,4238
ENV	175	55.2352	21.5256	11,0550	93,0116
FIRMAGE (ln)	175	3.8707	0.5327	1,0986	4,7362

Source: Data processed (2026)

As Table 1 indicates, the sample firms recorded an average ROA of 0.0924 (around 9.24%), with a moderate standard deviation of 0.0686. The environmental performance variable (ENV) averaged 55.24 on the scale applied, placing the sample firms' environmental performance in the medium category. Firm age, transformed into natural logarithmic form, averaged 3.8707, reflecting considerable variation—from relatively young firms to companies that have operated for over a century.

Prior to testing the hypotheses, classical assumption tests were run to confirm that the panel regression model satisfied the BLUE (Best Linear Unbiased Estimator) properties; the results are summarized in Table 2.

Table 2. Summary of Classical Assumption Test Results

Types of Testing	Method	Statistical Results	Conclusion
Normality	Shapiro-Wilk	$W = 0.931; p < 0.001^*$	Followed by the Central Limit Theorem (CLT)
Multicollinearity	Variance Inflation Factor	VIF ENV = 1.11; VIF FIRMAGE = 1.11	Multicollinearity does not occur
Autocorrelation	Wooldridge Test	$F(1,34) = 0,970; p = 0,3316$	No autocorrelation occurs
Heteroskedastisitas	Modified Wald Test	$\chi^2(35) = 17.149,85; p = 0,000$	Followed by Robust Standard Errors Applied

Source: Data processed (2026)

The Shapiro-Wilk assessment indicated that the dataset was non- normally distributed ($p = 0.000$). However, given that there are 175 observations, this is not a major issue. According to the central limit theorem, such a sizable sample causes the mean's sampling distribution to approach normality, regardless of the original distribution of the

population as noted by Anderson in 2014. Thus, the panel regression analysis could continue without additional data adjustments, since the asymptotic characteristics of the CLT ensure that valid statistical conclusions can be drawn with this sample size.

The evaluation for multicollinearity generated a VIF of 1.11 for the two independent variables, which is significantly below the typical cut-off of 10. This confirms that the model is not affected by multicollinearity issues. According to the Wooldridge test, the probability of 0.3316 ($p > 0.05$) indicates no signs of autocorrelation in the panel dataset. Conversely, the Modified Wald Test indicated the presence of heteroscedasticity ($p = 0.000$), necessitating a re-estimation of the model utilizing cluster-robust standard errors to mitigate this concern.

Subsequently, the Hausman test was conducted to determine whether to use the Fixed Effect Model (FEM) or the Random Effect Model (REM), producing a $\chi^2(2)$ statistic of 29.71 with a probability of 0.0000 ($p < 0.05$). Thus, the null hypothesis was rejected, and the Fixed Effect Model was selected as the most appropriate method for evaluating the study's hypotheses. Table 3 reports the hypothesis-testing results from the Fixed Effect Model estimated with robust standard errors.

Table 3. Regression Results of Panel Fixed Effect Model (Robust Standard Error)

Variabel	Coefficient	Std. Error (Robust)	T-Statistics	p-value
ENV	0,0003878	0,0003105	1,46	0,228
FIRMAGE	- 0,1728955	0,0497029	- 4,31	0,000*
Konstanta	0.0924085	0,0000043	21490.81	0,000*

Source: Data processed (2026); * significant at $\alpha = 5\%$. R^2 within = 0.246; F-test = 6.19; Prob > F = 0.0004; N = 175; Number of companies = 35.

The within R^2 of the fixed-effects model is 0.246, indicating that 24.6% of the within-firm variation in ROA is jointly explained by environmental performance and firm age. The remaining 75.4% is explained by other factors outside the model. The overall model is statistically significant ($F = 6.19$; $p = 0.0004$).

These estimates translate into the following panel regression equation:

$$ROA = 0.0924085 + 0.0003878 \text{ ENV} - 0.1728955 \text{ FIRMAGE} + \varepsilon$$

This equation implies that with a constant of 0.0924085, ROA is predicted at 0.0924085 (9.24%) when both ENV and FIRMAGE are zero. The ENV coefficient (0.0003878) signals a positive but statistically insignificant relationship, so shifts in the environmental performance score do not translate into a significant change in ROA. The FIRMAGE coefficient (-0.1728955), by contrast, is negative and significant: a one-unit rise in firm age (in log terms) corresponds to a 0.1728955 decline in ROA, holding ENV constant (*ceteris paribus*).

DISCUSSION

The Effect of Environmental Performance (ENV) on Financial Performance (ROA)

The ENV coefficient yields a positive value of 0.0003878; however, its significance level is 0.228 ($p > 0.05$). This suggests that the environmental effectiveness does not have a statistically significant influence on the economic results of manufacturing firms in Indonesia and Malaysia for the period of 2021 to 2025. Essentially, having strong environmental performance does not result in an immediate increase or decrease in profitability (ROA). Investments related to environmental management, such as green certification, waste management, and energy efficiency, often detract from profits in the current period, while any potential benefits to reputation, manifesting as increased sales or enhanced consumer loyalty, typically take much longer to materialize.

This observation corresponds with the work of Kore & Prasasyaningsih, (2023), which demonstrated no impact of PROPER-based environmental performance on Net Profit Margin in Indonesia. Likewise, Evatiana, (2024), found no noteworthy effect of PROPER-driven green accounting on ROA. Furthermore, Palma-Molina et al., (2023), noted that technologies for grass management on dairy farms in Ireland enhanced physical and environmental results without notably affecting financial outcomes. Conversely, the findings contrast with those of Le & Nguyen-Phung, (2024); Pramdy, (2025); and Rahayu et al., (2026), who each identified a significant relationship between environmental performance and financial performance. This discrepancy can likely be attributed to variances in environmental performance indicators, the sectors examined, and the regulatory environments across the research.

From a theoretical point of view, this result aligns with legitimacy theory, which states that companies change how they work to fit with the social standards, beliefs and values that are common at the moment, expectations are in place to keep public trust and protect their social license to operate Widyastuti, (2022). Environmental activities, on this view, are pursued to gain public recognition and legitimacy rather than to serve as a short-term profit strategy, a reading consistent with Muslichah, (2020), who argues that voluntary environmental disclosure is driven mainly by the need to meet public expectations and avoid a legitimacy gap rather than to boost profit. Sugitan & Kapojos, (2026) lend further support, noting that in sectors carrying high environmental risk, environmental practices serve chiefly to preserve legitimacy and satisfy regulatory demands, so their financial payoff need not show up in the short run since such practices are still treated as a cost of compliance.

Effect of Company Age (FIRMAGE) on Financial Performance (ROA)

The regression puts the FIRMAGE coefficient at -0.1728955 , significant at $p < 0.001$ ($p < 0.01$), which shows that firm age has a significant negative effect on financial performance. In practical terms, firms older than the sample average tend to post lower profitability, a pattern commonly traced to organizational inertia: long-standing firms tend to accumulate heavier, more rigid bureaucratic structures that respond more slowly to technological change and shifting markets. Older firms also carry heavier operating

burdens maintaining aging fixed assets and outdated machinery, along with higher compensation for senior staff all of which squeeze profit margins (ROA).

These findings match Garba, (2026), who reported a significant negative effect of firm age on ROE among Nigerian consumer goods companies, and Riswan & Martha, (2024) , who found a comparable significant relationship between firm age and ROE among manufacturing firms on the Indonesia Stock Exchange. They also echo Nurahman & Hersugondo, (2026), who find that firm age moderates the ESG financial performance relationship, especially for ROE. They diverge, though, from Simanjuntak et al., (2022) who found a positive relationship between firm age and financial performance mediated by financial inclusion, and from Putra, (2021) who found no significant effect of firm age on either ROA or ROE. This divergence likely traces back to the fact that Putra's study looked at a single Islamic banking institution as a case study, a setting that lacks the cross-firm variation the cross-country panel data used here can capture.

These findings fit Firm Life Cycle Theory, which holds that each stage of a firm's life cycle introduction, growth, maturity, decline, and shakeout carries its own characteristics and places different demands on organizational structure, leadership style, and decision-making, which together shape financial strategy and performance (Al Rasyid et al., 2022). The firms sampled here appear to have moved past the growth phase and settled into maturity, heading toward decline. At this stage, the room for expansion that once drove high profitability narrows, while cost efficiency erodes under market saturation and heavier internal structural burdens, so older firms tend to post lower financial performance than their younger, more adaptable counterparts.

CONCLUSIONS

This research finds that environmental performance does not significantly affect the financial outcomes of manufacturing firms in Indonesia and Malaysia from 2021 to 2025. It seems that the environmental initiatives of these companies are more focused on acquiring social legitimacy and adhering to existing standards and laws, as indicated by Legitimacy Theory, rather than functioning as a strategy for short-term profits. In contrast, the age of firms exhibits a notable adverse impact on financial results, implying that manufacturing companies in the later stages of their life cycle, as described by Company Life Cycle Theory, experience diminishing profitability due to organizational culture, inflexible bureaucratic systems, and the increased operational challenges associated with aging. These insights highlight the importance for business leaders to frequently reassess and rejuvenate their strategies and organizational frameworks as their firms mature. Additionally, regulators should consider long-term incentives that can mitigate the delay between investing in environmental efforts and realizing financial returns, transforming sustainability initiatives from a mere compliance requirement into a pathway for creating enduring value. This study runs against several limits even if it presents empirical data on the relationships among environmental performance,

company age, and financial performance within the manufacturing sectors in Indonesia and Malaysia. The study first concentrates only on manufacturing businesses listed on the Indonesia Stock Exchange and Bursa Malaysia from 2021 to 2025, therefore perhaps constraining the extent to which the findings could be applied across other industries or countries. Environmental ratings and disclosure measures used to gauge environmental performance may not fully capture every facet of the companies' sustainability initiatives. Finally, this study only uses two explanatory factors, while financial performance is likely influenced by many other important aspects including capital structure, corporate governance, the size of the company, innovation capacity, and general economic circumstances. Future studies are advised to extend the study by including businesses from other ASEAN countries or several industrial sectors to improve the outside reliability of the findings. Furthermore, future studies could include more thorough Environmental, Social, and Governance (ESG) indices, investigate the impact or intermediary roles of corporate governance and sustainability reporting, and apply dynamic panel estimation techniques.

AUTHOR CONTRIBUTION

Riri Mayliza¹: Conceptualization, Methodology, Formal Analysis, Data Curation, Writing – Original Draft. Tafdil Husni²: Supervision, Validation, Writing – Review & Editing. Rida Rahim³: Supervision, Methodology, Writing – Review & Editing. Rizky Prima Sakti⁴: Validation, Writing – Review & Editing. All authors have read and approved the final version of the manuscript.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SIMILARITY STATEMENT

The authors confirm that this manuscript is an original work and has been subjected to institutional plagiarism screening using Turnitin, ensuring it meets the required similarity threshold.

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