

# The Influence of Carbon Emissions and Corporate Social Responsibility (CSR) on the Financial Performance of Transportation Companies Listed on the Indonesia Stock Exchange

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## ABSTRACT

This study aims to analyze the effect of carbon dioxide (CO<sub>2</sub>) emissions and Corporate Social Responsibility (CSR) on the financial performance of transportation companies listed on the Indonesia Stock Exchange (IDX) during the 2018–2023 period. Financial performance is measured using Return on Asset (ROA) as the dependent variable, while carbon emissions and CSR serve as the independent variables. The study employs a quantitative approach using panel data regression with a common effect model. A total of 15 transportation companies were selected through purposive sampling, resulting in 90 balanced panel data observations. The results show that carbon emissions do not have a significant effect on ROA, indicating that environmental issues are not yet a primary concern in the business strategies of transportation companies. Conversely, CSR has a negative and significant effect on ROA, which may be due to the high costs of CSR implementation that have not yet generated short-term financial returns for the companies. The R-squared value of 5.68% indicates that the model explains only a small portion of the variation in financial performance. These findings highlight the importance of fully integrating sustainability strategies to create long-term value for companies.



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## 1. INTRODUCTION

The transportation sector plays a crucial role in driving economic growth in Indonesia. Its role is not only limited to supporting the distribution of goods and services, but also facilitating the mobility of the community at large. Along with the increase in transportation activities, it has an environmental impact. One of the environmental impacts is the increase in carbon dioxide (CO<sub>2</sub>) emissions due to the massive use of fossil fuels. According to data from the Ministry of Environment and Forestry (MoEF), the transportation sector accounts for around 21.85% of the total greenhouse gas (GHG) emissions in the energy sector. This high figure shows that the transportation sector is one of the largest contributors to carbon emissions in Indonesia. The transportation and logistics sector plays a strategic role in the Indonesian economy, because it supports the distribution of goods and

services, supply chain efficiency, and supports national and global mobility. As the industry develops and trade activities increase, companies in this sector experience significant growth. However, behind this growth, this sector is also one of the largest contributors to carbon emissions, especially from the use of fossil fuels for vehicle operations and logistics fleets.

According to data from the Ministry of Environment and Forestry (KLHK), the transportation sector contributes around 21.85% of total greenhouse gas (GHG) emissions in the energy sector. This high figure shows that the transportation sector is one of the largest contributors to carbon emissions in Indonesia. The transportation and logistics sector plays a strategic role in the Indonesian economy, because it supports the distribution of goods and services, supply chain efficiency, and supports national and global mobility. As industry develops and trade activities increase, companies in this sector experience significant growth. However, behind this growth, this sector is also one of the largest contributors to carbon emissions, especially from the use of fossil fuels for vehicle operations and logistics fleets.

According to data from the Ministry of Transportation (2022), the transportation sector contributes around 21.15% of carbon emissions from the total emissions of the energy sector in Indonesia. Of this amount, most of it comes from fossil fuel vehicles in the land transportation and logistics sector, including commercial vehicles and transportation company operations. This amount of emissions is expected to continue to increase as national logistics needs increase. For transportation and logistics companies that have been listed on the Indonesia Stock Exchange (IDX), pressure on environmental issues is increasing. Investors, consumers, and regulators are now paying greater attention to sustainability practices. From a strategic management perspective, high carbon emissions can be a source of reputational and business risk, which can ultimately impact the company's competitiveness and profitability. To overcome this, many companies have begun to implement a Corporate Social Responsibility (CSR) strategy with a focus on environmental sustainability. CSR is part of a long-term strategy to improve brand image, customer loyalty, and company value. In the transportation sector, CSR can be realized in the form of energy efficiency, fleet rejuvenation with environmentally friendly technology, service digitalization, and social programs for affected communities. For example, PT Blue Bird Tbk as one of the leading public transportation companies, has adopted electric vehicles as part of its business transformation. This step not only reduces carbon emissions but also strengthens the company's positioning amidst increasing market demand for environmentally friendly services. The results of studies related to the influence of CSR and carbon emission management on financial performance or company profitability are still varied. Several studies found that sustainability strategies have a positive impact on profitability, while others showed insignificant results. This variation indicates the need for more in-depth studies, especially with a managerial approach, to understand how environmental and social strategies are integrated into the business models of transportation and logistics companies.

Previous studies have shown mixed findings regarding the relationship between carbon emissions, CSR and financial performance. Hermawan and Mulyawan (2014) found that CSR can increase positive investor perceptions and have an impact on company value. Wibowo and Putri (2019) found that CSR has a significant impact on profitability in public transportation companies in Indonesia. Rizki and Daromes (2020) found that carbon emission disclosure has a negative impact on company value, especially if it is not accompanied by strong mitigation efforts or communication strategies. Saka and Oshika (2014) also stated that the relationship between carbon disclosure and company performance is highly dependent on market reaction and the company's seriousness in dealing with environmental issues. Nurlaili et al. (2022) highlighted that the combination of CSR and carbon emission management has a positive impact on profitability, but with the note that the company must have a certain economic scale and a good level of efficiency for the impact to be seen significantly.

This study aims to analyze how carbon emission levels and CSR implementation affect the profitability of transportation and logistics companies listed on the IDX. The results of this study are expected to contribute to the strategic management literature, as well as become a reference for industry players and policy makers in designing sustainable business strategies that remain competitive in the market. Given the important role of the transportation sector as well as its high contribution to carbon emissions, this study is relevant to conduct. The aim is to empirically examine how carbon emissions and CSR affect the profitability of transportation companies listed on the

Indonesia Stock Exchange (IDX). The results of this study are expected to contribute to the company's strategic decision-making and become a reference in formulating public policies towards sustainable transportation.

## 2. RESEARCH METHOD

This study was conducted by determining one independent variable and two dependent variables. The selected dependent and independent variables refer to previous studies that examine the effect of carbon dioxide emissions and CSR on the profitability of logistics and transportation companies listed on the Indonesia Stock Exchange. Then for the dependent variable is profitability while the independent variables are carbon dioxide emissions and CSR. The type of data used is secondary data in the form of annual reports, sustainability reports, and company financial reports. Data was obtained from the official website of the Indonesia Stock Exchange, the websites of each company, and other trusted sources. This study uses panel data with a combination of time series and cross-section data. Observations were made on 15 transportation and logistics sector companies that were consistently listed on the IDX and published financial and sustainability reports during the period 2018–2022 (5 years).

**Table 1.** Summary of Research Variables

No.	Variable	Explanation	Unit	Source
1	Return on Asset (ROA)	The rate of return or the level of return that indicates the profitability of the company	Percentage (%)	Company's Financial Statements (IDX)
2	Absorbent Carbon Dioxide (CO <sub>2</sub> )	The amount of carbon emissions generated by the company's operational activities, especially from fossil fuel consumption	Annual metric tons / Indices Disclosure	World Bank
3	Corporate Social Responsibility (CSR)	The level of involvement of companies in social and environmental responsibility, measured based on the presence or absence of annual reports	Dummy	Annual Report /Sustainability Report

In this study, the research model estimation technique used is the panel data approach. To address the intercorrelation between independent variables that can ultimately result in inaccurate regression refining, the panel data method is more appropriately used. Some of the advantages of using panel data in this study include using panel data, the amount of observation data is more when compared to time series data and cross section data alone, so that this can increase a greater degree of freedom (Widardjono, 2005:254). The large number of observations has implications for more informative data, more variety, reduced collinearity between variables and increased freedom, which can help researchers to obtain more efficient estimates. In estimating with the datapanel regression method, there are three methods that can be used to work with data panels. The datapanel can be estimated using the three methods: the pooledleast square (PLS) approach, the fixed effect method (FEM) approach, and the randomeffect method (REM) approach. This study analyzes the profitability of transportation and logistics companies on the Indonesian stock exchange. The independent variables in this study are carbon dioxide emissions and CSR from 2008 – 2023. The estimation model in this study is shown in the following equation:

$$ROA = \beta_0 + \beta_1CO_2 + \beta_2CSR$$

The explanation:

b <sub>0</sub>	= Constant
b <sub>1</sub> ,..., β <sub>n</sub>	= Independent Variable Regression Coefficient
ROA	= Return Of Equity
CO <sub>2</sub>	= Carbon dioxide emissions
CSR	= Corporate Social Responsibility

i = Observation i  
 t = Year t  
 ε = Previous residual

### 3. RESULTS AND DISCUSSIONS

**Table 2.** CEM Regression Results

Dependent Variable: ROA  
 Method: Panel Least Squares  
 Date: 04/06/25 Time: 14:56  
 Sample: 2018 2023  
 Periods included: 6  
 Cross-sections included: 15  
 Total panel (balanced) observations: 90

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.079404	0.084301	0.941909	0.3488
CO2	1.16E-06	1.18E-06	0.987813	0.3260
CSR	-0.135745	0.063906	-2.124126	0.0365
R-squared	0.056788	Mean dependent var		0.096333
Adjusted R-squared	0.035105	S.D. dependent var		0.304204
S.E. of regression	0.298817	Akaike info criterion		0.454795
Sum squared resid	7.768376	Schwarz criterion		0.538122
Log likelihood	-17.46579	Hannan-Quinn criter.		0.488398
F-statistic	2.619021	Durbin-Watson stat		2.204530
Prob(F-statistic)	0.078614			

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Based on the results of panel data regression analysis through the selected model selection test using the Common Effect Model (CEM) method on 15 transportation and logistics sector companies listed on the Indonesia Stock Exchange (IDX) during the period 2018 to 2023, it was found that the Corporate Social Responsibility (CSR) variable has a negative and significant effect on company profitability as measured by Return on Asset (ROA), with a coefficient value of -0.135745 and a probability value (p-value) of 0.0365. These results indicate that the higher the CSR disclosure made by the company, the more it tends to reduce profitability. This is likely because CSR activities have not had a direct impact on financial performance, and are more long-term in nature. The large cost of implementing CSR, if not supported by an effective communication strategy, can be perceived as a burden and has not produced real economic added value in the short term.

Meanwhile, the carbon dioxide (CO<sub>2</sub>) emission variable shows a positive coefficient of 1.16E-06, but is not statistically significant because it has a p-value of 0.3260. This means that carbon emissions do not significantly affect the company's ROA in this model. This finding shows that reducing or increasing carbon emissions has not been a major factor affecting the profitability of transportation and logistics companies in Indonesia. This is possible because the emission aspect has not been a major concern for stakeholders or investors in decision making, as well as the lack of strict environmental regulatory pressure in this sector.

The R-squared value of 0.0568 shows that the contribution of the CO<sub>2</sub> and CSR variables to the variation in ROA is only 5.68%, while the rest is influenced by other factors outside the model. Nevertheless, this finding still provides an important contribution in showing that corporate social responsibility has real consequences for profitability, so it needs to be designed and implemented

more strategically in order to create value for the company and stakeholders in a sustainable manner.

#### 4. CONCLUSION

This study aims to analyze the effect of carbon dioxide (CO<sub>2</sub>) emissions and Corporate Social Responsibility (CSR) on the profitability of transportation and logistics companies listed on the Indonesia Stock Exchange (IDX) during the period 2018–2023. Profitability in this study is measured using Return on Asset (ROA), and the analysis method used is panel data regression with the Common Effect Model (CEM) approach. The results of the study show that the CSR variable has a negative and significant effect on ROA, indicating that increasing CSR activities has not been able to directly increase the company's profitability. This shows that the implementation of CSR that is not yet strategic or focuses more on compliance and image can increase the cost burden without having a direct impact on the company's profits in the short term. On the other hand, the carbon emission variable (CO<sub>2</sub>) does not have a significant effect on ROA. This shows that the level of carbon emissions produced by the company has not become the main factor influencing financial performance. The lack of strict environmental regulations, as well as low consumer and investor awareness of sustainability issues in this sector, are suspected to be the causes of the lack of ROA sensitivity to carbon emission levels. With a relatively low R-squared value (5.68%), this study concludes that carbon emissions and CSR only explain a small part of the variation in company profitability, and there are other more dominant factors that have not been studied further. Therefore, it is important for companies to run CSR programs that are more integrated with business strategies and pay attention to sustainable emission management to increase company value in the long term.

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