# Carbon Emissions Intensity and Environmental Cost Effect to Corporate Financial Performance

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***Abstract***
***Main Purpose –*** *This research aims to test the conclusions of research from Delmas, Nairn-Brich, and Lim (2015)* and *Lewandowski et al. (2018) on carbon emissions intensity, environmental costs, and their relationship to financial performance.*
***Method –*** *The analysis method of this study uses the Eviews program (EconometricViews). An application system that can perform econometric and statistical analysis quickly and efficiently generates forecasts or model simulations, as well as high-quality graphs and tables.*
***Main Findings -*** *The main findings indicate that the allocation of environmental costs and CO2 emissions have no impact on firm performance in the short term. The corporation'sconcern for carbon emissions and environmental costs will affect financial performance more effective if implemented in the long term.*
***Theory and Practical Implications -*** *The results of this analysis suggest that corporate management should concentrate more on processing production by minimizing the effect of carbonon the manufacturing process and taking into account environmental costs in financial statements for the long term to predict environmental effects accurately. Investors ought to consider green and carbon-based businesses more thoughtfully.*
***Novelty -*** *This study contributes significantly to carbon intensity and environmental costs that can drive substantial financial performance.*

***Keywords:*** *Carbon Emission Intensity; Corporate Financial Performance; Environmental Cost.*

**Abstrak**
**Tujuan Utama -** Penelitian ini bertujuan untuk menguji secara empiris temuan *Delmas, Nairn-Brich, and Lim,(2015)* dan *Lewandowski et al., (2018)* terhadap *carbon emissions intensity, environmental cos*t serta hubungannya dengan *financial performance*.
**Metode –** Penelitian ini menggunakan Eviews (Economic Views). Sistem aplikasi yang dapat dengan cepat dan efisien melakukan analisis ekonometrika dan statistik, dapat menghasilkan estimasi atau simulasi model, grafik dan tabel berkualitas tinggi.
**Temuan Utama –** Temuan utama menunjukkan bahwa alokasi biaya lingkungan dan emisi CO2 tidak berpengaruh terhadap kinerja keuangan perusahaa. Kepedulian korporasi terhadap emisi karbon dan biaya lingkungan dalam jangka waktu pendek (*short term*) tidak berpengaruh terhadap kinerja keuangan
**Implikasi Teoritis dan Kebijakan –** Hasil analisis ini menyarankan agar manajemen perusahaan lebih berkonsentrasi pada pengolahan produksi dengan meminimalkan pengaruh karbon dan memperhitungkan biaya lingkungan dalam laporan keuangan dalam jangka waktu yang panjang (*long term*) untuk memprediksi dampak lingkungan secara akurat terhadap kinerja keuangan.
**Kebaruan Penelitian –** Hasil penelitian ini memberikan kontribusi signifikan dalam kepedulian penggunaan karbon dan alokasi biaya lingkungan yang dapat mendorong kinerja keuangan yang optimal

**Kata kunci:** Intensitas Emisi Karbon; Kinerja Keuangan Perusahaan; Biaya Lingkungan.

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***How to cite this article.*** Nengzih, N. (2022) Carbon Emission Intensity and Environmental Cost Effect on Corporate Financial Performances: Evidence from Manufacturing Company in IDX. *Jurnal ASET (Akuntansi Riset). Program Studi Akuntansi. Fakultas Pendidikan Ekonomi dan Bisnis Universitas Pendidikan Indonesia*, 14(1), 245-254. Retrieved from http://ejournal.upi.edu/index.php/aset/article/view/49056
***History of the article.*** **Received:** July 2022, Revision: September 2022, Published: December 2022
Online ISSN: 2541-0342. Print ISSN: 2086-2563. DOI: 10.17509/jurnal aset.v14i2.49056


## INTRODUCTION

Today company's management has made more efforts to protect the environment and focus on growing their profits. It is possible to move production to nations with fewer environmental regulations in an open global

economy. Market-based financial performance measurements are more favorably associated with CO2 performance instead of accounting performance (Busch & Lewandowski, 2018). A decrease in the frequency of marketable products with relatively high absorption in the collaboratingnations would decrease the output of products from a such sector (Almer & Winkler, 2017). A 0.1% increase in carbon efficiency leads to a 1.0% rise in profit and a 0.6% decrease in systemic risk. Although it is closely related to resource efficiency, carbon efficiency has extra financial ramifications, particularly in terms of lowering systematic risk (Trinks et al., 2020a). CO2 emissions disclosure has a big and favorable influence on corporate value. The final results of this study by Noor & Ginting (2022) showed that environmental costs did not have much impact on firm value. Firm's value associated with financial performance.

The legitimacy theory is one of the most highly disputed ideas characterizing the occurrence of voluntary social and environmental disclosure in corporate communication. Legitimacy considers resources and depends on the company's resources for survival (Dowling & Pfeffer, 1975). Related to the legitimacy theory, the strategy includes targeting disclosure, control, or collaboration with other parties (Deegan, 2002). A significant contribution to the ongoing discussion on social relationships and corporate financial performance is made by Delmas et al. (2015) and Orlitzky et al. (2003). According to their research, higher carbon emissions are linked to greater returnson investment (ROA). Still, investors also appear to be conscious of the possible long-term hazards associated with high carbon emissions, as seen by lower Tobin Q values. For instance, according to Delmas et al. (2015), lowering carbon emissions can have a negative influence on financial performance in the short term but a positive impact in the long run. Based on the research, corporate sustainability benefits defined by ROA were short-term negative. The results study (Setya Permana & Tjahjadi, 2020) shows that disclosure of environmental expenditures does not affect firm value, so it cannot be used as a reference for decision-making. However, the results also show that disclosing information on carbon emissions is beneficial for investors. The ROA is positively influenced by CO2e intensity score and social intelligence, according to Rokhmawati et al. (2015). CO2 emissions are constantly lowering societal worth. The market "punishes society" more consistently for its harmful environmental conduct than for its beneficial outcomes. The analysis demonstrates that the efforts made by the corporation to comply with international environmental treaties, such as the Kyoto Protocol, do not constitute binding constraints on the company's performance. Lee et al. (2015) Results study by (Setiawan et al., 2018) and (Septiadi, 2016) stated that the company's concern for environmental management by incurring environmental costs gives benefits shareholders need. Therefore environmental costs influence financial performance. Zainab & Burhany (2020) argued that after the company incurred environmental costs, stakeholder interest did not increase. Thus environmental costst, therefore, had no impact on the firm’s financial performance.

Kuo et al. (2010) argued there is a correlation between financial performance and eco-efficiency that is beneficial. Eco-efficiency indicates that economic output increases by decreased material use, enhanced production techniques, and waste recycling can increase a company's operational efficiency. There is increasing evidence of a relationship between both carbon emissions and financial performance (Busch & Lewandowski, 2018). Nevertheless, this research frequently uses metrics of the intensity and level of carbon emissions or broad judgments of eco-efficiency (scaling of carbon emissions using trade measures) (Trinks et al., 2018; Busch & Lewandowski, 2018). Firm Value is not significantly impacted by other groups represented by GCG, company size, dividend, inflation,exchange rates, or CSR. According to research by Hidayah et al. (2021), the Corporate Social Responsibility (CSR) variable have no relationship with return on assets (ROA).ROA is unaffected by factors related to the company's nature, leverage, and size. However, there is a lot to learn about how a business reduces emissions and how that connects to financial results (Eccles et al., 2011; and Chen, 2014).

This study finds a link between carbon intensity, cost, and environmental and financial performance in developing countries. This research guides future research in analyzing trends to give more awareness of carbon intensity and performance in the field. However, there is a lot to learn about how a business reduces emissions and how that connects to financial results (Eccles et al., 2011; and Chen, 2014). This study uses the Eviews programs (Econometric-Views) analysis approach to answering the following research questions.

Q1. Implementing carbon intensity will affect financial performance.

Q2. Implementing environmental costs in its decision-making will drive financial performance.

Q3. Both carbon intensity and environmental cost will drive the financial performance.

## METHOD

### Research Design

This study employs a quantitative method, with each variable or between variables being measured using a quantitative scale. The research's quantitative analytical method, according (to Sugiyono, 2018, p. 13) Quantitative techniques defined as "research methods depend on the positivismconcept and applied for research." An advanced hypothesis is validated through the study of specific populations or samples, the collection of data utilizing research methods, and quantitative and statistical data analysis.

### Collecting Data

The data from the Indonesia Stock Exchange (IDX) is used in this study on manufacturing companies from 2017 through 2020. Data related to carbon emission intensity and environmental costs were collected from annual reports—corporate financial performance using data from financial reports.

### Data Analysis

The Eviews *(Econometric Views)* program data panel regression analysis is used in this analysis to analyze the relation between carbon emission intensity, environmental cost, and financial performance. The study population consisted of 154 manufacturing industries on the Indonesian Stock Exchange for the years 2017 through 2020. After the selection of the sample using a purposive technique. The analysis data (observations) are 104 data, obtained from the results of the multiplication of 26 companies with the number of research periods, or 4 (four) years.

## RESULTS AND FINDINGS

**Table 1.** Descriptive Statistics of Corporate Financial Performance, Carbon Emission Intensity, and Environmental Cost

| | Y1 | X1 | X2 |
|---|---|---|---|
| Mean | 0.034557 | 0.625000 | 0.056310 |
| Median | 0.031359 | 1.000000 | 0.009204 |
| Maximum | 0.156749 | 1.000000 | 0.881880 |
| Minimum | -0.139950 | 0.000000 | -0.311236 |
| Std. Dev. | 0.051203 | 0.486467 | 0.178014 |
| Skewness | 0.030409 | -0.516398 | 3.010788 |
| Kurtosis | 3.913854 | 1.266667 | 13.91423 |
| | | | |
| Jarque-Bera | 3.634923 | 17.64148 | 673.3122 |
| Probability | 0.162438 | 0.000148 | 0.000000 |
| | | | |
| Sum | 3.593895 | 65.00000 | 5.856231 |
| Sum Sq. Dev. | 0.270045 | 24.37500 | 3.263966 |
| | | | |
| Observations | 104 | 104 | 104 |

The research data (observations) are 104 data, obtained from the results of the multiplication of 26 companies with the number of research periods, namely 4 (four) years.

**Corporate Financial Performance**

The financial performance of the company is the dependent variable (Y1) in this study, which is approximated by ROA (return on assets). The largest ROA (max) value of 0.156749 is from PT Ultra Jaya Tbk, while the smallest ROA (minimum) value of -0.139950 is from PT Century Textile Tbk in 2020. The value of the standard deviation variable Y1 is 0.050767. Then the average value (mean) is 0.034557 or 3.46%. Consequently, the average ROA of manufacturing companies listed on the BEIis low since a good ROA value must be greater than 5.98%. The management of the company's assets concerning profits can be inefficient, resulting in a negative ROA value.

**Carbon Emission Intensity**

The variable X1 in this study, which representsthe intensity of carbon emissions, has been substituted by a dummy variable in which companies that report carbon emissions areassigned the number 1. In contrast, those that report no carbon emissions are given the number 0. The company with the highest carbon emissions intensity value, PT Solusi Bangun Indonesia Tbk, fully discloses all of its carbonemissions in its annual report and generates a sustainability report. Although PT Wilmar Cahaya Indonesia Tbk provided a minimal carbon emissions intensity value of 0, it indicates that the company does not provide a sustainability report and does not consider carbon emissions in its annual report. The intensity of carbon emissions' standard deviation is 0.486467. When rounded to 1, the average (mean) number is 0.625000, which indicates that the average manufacturing business listed in the IDX for four years (2017–2020) has reported its CO2 emissions in its annual reports and sustainability reports.

**Environmental Cost (CSR)**

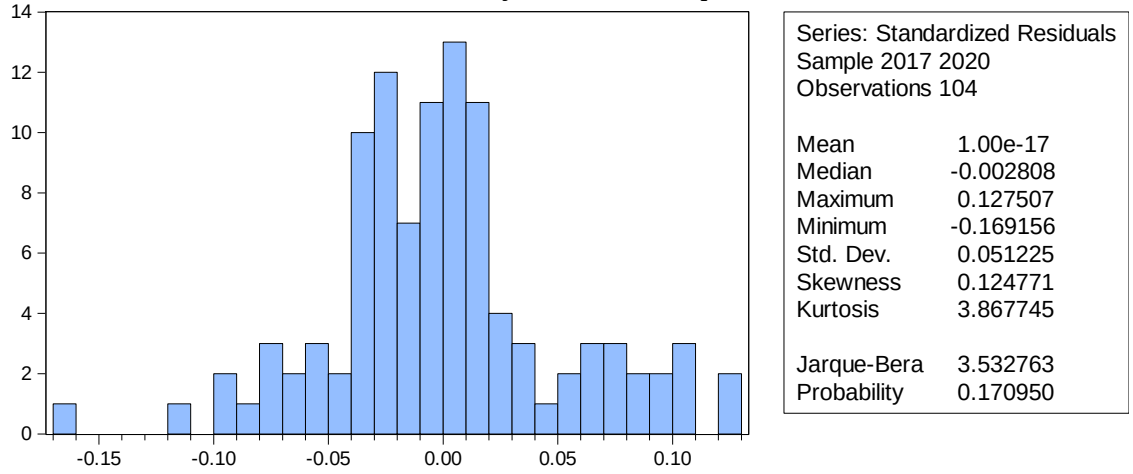
The independent variable (X2) in this study that is proxied is environmental cost (CSR) by comparing environmental expenses to the firm's net profit. The maximum CSR value of 0.881880 came from PT Budi Starch & Sweetener Tbk, and the minimum CSR value of -0.311236 came from PT Gunawan Dianjaya Steel Tbk. The standard deviation value CSR is 0.178014. Then, the mean (average value) is 0.056310.

**Classic Assumption Test**

**Normality Test**

The Jarque-Bera (JB) method was used to conduct the normality test in this research by looking at the probability numbers. The Jarque-Bera test's probability value provisions are as follows.

**Table 2.** Normality Test with Jarque-Bera Test



**Multicollinearity Test**

The multicollinearity test's objective is to assess if the regression model recognizes a connection between the independent variables. If the value between independent variables > 0.9, it can be said to indicate multicollinearity.

**Table 3.** Multicollinearity Test with Correlation Matrix

| | Y1 | X1 | X2 |
|---|---|---|---|
| Y1 | 1.000000 | 0.053209 | -0.001695 |
| X1 | 0.053209 | 1.000000 | 0.154772 |
| X2 | -0.001695 | 0.154772 | 1.000000 |

**Autocorrelation Test**

In this research, the autocorrelation test was carried out using the Lagrange Multiplier test (LM test) because the sample was more than 100. Based on table 4 below, It can be observed that the value of Prob. Chi-Square(2) is more than 0.05, to be precise, 0.1108. This means that there is no autocorrelation in the data in this research.

**Table 4.** Autocorrelation Test with Lagrange Multiplier Test

Breusch-Godfrey Serial Correlation LM Test:

| | | | |
|---|---|---|---|
| F-statistic | 2.186329 | Prob. F(2,98) | 0.1178 |
| Obs*R-squared | 4.399453 | Prob. Chi-Square(2) | 0.1108 |

**Heteroscedasticity Test**

It is seen from table 5 below that the value of Obs*R-Squared is 1.097004 and the value of Prob Chi-Square(2) (Obs*R-Squared) is 0.5778, meaning that there has no heteroscedasticity because both values are more than 0,05.

**Table 5.** Heteroscedasticity Test with Glejser Test

Heteroskedasticity Test: Harvey

| | | | |
|---|---|---|---|
| F-statistic | 0.538359 | Prob. F(2,101) | 0.5854 |
| Obs*R-squared | 1.097004 | Prob. Chi-Square(2) | 0.5778 |
| Scaled explained SS | 1.476436 | Prob. Chi-Square(2) | 0.4780 |

**Coefficient of Determination Analysis**

How effectively the model can describe variation in the independent variables is measured by the determining coefficient (R2) test. The adjusted R-squared value of 0.015559 is used to represent the coefficient of determination. This study demonstrates that there are limitations to the independent variable's ability to describe the dependent variable.

**Data Suitability Test (Fit Model)**

The purpose of the Data Suitability Test (Fit Model) is to ascertain how the cumulative effects of each independent factor's impact on the dependent factor. The has shown that the Prob. (F-statistic) value is 0.810136 or higher or larger than 0.05, indicating that the test for the appropriateness of the data is not satisfied.

**t-test**

The t-test demonstrates the extent to which each independent variable contributes significantly to the dependent variable's variation. The equation for panel data regression shown below is obtained.

Y = 0.029217 + 0.007323 + 0.013543 + e

It is possible to state that each independent variable's impact on the dependent variable in this situation is as follows.

a. The probability value of Carbon Emission Intensity is 0.6647, then H2 is rejected so

that CO2 emissions intensity would have no significant effect on ROA.

b. The probability value of Environmental Cost is 0.6609, so H3 is rejected so that Environmental Cost would have no significant effect on ROA.

**Table 10.** Statistical Value of the Coefficient of Determination Analysis, Model Fit Test (Fit Model), and t-test)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.029217 | 0.013967 | 2.091872 | 0.0390 |
| X1 | 0.007323 | 0.016843 | 0.434768 | 0.6647 |
| X2 | 0.013543 | 0.030783 | 0.439962 | 0.6609 |
| Effects Specification | | | | |
| | | | S.D. | Rho |
| Cross-section random | | | 0.044326 | 0.6889 |
| Idiosyncratic random | | | 0.029787 | 0.3111 |
| Weighted Statistics | | | | |
| R-squared | 0.004161 | Mean dependent var | | 0.011006 |
| Adjusted R-squared | -0.015559 | S.D. dependent var | | 0.029310 |
| S.E. of regression | 0.029538 | Sum squared resid | | 0.088119 |
| F-statistic | 0.210993 | Durbin-Watson stat | | 1.553539 |
| Prob(F-statistic) | 0.810136 | | | |
| Unweighted Statistics | | | | |
| R-squared | -0.000827 | Mean dependent var | | 0.034557 |
| Sum squared resid | 0.270269 | Durbin-Watson stat | | 0.506521 |

**Carbon Emission Intensity Effect on Financial Performance**

The probability value of Carbon Emission Intensity is 0.6647, then H2 is rejected. The level of CO2 emissions would not significantly affect ROA. Lee et al. (2015) and Wenni Anggita et al. (2022) reaffirm these findings, and carbon emissions persistently decrease financial performance. The market "punishes society" for consistently negative environmental behavior rather than positive. The analysis shows that the company's efforts to abide by global environmental agreements, like the Kyoto Protocol, do not place legally binding restrictions on the company's performance. The results study opposites the study from Delmas et al. (2015); Ganda & Milondzo (2018); Trinks et al. (2018, 2020); Noor & Ginting (2022) studies showed that cutting carbon emissions might have both short- and long-term negative effects on financial performance, however, they might also have favorable long-term effects. Although resource and carbon efficiency is connected, it also has financial implications, particularly in terms of reducing systematic risk. Overall, carbon-efficient manufacturing can benefit operations as well as risk management. According to these studies, business sustainability benefits defined by ROA were short-term negative. They also discovered that lowering greenhouse gas emissions raised Tobin's q. This resulting study, opposite the study by (Rokhmawati et al., 2015), Social reporting ratings and CO2 intensity is favorably and significantly correlated with ROA. This indicates that despite increasing and unregulated environmental issues, the market still sees long-term benefits in lowering greenhouse gas emissions.

This finding contradicts the findings of Kuo et al. (2010), who discovered a positive correlation between the intensity of carbon emissions and financial performance. Eco-efficiency indicates that a company's operational efficiency can be achieved through higher productivity through decreased

material consumption, increased manufacturing technologies, and waste recycling.

**Environmental Costs Effect on Financial Performance**

The probability value of Environmental Cost is 0.6609, so H3 is rejected. Environmental costs would have no significant impact on ROA. The findings of this study contradict the claims made in a previous study by (Setiawan et al., 2018) and (Septiadi, 2016), stating that the company's concern for environmental management by incurring environmental costs gives benefits shareholders' needs. Therefore environmental costs influence financial performance. This study confirmed to study by Rizki & Taufiq (2019); Zainab & Burhany (2020), stating that after the company incurred environmental costs, stakeholder interest did not increase, and Environmental Costs had no significant effect on ROA. According to the findings of Al-Waeli et al. (2020), measuring environmental costs with image and relationship costs and contingent environmental costs has no significant impact on financial performance. However, potential hidden costs have a significant and positive impact on Iraqi companies' financial performance and may affect their future earnings (ROA). Environmental costs for this research are measured by Image & Relationship Costs, Contingent Environmental Costs, and Potentially Hidden Costs.

## CONCLUSION

According to the report's results, at first, the company's financial performance will be negatively impacted by the carbon intensity because the company has to invest many resources to reduce CO2 in the production process. However, in the long run, it will positively impact the company's financial performance. However, environmental costs might not have an effect on financial performance but will support the company in getting an excellent track record with consumers. In the green era, businesses must be environmentally conscious by considering environmental costs. It is advised to extend the study period by at least five years to further their studies because there are still numerous limitations to this study. Research on measuring additional carbons to determine the extent of carbon use will be expanded.

## ACKNOWLEDGEMENT

We would like to thank Associate Prof. Dr. Maisarah Binti Mohd Saat as the research partner review and Ms. Iznia Azyati for helping the research team.Last but not least, we want to thank everyone who contributed to the realization success of this research. Although this research is far fromflawless, we sincerely hope constructive, thoughtful suggestions and welcomed with all critics.

## REFERENCES

Al-Waeli, A. J., Ismail, Z., & Khalid, A. A. (2020). THE IMPACT OF ENVIRONMENTAL COSTS ON THE FINANCIAL PERFORMANCE OF INDUSTRIAL COMPANIES IN IRAQ. *International Journal of Management (IJM)*, *11*(10), 1955–1969.

Almer, C., & Winkler, R. (2017). Analyzing the effectiveness of international environmental policies: The case of the Kyoto Protocol. *Journal of Environmental Economics and Management*, *82*, 125–151.

Busch, T., & Lewandowski, S. (2018). Corporate carbon and financial performance a meta-analysis. *Journal of Industrial Ecology*, *22*(4), 745–759.

Chen, C. M. (2014). Evaluating eco-efficiency with data envelopment analysis: An analytical reexamination. *Annals of Operations Research*, *214*(1), 49–71.

Deegan, C. (2002). Introduction: The legitimizing effect of social and environmental disclosures – a theoretical foundation. *Accounting, Auditing & Accountability Journal*, *15*(3), 282–311.

Delmas, M. A., Nairn-Birch, N., & Lim, J. (2015). Dynamics of Environmental and Financial Performance: The Case of Greenhouse Gas Emissions. *Organization and Environment*, *28*(4), 374–393.

Dowling, J., & Pfeffer, J. (1975). Organizational legitimacy: Social values and organizational behavior. *Sociological Perspectives*, *18*(1), 122–136.

Eccles, R. G., Serafeim, G., & Krzus, M. P. (2011). Market Interest in Nonfinancial Information. *Journal of Applied Corporate Finance*, *23*(4), 113–127.

Ganda, F., & Milondzo, K. S. (2018). The impact of carbon emissions on corporate financial performance: Evidence from the South African Firms. *Sustainability (Switzerland)*, *10*(7).

Hidayah, N., Nugroho, L., Prihanto, H., & Prihantini, D. (2021). Company Characteristics, Disclosure of Social Responsibility, and its Impact on Company Performance : An Empirical Study in Indonesia. *Journal of Asian Finance, Economics, and Business*, *Korea Distribution Science Association (KODISA).*, *8*(6), 889–895.

Kuo, L., Huang, S. K., & Wu, Y. C. J. (2010). Operational efficiency integrating the evaluation of environmental investment: The case of Japan. *Management Decision*, *48*(10), 1596–1616.

Lee, K. H., Min, B., & Yook, K. H. (2015). The impacts of carbon (CO2) emissions and environmental research and development (R&D) investment on firm performance. *International Journal of Production Economics*, pp. *167*, 1–11.

Noor, A., & Ginting, Y. L. (2022). INFLUENCE OF CARBON EMISSION DISCLOSURE ON FIRM VALUE OF INDUSTRIAL FIRMS IN INDONESIA.

*International Journal of Contemporary Accounting*, *4*(2), 151–168.

Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate Social and Financial Performance: A Meta-analysis. *Organization Studies*, *24*(3), 403–441.

Rizki, D., & Taufiq, E. (2019). Pengaruh Biaya Lingkungan, Ukuran Perusahaan Dan Pengungkapan Emisi Gas Rumah Kaca (GRK) Pada Nilai Perusahaan. *JURNAL KEWIRAUSAHAAN, AKUNTANSI DAN MANAJEMEN TRI BISNIS*, *1*(2), 112–129.

Rokhmawati, A., Sathye, M., & Sathye, S. (2015). The Effect of GHG Emission, Environmental Performance, and Social Performance on Financial Performance of Listed Manufacturing Firms in Indonesia. *Procedia - Social and Behavioral Sciences*, *211*(September), pp. 461–470.

Septiadi, N. L. E. I. (2016). Pengaruh Kinerja Lingkungan, Biaya Lingkungan, dan Luas Pengungkapan Corporate Social Responsibility Terhadap Kinerja Keuangan Perusahaan. *Jurnal Akuntansi Profesi*, *6*(1), 21–25.

Setiawan, W., Hasiholan, L. B., & Pranaditya, A. (2018). Pengaruh Kinerja Lingkungan, Biaya Lingkungan Dan Ukuran Perusahaan Terhadap Kinerja Keuangan Dengan Corporate Social Responsibility (CSR) Sebagai Variabel Intervening (Studi Kasus Perusahaan Studi Kasus pada Perusahaan Manufaktur yang terdaftar di Bursa. *Journal Of Accounting*, *4*(4), 1–12. http://jurnal.unpand.ac.id/index.php/AKS/article/view/1187

Setya Permana, A. B., & Tjahjadi, B. (2020). Pengaruh Pengungkapan Lingkungan dan Karbon terhadap Nilai Perusahaan. *E-Jurnal Akuntansi*, *30*(4), 932.

Sugiyono. (2018). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.

Trinks, A., Mulder, M., & Scholtens, B. (2020a). An Efficiency Perspective on Carbon Emissions and Financial Performance. *Ecological Economics*, *175*(February), 106632.

Trinks, A., Mulder, M., & Scholtens, B. (2020b). An Efficiency Perspective on Carbon Emissions and Financial Performance. *Ecological Economics*,

*175*, 106632.

Trinks, A., Scholtens, B., Mulder, M., & Dam, L. (2018). Fossil Fuel Divestment and Portfolio Performance. *Ecological Economics*, *146*, 740–748.

Wenni Anggita, Ari Agung Nugroho, & Suhaidar. (2022). Carbon Emission Disclosure And Green Accounting Practices On The Firm Value. *Jurnal Akuntansi*, *26*(3), 464–481.

Zainab, A., & Burhany, D. I. (2020). Biaya Lingkungan , Kinerja Lingkungan , dan Kinerja Keuangan pada Perusahaan Manufaktur. *Prosiding Industrial Research Workshop and National Seminar*, *11*(1), 992–998.