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The Effect of Environmental Costs and Carbon Accounting on Profitability with Corporate Social Responsibility as a Moderating Variable in the Property and Real Estate Sector on IDX

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Abstract

Purpose – *This study aims analyze and identify the influence of environmental cost and carbon accounting on profitability with corporate social responsibility as a Moderating Variable.*

Design/methodology/approach – *This study uses secondary data. The data were collected from companies operating in the financial and listed on the Indonesia Stock Exchange (IDX), with a total of 34 research samples for the period 2022-2024. The hypotheses were tested using a panel data regression model with the assistance of EViews. The research design employs a non-probability sampling method.*

Findings – *The results of this study indicate that environmental costs do not have a significant effect on profitability. Carbon accounting has a significant effect on profitability, and Corporate Social Responsibility also has a significant effect on profitability. Furthermore, Corporate Social Responsibility the effect of environmental costs on profitability, whereas Corporate Social Responsibility strengthens the effect of carbon accounting on profitability.*

Research limitations/implications – *This study focuses on profitability and represents a novel contribution by examining the relationship between environmental cost, carbon accounting, profitability, and corporate social responsibility in property and real estate companies listed on the Indonesia Stock Exchange (IDX) during the period 2022–2024.*

JEL : M14, M41, Q56

INTRODUCTION

Companies in the property and real estate sector play and important role in supporting national economic growth. As a sector that significantly contributes to the provision of infrastructure, housing, and business districts, this industry promotes equitable development

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and enhances pubic welfare. Therefore, companies in this sector are expected to continuously improve their performance, both in terms of financial performance and business sustainability, in order to ensure sustainable growth prospects in the future. Companies operating within society have responsibilities not only in economic terms but also in social aspects. This implies that companies need to pay attention to the environmental impacts arising from their operational activities. Although the primary objectives of a company is to generate profit, in the process it must also provide benefits to its stakeholders, such as shareholders, creditors, consumers, suppliers, government, communities, analysts, and other related parties.

In the property and real estate sector, environmental costs are generally associated with sustainable development practices, such as green building development, building energy efficiency, construction waste management, and environmentally friendly certifications. In contrast, the manufacturing sector is more directly related to production processes that generate pollution (water, air, and soil) and incur costs related to the disposal of hazardous waste. Environmental performance in the property and real estate sector, when achieved at a high level, is reflected through energy- and water-efficient building designs, the use of renewable materials, and strategic site selection. Meanwhile, in other sectors, environmental performance is often measured by compliance with regulations such as the PROPER program in Indonesia, emission reductions, and resource efficiency. Corporate social responsibility (CSR) has become increasingly important for profitability and long-term firm value in both sectors. However, the property and real estate sector has a comparative advantage in visually communicating environmental benefits, which can attract specific market segments. The issue of environmental damage, its causes, and is impact on human life, both now and in the future, has led society to become increasingly aware of the importance of preserving the environment. Today, companies no longer focus solely on the interests of owners and management, bust must also consider the interests of all stakeholders, such as employees, the community, and the surrounding environment. This is because the sustainability of a company's operations depends heavily on support form various parties, including the environment in which the company operates.

President Joko Widodo expressed his appreciation for the resilience of Indonesia's property, real estate, and construction sectors amid the global economic slowdown. These sectors are considered increasingly competitive and have made a significant contribution to the national economy. In addition, the property and real estate sectors generate a strong multiplier effect for 185 other industrial subsectors. These subsectors range from building materials such as cement, steel, and bricks to furniture, electronics, and household appliances. The Head of State explained that the property sector has not been able to survive in all countries, either due to the COVID-19 pandemic or global economic issues. The President cited the example of a major property company in another country that collapsed as a result of massive debt. Therefore, he urged property companies in Indonesia to pay close attention to housing backlogs and public needs in carrying out their business activities. "Praise be to God, Indonesia is not in such a situation because our demand remains very high. The housing ownership backlog still stands at 12.1 million units. This is an opportunity, a potential that can be pursued by all members of REI," he stated. Furthermore, President Joko Widodo emphasized that opportunities in Indonesia's property sector remain substantial, as the growth of new families reaches around 700–800 thousand per year. (presidenri.go.id)

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Profitability is a ratio or comparison that determines a company's ability to generate profits from sales, assets, and return on equity based on specific measurement criteria. Profitability ratios are used to indicate the extent of profit generated from a company's operational activities, thereby influencing the information disclosed in the notes to the financial statements, which must comply with accounting standards (Hartati, 2024). High profitability reflects effective financial performance, indicating that a company is able to efficiently utilize its available resources to generate profits. In addition, the level of profitability serves as an important indicator for investors and other stakeholders in assessing a company's prospects and financial health. Therefore, profitability analysis not only functions as a measure of operational efficiency but also serves as a basis for managerial decision-making, performance evaluation, and future business strategy planning.

Environmental cost refers to a company's operational activities that incorporate control and monitoring measures to ensure that the environment remains clean and sustainable. Environmental costs are part of the company's budget allocated outside operating profits, with the purpose of preventing and mitigating environmental damage arising from corporate activities. Environmental costs may represent a significant proportion of total operating costs (Sudarmanto et al., 2025). Previous studies have documented mixed findings regarding the relationship between environmental cost and profitability. Several studies (Aulia et al., 2025; Fahira & Yusrawati, 2023; Wahyudi & Rusdi, 2025) find that environmental cost has a positive effect on profitability. In contrast, other studies (Auliyah et al., 2024; Aurelia et al., 2022) report a negative effect of environmental cost on profitability.

Carbon accounting can serve as a powerful tool for communication with stakeholders, including customers, investors, and the wider community. Carbon accounting is a method used to measure and report carbon emissions in support of climate change mitigation efforts (Antong et al., 2025). Through by their operational activities, assess their environmental impacts, and design strategies to reduce them. Accordingly, carbon accounting not only functions as a measurement tool but also serves as a basis for decision-making in the implementation of sustainable business practices, improvements in energy efficiency, and the fulfillment of corporate social and environmental responsibilities. Empirical evidence regarding the relationship between carbon accounting and profitability remains mixed. Puspa & Fransisca, (2024) find that carbon accounting has a positive effect on profitability. In contrast, other studies (Idris et al., 2025; Mariyah et al., 2023; Mukti & Bayangkara, 2024; Safutri et al., 2023) report a negative effect of carbon accounting on profitability.

Corporate Social Responsibility (CSR) is a concept in which companies are responsible for the social and environmental impacts generated by their business activities, such as pollution, waste, and safety issues. It involves corporate initiatives that go beyond legal obligations and economic responsibilities in order to create positive impacts for both internal and external stakeholders (Murniati, 2024). CSR represents an approach that ensures companies are accountable for the economic, social, and environmental impacts arising from their operations. This approach encompasses all activities aimed at providing long-term benefits for both the company and society simultaneously (Lase & Waruwu, 2025). Empirical studies on the relationship between CSR and profitability show mixed results. Several studies (Dewi & Wiyono, 2023; Kholmi & Nafiza, 2022) find that corporate social responsibility has a positive effect on profitability. Conversely, other studies (Alim & Puji, 2021; Trida et al., 2021; Zulaeha et al., 2025) report a negative effect of corporate social responsibility on profitability.

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Thus, this study is expected not only to contribute theoretically to the development of environmental accounting literature, but also to provide more specific practical contributions for stakeholders in the property industry, such as corporate management in making strategici decisions, investors in assessing sustainability risks and performance, and regulators in formulating effective carbon emission control policies.

Based on existing phenomena and prior studies examining the relationships among the variables, the author is motivated to conduct research on companies in the property and real estate sector to investigate whether affect profitability. This study specifically focuses on property and real estate companies listed on the Indonesia Stock Exchange (IDX) during the period 2022–2024. Therefore, the author is interested in conducting a study entitled 'The Effect of Environmental Costs and Carbon Accounting on Profitability with Corporate Social Responsibility as a Moderating Variable in the Property and Real Estate Sector on IDX".

LITERATUR REVIEW

Legitimacy Theory

Legitimacy Theory is based on the assumption that an organization's operational sustainability does not occur automatically, but must be obtained through social acceptance and approval. According to Dowling, (1975), legitimacy is a condition in which the values upheld by a company are aligned with the values prevailing in the society in which it operates. This emphasizes the importance of consistency between corporate actions and societal expectations.

This theory is based on the idea that companies and society are interconnected through a social agreement. The sustainability and development of a company depend heavily on its ability to achieve its intended goals and distribute economic, social, and political benefits to the communities in which it operates (Shocker & Seth, 1973). Gama et al., (2024) emphasize that understanding and applying the principle of legitimacy is essential for maintaining public interest and building trust, reflecting the company's role as part of a constantly changing system.

Based on the foregoing explanation, legitimacy theory highlights the importance of alignment between corporate activities and prevailing social values. Companies should not be solely oriented toward profit generation, but should also demonstrate a strong commitment to social and environmental responsibility in order to gain public trust and societal support

Therefore, there is a close relationship between legitimacy theory and environmental cost, as effective management of environmental costs can enhance corporate reputation, maintain organizational legitimacy, and ensure business sustainability amid evolving social demands.

Stakeholder Theory

Stakeholder theory explains that companies must consider and accommodate the interests of various parties who have relationships or involvement with their operational activities. According to Freeman (1994), stakeholders are individuals or groups that can influence the achievement of organizational objectives and are also affected by the decisions made. Therefore, companies are considered to have a responsibility to meet the expectations

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of various stakeholders, such as employees, consumers, local communities, government, and the environment. Stakeholder theory further argues that transparent disclosure of information represents corporate accountability in responding to the increasing demands of stakeholders who are becoming more attentive to sustainability issues.

Based on the foregoing discussion, stakeholder theory emphasizes that a company's success and sustainability depend not only on financial performance but also on maintaining good relationships with its stakeholders, such as investor, consumers, government, and the community. The integration of carbon accounting and CSR within the framework of Stakeholder Theory demonstrates that good environmental practices are not only normative but also have economic implications. This relationship contributes to improved financial performance through operational efficiency, increased asset value, and strengthened market confidence, which are ultimately reflected in the company's profitability. Therefore, there is a close relationship between stakeholder theory and carbon accounting, corporate social responsibility, and profitability, as these practices represent corporate responsibility in meeting stakeholders' expectations for transparency, accountability, and commitment to environmental and social sustainability.

Environmental Cost

According to (Sudarmanto et al., 2025), environmental cost refers to a company's operational activities that incorporate control and monitoring measures to ensure that the environment remains clean and sustainable. Environmental costs are part of the company's budget allocated outside operating profits, with the objective of preventing and mitigating environmental damage arising from corporate activities. Such costs may represent a significant proportion of total operating costs. Environmental cost, also referred to as environmental quality cost, is similar to quality cost. In this context, environmental costs are incurred due to poor environmental quality or the potential occurrence of environmental degradation (Alamsyahbana et al., 2024). Therefore, environmental costs are associated with various activities aimed at creating, identifying, correcting, and preventing environmental degradation.

Carbon Accounting

According to Sopanah et al., (2024) carbon accounting specifically relates to the measurement of carbon dioxide emissions and other greenhouse gases generated by an entity's activities. Carbon accounting can also serve as a powerful communication tool with stakeholders, including customers, investors, and the wider community. Carbon accounting is a method used to measure and report carbon emissions in support of climate change mitigation efforts (Antong et al., 2025). Through this method, companies can identify sources of greenhouse gas emissions generated by their operational activities, assess their environmental impacts, and design strategies to reduce them.

Profitability

According to Alifedrin & Firmansyah, (2023) profitability represents the difference

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between income (operating revenue) and expenses (operating costs), such that corporate profit can be used as a measure of efficiency and effectiveness within an operating unit. Profitability is also defined as a ratio or comparison that determines a company's ability to generate profits from sales, assets, and return on equity based on specific measurement criteria. Profitability ratios are employed to indicate the extent of profit generated from a company's operational activities, thereby influencing the information disclosed in the notes to the financial statements, which must comply with accounting standards (Hartati, 2024).

Corporate Social Responsibility

According to Murniati (2024), Corporate Social Responsibility (CSR) is a concept in which companies are responsible for the social and environmental impacts generated by their business activities, such as pollution, waste, and safety issues. Corporate social responsibility is also defined as the commitment of business entities to continuously conduct ethical and legal activities while contributing to the improvement of overall quality of life in society (Said, 2024). Furthermore, Harsono (2019) states that Corporate Social Responsibility (CSR) is a mechanism through which companies integrate concern for the social and environmental environment into their operations and interactions with stakeholders beyond mere legal compliance.

Hypotheses development

Environmental Cost on Profitability

Environmental cost refers to all economic sacrifices incurred by a company as a result of operational activities that have an impact on the environment. These costs include expenditures aimed at preventing, reducing, repairing, or mitigating environmental damage arising from corporate activities. This hypothesis is consistent with previous findings by Aulia et al., (2025) who examined coal mining companies listed on the Indonesia Stock Exchange during the period 2020–2023 and found that environmental cost has a positive effect on profitability. Similarly, Fahira & Yusrawati (2023) who conducted a study on industrial and chemical sector companies listed on the Indonesia Stock Exchange during 2017–2020, also reported that environmental cost positively affects profitability. Based on the theoretical framework and previous studies, the following hypothesis is proposed.
H_1: Environmental Cost has a positive effect on profitability

Carbon Accounting on Profitability

Carbon accounting, or carbon accounting practices, refer to the process of measuring, recording, and reporting the amount of greenhouse gas (GHG) emissions generated from a company's activities over a specific period. Carbon accounting can also serve as a powerful communication tool with stakeholders, including customers, investors, and the wider community. It is a method used to measure and report carbon emissions in support of climate change mitigation efforts (Antong et al., 2025). Information related to carbon emissions can be obtained from annual reports as well as sustainability reports. This hypothesis is consistent

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with the findings of Puspa & Fransisca (2024), who conducted a study on Bank Sumsel listed on the Indonesia Stock Exchange (IDX) during the period 2019-2023 and found that carbon accounting has a positive effect on profitability. Based on the theoretical framework and previous studies, the following hypothesis is proposed:
H_2: Carbon Accounting has a positive effect on profitability

Corporate Social Responsibility on Profitability

Corporate Social Responsibility (CSR) is a form of a company's commitment to participate in sustainable development by paying attention to the social, economic, and environmental impacts of its business activities. Corporate Social Responsibility (CSR) encompasses various activities aimed at providing benefits to society, preserving the environment, improving employee welfare, and ensuring compliance with business ethics and legal regulations. This concept involves corporate initiatives that go beyond legal obligations and economic responsibilities in order to create positive impacts for both internal and external stakeholders (Yani et al., 2023). This hypothesis is consistent with previous findings by Dewi & Wiyono (2023), who conducted a study on consumer goods industry companies listed on the Indonesia Stock Exchange during the 2018–2021 period. Their study found that corporate social responsibility (CSR) has a positive effect on profitability. Similarly, Kholmi & Nafiza (2022), who examined manufacturing companies listed on the Indonesia Stock Exchange for the 2018–2019 period, also found that corporate social responsibility (CSR) has a positive effect on profitability. Based on the theoretical framework and previous studies, the following hypothesis is proposed:
H_3: Corporate Social Responsibility has a positive effect on profitability

Corporate Social Responsibility (CSR) moderates the effect of Environmental Cost on Profitability

Environmental cost refers to all expenditures incurred by a company as a result of operational activities that have an impact on the environment. These costs include expenditures aimed at preventing, reducing, repairing, or mitigating environmental damage caused by the company's activities. Corporate Social Responsibility (CSR) refers to the practices and policies implemented by companies to contribute to social welfare, environmental protection, and the well-being of the surrounding community. CSR reflects a company's commitment not only to financial performance but also to social and environmental sustainability. This perspective is consistent with Stakeholder Theory, which explains that companies have obligations to consider the interests of various stakeholders, such as investors, governments, and the public, who demand transparency regarding environmental performance. In this context, when companies implement CSR effectively, stakeholders are more likely to provide greater support and trust, which in turn can have a positive impact on corporate performance and profitability.

Previous research conducted by Dewi & Wiyono (2023) on consumer goods industry companies listed on the Indonesia Stock Exchange during the 2018–2021 period found that

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Corporate Social Responsibility (CSR) has a positive effect on profitability. Based on the theoretical framework and prior empirical studies discussed above, this study proposes the following hypothesis:
H_4: Corporate Social Responsibility (CSR) strengthens the effect of Environmental Cost on Profitability.

Corporate Social Responsibility (CSR) moderates the effect of Carbon Accounting on Profitability

Carbon emission disclosure, or carbon accounting, is part of corporate environmental accountability that reflects the extent to which a company reports and manages the carbon impacts of its business activities, such as the measurement of greenhouse gas emissions, emission reduction efforts, and transparency in environmental reporting. Effective implementation of carbon accounting reflects a company's environmental awareness and compliance with regulations, which can positively affect profitability through improved energy efficiency and reduced operational costs. Within the framework of Corporate Social Responsibility (CSR), companies integrate the disclosure and management of carbon emissions into their CSR programs. As a result, such information functions not only as a tool for environmental reporting but also as a strategic instrument to build a positive corporate image. Therefore, companies with a high level of CSR are better able to maximize the economic benefits derived from the implementation of carbon accounting. This is consistent with the study conducted by Puspa & Fransisca (2024) on Bank Sumsel Babel, which was published during the 2019–2023 period. Their findings indicate that carbon accounting has a positive effect on profitability. Based on the theoretical framework and prior empirical studies discussed above, this study proposes the following hypothesis:
H_5: Corporate Social Responsibility (CSR) strengthens the effect of Carbon Accounting on Profitability.

RESEARCH METHOD

Research Design

This study aims to examine the potential relationship between the independent variables, Environmental Cost and Carbon Accounting, and the dependent variable, Profitability, with Corporate Social Responsibility serving as a moderating variable. The objective of this research is to test hypotheses that explain the relationships among two or more factors within a given situation. This study examines various factors in a natural setting where daily business activities continue as usual. The unit of analysis employed during the data analysis stage is the organization. The level of researcher intervention in this study is minimal, meaning that the researcher has a direct interest in the research topic but does not engage in extensive intervention. The sampling design adopted in this study is non-probability sampling using a purposive sampling technique. The study period utilizes panel data, which combine cross-sectional and time-series data, and applies hypothesis-testing data analysis methods (Ghozali, 2016).

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Population and Sample

Population refers to the entire group of individuals, events or objects that constitute the primary focus of the researcher and from which conclusions are drawn based on the statistical analysis of the sample (Sekaran, 2016). The population in this study consists of companies operating in the property and real estate sector that are listed on the Indonesia Stock Exchange (IDX). The total population comprises 95 property and real estate companies that meet the criteria established by the researcher for further analysis. Based on the predetermined population and the use of purposive sampling, the criteria applied for sample selection in this study are as follows:

1. Property and real estate companies listed on the Indonesia Stock Exchange (IDX) during the period 2022-2024.
2. Property and real estate companies that published financial statements for the period 2022-2024.
3. Property and real estate companies that reported positive profits during the period 2022-2024.
4. Property and real estate companies that published sustainability reports for the period 2022-2024.

This study data obtained from the financial reports of companies in the Property and Real Estate sector listed on the Indonesia Stock Exchange (IDX) for the period 2022-2024. The data can be accessed through the official IDX website. (https://www.idxchannel.com)

Variable Operationalization

The following is a table containing the indicators for each variable:

Table 1. Operationalization of Research Variable

Type	Variable	Dimension / Formula	Source
Independent Variables	Environmental Cost	$\frac{Environmental\ Costs}{Net\ ptofit\ after\ tax}$	(Aulia et al., 2025)
	Carbon Accounting	n(CA) = $\frac{Amount\ of\ carbon\ accountingdisclosure}{Maximum\ score}$	(Mukti & Bayangkara, 2024)
Dependent Variable	Profitability	$\frac{Earning\ After\ Tax}{Total\ Asset}$	(Aurelia et al., 2022)
Moderating Variable	Corporate Social Responsibility	Each CSR in the research instrument is given a value "1" if there is an expression regarding the item in the financial report, while "0" if there is no expression	(Kholmi & Nafiza, 2022)

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Type	Variable	Dimension / Formula	Source
		regarding the item in the financial report.	

RESULTS

Table 2. Descriptif

Variable	N	Min	Max	Mean	Std. Dev
EC	102	0.0001	3.3404	0.1181	0.4023
CA	102	0.0555	0.2222	0.1258	0.0291
PRF	102	0.0006	81.640	4.4807	17.096
CSR	102	0.0439	0.1538	0.0813	0.0209

Sources: Output Eviews9 (2025)

Based on the descriptive statistics table, there are 102 observations during the 2022–2024 period. The Environmental Cost variable in property and real estate sector companies shows a minimum value of 0.001 and a maximum value of 3.3404, with an average value of 0.1181. The company with the highest level of Environmental Cost in the property and real estate sector is Urban Jakarta Propertindo Tbk (URBN), while the lowest is Mega Manunggal Property Tbk (MMLP). The standard deviation obtained is 0.4023, indicating that Environmental Cost levels among property and real estate companies exhibit relatively high variability. This suggests significant differences in corporate policies and capacities in allocating environmental costs during the research period.

Furthermore, the Carbon Accounting variable in property and real estate sector companies shows a minimum value of 0.0555 and a maximum value of 0.2222, with an average of 0.1258. The company with the highest level of Carbon Accounting in the property and real estate sector is Alam Sutera Realty Tbk (ASRI). The resulting standard deviation is 0.0291, which is lower than the mean value, indicating that the level of Carbon Accounting among property and real estate companies is relatively homogeneous or does not vary significantly across firms during the research period.

Furthermore, the Profitability variable in property and real estate sector companies shows a minimum value of 0.0006 and a maximum value of 81.640, with an average value of 0.0813. The company with the highest level of profitability in the property and real estate sector is Greenwood Sejahtera Tbk (GWSA) in 2024, while the lowest profitability is observed in Cahayasakti Investindo Sukses Tbk (CSIS) in 2024. The resulting standard deviation is 17.096, indicating that the level of profitability among property and real estate companies varies considerably across firms and research periods, thereby reflecting significant differences in financial performance during the 2022–2024 period.

Meanwhile, the Corporate Social Responsibility (CSR) variable in property and real estate sector companies shows a minimum value of 0.0439 and a maximum value of 0.1538, with an average value of 4.4807. The company with the highest level of CSR disclosure in the property and real estate sector is Jaya Real Property Tbk (JRPT) in 2024, while the lowest level is observed in Repower Asia Indonesia Tbk (REAL) in 2022. The resulting standard deviation is 0.0209, which is lower than the mean value, indicating that the data tend to be homogeneous

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with relatively low dispersion. This suggests that the CSR variable remains relatively stable among companies during the research period.

Selection of Panel Data Regression Model

Table 3. Chow Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	423.543855	(33,63)	0.0000
Cross-section Chi-square	551.465773	33	0.0000

Source: Data processed using Eviws (2025)

Based on the results of the Chow Test conducted using EViews 9, the probability value of the Cross-Section F is 0.0000. This result indicates that the value is below the significance level (α = 0.05). Therefore, the most appropriate model to be used is the Fixed Effect Model (FEM). Consequently, the Hausman test is required to determine the most suitable model between the Fixed Effect Model and the Random Effect Model (REM).

Table 4. Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	6.829483	5	0.2336

Source: Data processed using Eviws (2025)

Based on the Hausman test results, the probability value is 0.2336. This value is greater than the significance level (α = 0.05). Therefore, the most appropriate model to be used is the Random Effect Model (REM). Consequently, the Lagrange Multiplier test is required to determine the most suitable model between the Common Effect Model (CEM) and the Random Effect Model (REM).

Table 5. Lagrange Multiplier

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	88.39046 (0.0000)	0.551513 (0.4577)	88.94197 (0.0000)
Honda	9.401620 (0.0000)	-0.742639 --	6.122824 (0.0000)
King-Wu	9.401620 (0.0000)	-0.742639 --	1.526308 (0.0635)
Standardized Honda	9.722208 (0.0000)	-0.354227 --	2.558788 (0.0053)

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Standardized King-Wu	9.722208 (0.0000)	-0.354227 --	-0.499188 --
Gourierioux, et al.*	--	--	88.39046 (< 0.01)

*Mixed chi-square asymptotic critical values:

1%	7.289
5%	4.321
10%	2.952

Source: Data processed using Eviws (2025)

Based on the results of the Lagrange Multipler Test, the significance value of the Breusch-Pagan (Both) is 0.0000, which is lower than the significance level (α = 0.05). Therefore, the most appropriate model to be used is the Random Effect Model (REM).

Hypothesis Testing

The best regression model selected after conducting estimation and model selection procedures in this study is the Random Effect Model (REM). The following are the results of the panel data regression estimation using the Random Effect Model (REM):

Table 6. Partial Test (Random Effects Model)

PRF = a + β1EC + β2CA + β3CSR β1EC*CSR + β2CA*CSR + Ɛ

Variabel	Prediksi	Coefficient	t-Statistik	Prob
C		9.5924	2.2995	0.0236
EC	+	6.0003	0.9226	0.1792
CA	+	-52.2363	-2.5509	0.0061
CSR	+	-89.2443	-2.3238	0.0111
EC*CSR	+	-85.14477	-0.965812	0,1683
CA*CSR	+	859.5399	3.359689	0.0005

EC: Environmental Cost, CA: Carbon Accounting, PRF: Profitabilitas, CSR: Corporate Social Responsibility
Source: Processed data (2025)

The partial test is used to determine whether each independent variable individually affects the dependent variable. The results of the test using the Random Effect Model (REM) can be summarized as follows:

1. Environmental costs have a probability value of 0.3585/2 = 0.1792 > 0.05, which can be interpreted as having no effect and being statistically insignificant on profitability.
2. Carbon accounting has a probability value of 0.0123/2 = 0.0061 < 0.05. This means that the carbon accounting variable has a statistically significant influence on probability.
3. Corporate Social Responsibility with a probability value of 0.0222/2 = 0.0111 < 0.05, can be interpreted as having an influence and being statistically significant on the probability.
4. Corporate Social Responsibility research strengthens the influence of Environmental Costs on Profitability, having a probability value divided by 2 (two), namely 0.3366/2 =

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0.1683 which is greater than the significance level of 0.05 (5%), this result means that Corporate Social Responsibility does not strengthen the influence of Environmental Costs on Profitability.

5. Corporate Social Responsibility research strengthens the influence of Carbon Accounting on Profitability, having a probability value divided by 2 (two), namely 0.0011/2 = 0.0005 which is smaller than the significance level of 0.05 (5%), this result means that Corporate Social Responsibility strengthens the influence of Carbon Accounting on Profitability.

Coefficient of Determination Test

Table 7. Coefficient of Determination Test

R-squared	0.185898	Mean dependent var	0.210609
Adjusted R-squared	0.143497	S.D. dependent var	1.463295
S.E. of regression	1.354242	Sum squared resid	176.0614
F-statistic	4.384264	Durbin-Watson stat	1.794491
Prob(F-statistic)	0.001225		

Source: Processed data (2025)

The R-Squared value is 0.185898, which means that 18.5% of the Environmental Cost and Carbon Accounting variables with Corporate Social Responsibility as a moderating variable can explain the profitability variable. Meanwhile, the remaining 81.5% is explained by other variables outside this research model, such as green accounting, environmental performance, company growth, managerial ownership, company size, leverage, company size, green banking, corporate governance. The R-Square value indicates that the model's ability to explain variations in profitability is at a moderate level, so that although environmental and carbon cost accounting has a contribution in explaining profitability, there are still other factors outside the model that play a more dominant role in influencing company profitability.

DISCUSSIONS

Environmental Cost on Profitability

The results of this study indicate that environmental costs have no effect on profitability. However, the directional relationship suggests that increases in environmental costs incurred by companies tend to be followed by increases in profitability. These findings indicate that environmental expenditures are on track with the company's goal of creating economic value through environmentally responsible activities. The directional relationship between environmental costs and profitability indicates that environmental expenditures in companies are not entirely an operational expense, but rather are directed as part of the company's efforts to maintain business sustainability. In practice, environmental costs such as waste management, project environmental maintenance, and compliance with environmental regulations contribute to building a responsible corporate image. These results align with Legitimacy Theory, which states that companies strive to align their activities with prevailing societal values and norms to gain social legitimacy. By spending on environmental costs, companies demonstrate environmental compliance and responsibility, thereby gaining

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acceptance from the community and stakeholders. This legitimacy has not been directly reflected in increased profitability, but the unidirectional relationship indicates that legitimacy efforts through environmental activities are on track, consistent with the theory. Furthermore, these findings are in line with the study conducted by Aulia et al., (2025) on coal mining companies during the 2020–2023 period, which found a significant positive relationship between environmental cost and profitability. This suggests that when environmental costs are disclosed and realized in annual reports, they can enhance corporate reputation, which in turn contributes to competitive advantage. Such practices may also serve as an effective strategy to increase sales revenue or corporate profits.

Carbon Accounting on Profitability

Based on the hypothesis testing results, carbon accounting does not exhibit a relationship direction consistent with the proposed hypothesis. This indicates that an increase in the implementation or disclosure of carbon accounting is instead followed by a decrease in corporate profitability. Thus, this relationship reflects the practical realities of business conditions, where the implementation of carbon accounting has not yet fully generated direct economic benefits for companies. In practice, the adoption of carbon accounting often requires additional costs, such as expenses related to emission measurement, carbon reporting, investment in environmentally friendly technologies, and adjustments to operational processes. These findings can be explained through Trade-Off Theory, which suggests that companies face a trade-off between costs and benefits in every strategic decision. In the context of carbon accounting, benefits such as enhanced reputation and long-term sustainability must be balanced against substantial implementation costs. When these costs outweigh the benefits received in the short term, corporate profitability tends to decline. Therefore, this finding reflects the reality that the implementation of carbon accounting still imposes greater cost burdens than immediate economic benefits, resulting in a negative impact on profitability. These results are consistent with the studies conducted by Mukti & Bayangkara (2024)on pharmaceutical companies in 2022, which found a significant negative relationship between carbon accounting and profitability. Similarly, Mariyah et al., (2023) examined manufacturing companies in 2021 and also reported a significant negative relationship between carbon accounting and profitability.

Corporate Social Responsibility on Profitability

Based on the hypothesis testing results, Corporate Social Responsibility (CSR) affects corporate profitability, but the direction of the relationship is not consistent with the hypothesis and therefore does not support Stakeholder Theory. An increase in CSR activities and disclosure is instead followed by a decrease in corporate profitability, indicating that CSR has not fully generated direct economic benefits in the short term. This condition can be explained by Trade-Off Theory, which suggests that CSR costs are immediate and tangible, while economic benefits such as reputation and stakeholder loyalty are long-term. As a result, during the research period, CSR costs tend to outweigh the benefits and exert downward pressure on corporate profitability. These findings are consistent with the study conducted by Zulaeha et

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al., (2025)on energy sector companies during the 2019–2023 period, which found a significant negative relationship between Corporate Social Responsibility (CSR) and profitability. Similarly, Trida et al., (2021), in their study of manufacturing sector companies for the 2015–2019 period, also reported a significant negative relationship between Corporate Social Responsibility (CSR) and profitability.

Corporate Social Responsibility does not strengthen the effect of Environmental Cost on Profitability

The results of hypothesis testing indicate that Corporate Social Responsibility (CSR) does not strengthen the relationship between Environmental Cost and profitability; therefore, the hypothesis is rejected. This finding suggests that environmental expenditures have not been able to enhance profitability even when accompanied by CSR activities. This condition can be explained by the implementation of CSR in the property and real estate sector, which is generally social and philanthropic in nature and does not focus on environmental management, resulting in a weak connection with Environmental Cost. In addition, CSR and environmental costs are often perceived as compliance obligations rather than integrated business strategies, causing them to operate separately without clear synergy. From a stakeholder perspective, CSR that is not oriented toward environmental issues is also less effective in building positive perceptions of a company's environmental performance. Consequently, CSR has not been able to enhance the effectiveness of Environmental Cost in creating economic value as reflected in corporate profitability. This finding is consistent with the study conducted by Aurelia et al., (2022) on mining sector companies during the 2018–2020 period, which found that Environmental Cost has a negative effect on profitability. Furthermore, the research conducted by Alim & Puji (2021) on energy sector companies during 2019–2023 and manufacturing companies in the CGI sub-sector during 2016–2020 found that Corporate Social Responsibility does not have a significant effect on profitability.

Corporate Social Responsibility strengthen the effect of Carbon Accounting on Profitability

The results of hypothesis testing indicate that Corporate Social Responsibility (CSR) is able to strengthen the effect of Carbon Accounting on profitability. This finding suggests that the implementation of carbon accounting has a more positive impact on financial performance when supported by effective CSR implementation and disclosure, positioning it as part of the company's business strategy. Companies that integrate carbon accounting into CSR programs tend to gain greater stakeholder trust through transparent carbon emission disclosure. From a stakeholder theory perspective, this condition creates positive perceptions of corporate governance and environmental risk management, which ultimately enhances corporate reputation, access to funding, and profitability. Based on the results of the hypothesis testing, Corporate Social Responsibility (CSR) can strengthen the influence of Carbon Accounting on profitability. This finding indicates that the implementation of carbon accounting will have a more positive impact on financial performance if supported by proper CSR implementation and disclosure. With CSR, a company's efforts to manage and report carbon emissions are seen not only as an environmental obligation but also as part of a valuable business strategy for the company. Practically speaking, companies that integrate carbon accounting into their CSR

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programs tend to gain greater trust from stakeholders, including investors, creditors, and the public. Transparent disclosure of carbon emissions through sustainability reports strengthens a company's image as a responsible and sustainability-oriented entity. This trust has the potential to enhance a company's reputation, expand access to funding, and maintain customer loyalty, ultimately positively impacting profitability. From a Stakeholder Theory perspective, transparent disclosure of carbon emissions through sustainability reports provides crucial information for stakeholders in assessing a company's performance and risks. Companies that actively integrate carbon accounting into their CSR programs are perceived as having good governance and more manageable environmental risks. This positive perception drives increased investor interest, facilitates easier access to funding, and improves relationships with the government and the community, ultimately leading to increased company profitability. This finding is consistent with the study conducted by Puspa & Fransisca (2024) on Bank Sumsel Babel during the 2019–2023 period, which found a significant positive relationship between carbon accounting and profitability.This result is also in line with the research conducted by Dewi & Wiyono (2023) on consumer goods industry companies during the 2018–2021 period, which found that Corporate Social Responsibility has a positive effect on profitability

CONCLUSIONS

Based on the findings, this study concludes that environmental costs do not significantly influence profitability in the property and real estate sector, indicating that such expenditures are primarily positioned as compliance costs rather than profit-generating investments. In contrast, carbon accounting and Corporate Social Responsibility (CSR) have significant positive effects on profitability, suggesting that effective environmental management and stakeholder-oriented strategies contribute to improved financial performance. Furthermore, CSR does not moderate the relationship between environmental costs and profitability, as CSR activities are not necessarily aligned with environmental cost management. However, CSR strengthens the effect of carbon accounting on profitability, indicating that the integration of environmental transparency and social responsibility enhances stakeholder trust and reinforces carbon management as a strategic business value.

SUGGESTION

1. Future researchers are encouraged to consider additional variables, such as environmental performance and green accounting. Moreover, other moderating variables, including firm size, good corporate governance, and leverage, may be incorporated to provide a more comprehensive analysis.
2. Future studies may compare the property and real estate sector with other sectors, such as energy, manufacturing, and industrial sectors, to examine whether the effects of the variables on profitability differ across industries, either positively or negatively.
3. Future research is recommended to employ a longer observation period in order to obtain more accurate and in-depth results that better reflect sustainable and long-term corporate conditions.

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4. This study recommends that environmental costs and carbon accounting be positioned as integral components of operational strategy and long-term investment, particularly through building energy efficiency initiatives, green building development, and the management of operational emissions. This approach not only supports regulatory compliance but also has the potential to enhance asset attractiveness, reduce future cost risks, and strengthen investor confidence. Accordingly, effective environmental reporting can serve as a strategic instrument in enhancing sustainability and competitiveness for property companies in Indonesia.

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