The Role of CSR and ISO 14001 in Enhancing Environmental Performance: The Mediating Effect of Environmental Accounting

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Abstract:

When a company seeks to implement ISO 14001, it is committed to continuously improving its environmental performance. International standard certification of the ISO 14001 Environmental Management System and carrying out social responsibility where CSR conceptualises the triple bottom where the purpose of establishing a business is not solely to seek profit (profit), but also to participate in the welfare of society (people), to ensure survival (planet) so that CSR is expected to affect investors' views on the value or success rate of the company. This study aims to determine the effect of CSR, ISO 14001, and Environmental Accounting on the environmental performance of mining companies. This research design uses an explanatory quantitative type.

Keywords*: Corporate Social Responsibility, ISO 14001, Environmental Accounting, Environmental Performance.*

1. Introduction

In recent years, social and environmental issues have become a significant concern globally, sparking extensive discussions and debates, particularly in the business world. Among the most pressing environmental challenges are air pollution, global warming, ozone depletion, and the over-exploitation of natural resources, all of which have garnered widespread attention from governments, organizations, and the international community (Wahyuni et al., 2019). The impact of business operations on the environment is undeniable, with both positive and negative consequences. On the one hand, businesses can create job opportunities for local communities, but on the other hand, they can contribute to environmental degradation, including air, water, and soil pollution, noise, and flooding (Arthur et al., 2017).

The mining industry, for example, is particularly notorious for its environmental impact, as it involves the extraction and exploitation of natural resources, often leading to waste, pollution, and ecological damage. The larger the company's operations, the more significant the environmental consequences (Sen et al., 2011). As a result, there is growing pressure for companies to address the environmental impacts of their activities, particularly through initiatives such as Corporate Social Responsibility (CSR), which has evolved from a moral obligation into a business imperative. CSR, by encouraging companies to adopt responsible environmental and

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social practices, aims to mitigate the negative effects of industrial operations and foster sustainability (Susanto & Rina, 2018).

A key mechanism in managing environmental impact is the implementation of environmental management systems, such as ISO 14001, which provide guidelines for businesses to minimize their ecological footprint while balancing economic growth with environmental preservation (Aprilasani et al., 2017). ISO 14001 enables organizations to develop systematic approaches to environmental management, ensuring compliance with regulations and continuous improvement in environmental performance. However, despite the importance of such systems, their impact on broader environmental outcomes often remains underexplored, highlighting a gap in the current research that links CSR, ISO 14001, and environmental performance (Derchi et al., 2013).

In parallel, environmental accounting is gaining increasing attention as a tool to measure and disclose the environmental costs incurred by organizations (Aniela, 2012). While voluntary environmental disclosures are currently common, the lack of mandatory environmental accounting frameworks may limit the effectiveness of these practices in driving tangible environmental improvements (Suyudi, 2013). In Indonesia, the government has been actively promoting green industry practices, encouraging companies to adopt environmental accounting and awarding certifications to those excelling in green initiatives (Angelina & Nursasi, 2021). However, despite these efforts, the full potential of environmental accounting in enhancing environmental performance remains untapped.

Given this context, the purpose of this study is to examine how CSR, ISO 14001, and environmental accounting interrelate and contribute to environmental performance, with a particular focus on the mining sector in Central Halmahera Regency, North Maluku. This area is home to several large mining companies, which pose significant environmental risks, including pollution and flooding (Lako, 2017). By analyzing the interplay of CSR, environmental accounting, and ISO 14001 in these companies, this study seeks to fill the gap in the literature regarding their combined effect on environmental sustainability.

The novelty of this research lies in its integrated approach, focusing on the roles of both CSR and ISO 14001 as drivers of environmental accounting and performance, particularly in Indonesia's mining sector, where the impact of such practices has yet to be comprehensively studied. This research aims to contribute valuable insights into how businesses can better align their operations with environmental sustainability goals, offering practical recommendations for improving corporate environmental performance and informing future policy on environmental regulations and corporate governance.

2. Theoretical Background

Legitimacy Theory
Legitimacy theory, according to Ghozali (2011), is a counter-social theory between businesses and the societies in which they operate and use resources from the economy. This theory can help in explaining why companies should participate in reporting their performance to the company and motivate them to do so. Companies must disclose their environmental policies to comply with laws and regulations (Putri and Wahyuningrum 2021).

Legitimacy theory discusses how businesses can uphold their legal right to live in a society that recognises their operating needs as long as they are in line with societal values. According to legitimacy theory, companies that perform poorly in terms of the environment actually disclose more information than other companies. An organisation's legitimacy becomes a tactical asset that is critical to its survival. To obtain the resources it needs, the company must interact with its environment (Chelli, et al 2014).

The application of legitimacy is very balanced with the application of environmental accounting and CSR to society and companies that are closely related to the good environment around them, the implementation of programs that are in accordance with community expectations will build a good corporate image and have a relationship with corporate profitability in the implementation of environmental accounting. The practice of social responsibility and social disclosure by institutions and businesses is seen as an effort to fulfil the expectations of the public and society from institutions and businesses. Corporate agencies that consistently try to align themselves with community norms will be accepted by other communities and will be able to continue to carry out their business activities (Sen, et al 2011).

Based on the description above, it can be concluded that the application of legitimacy theory is based on the social contract between the company and society, where the company seeks legitimacy from society by accepting responsibility for environmental problems caused by the company's business activities.

CSR (Corporate Social Responsibility)
Corporate social responsibility disclosure, which is often also referred to as social disclosure, corporate social reporting, social accounting or corporate social responsibility (CSR), is the process of communicating the social and environmental impacts of the company's economic activities on special interest groups and on society as a whole. The concept of corporate social responsibility (CSR) has been around for a long time. In the early 1980s, the first wave of multinational companies actively pursued social cohesion and environmental protection in addition to maximising profits (Ranängen, et al 2014).

CSR relies heavily on a company's commitment and ethical norms to consider the surrounding social conditions. When companies decide to disclose social information,

they will consider costs and benefits. If the benefits of disclosing information outweigh the costs of doing so, the company will voluntarily disclose the information. Although voluntary, environmental information reporting becomes important when it is found that corporate environmental disclosure can generate benefits (Fitriyah and Saidah, 2022).

ISO 14001 Qualification Standard

ISO 14001 is an environmental management system standard with the foundation of how companies or organisations can continue to develop along with an awareness of maintaining the balance of nature and being responsible for environmental impacts. This standard specifies requirements for an organisation's environmental management system that can be used by companies to improve their environmental performance. This standard is intended to be used by companies in an effort to manage environmental responsibilities in a systematic way that contributes to the environmental pillar of sustainable development (Aprilasani, et al 2017).

The International Organisation for Standardisation (ISO) released the ISO 14001 Environmental Management System (ISO 14001 SML) in 1996 in Geneva, Switzerland. This system is considered to assist in the development of an integrated mechanism for the implementation of daily production activities of irrational improvement of environmental performance. This standard assists companies in achieving the expected results of their environmental management systems that benefit the corporate environment and interested parties. The following are the expected results of implementing an environmental management system (ISO 14001) that is consistent with the company's environmental policy.

a. Improve environmental performance
b. Fulfil compliance obligations;
c. Achieve environmental goals.
d. Improve performance measures
e. Enhance ISO programme
f. Implement an exercise programme
g. Carry out internal audits

The principles of the environmental management system in ISO 14001 which are based on the plan do check action (PDCA) principle include:

1. Environmental Policy
   In the process of implementing an environmental management system, companies or organisations are required to make policies that are documented and can be communicated to related parties as a whole, not to mention the surrounding community. This policy must include the company's or organisation's commitment to make continuous improvements to prevent pollution risks and comply with regulations and create a framework for realising goals and objectives.

2. Planning
   In the planning principle, the company will conduct identification that includes identification of environmental aspects of the company or organisation's activities, identification and access to regulatory requirements, setting goals and objectives documentation and consistent in implementing policies, making programs to

achieve the goals and objectives that have been determined including determining who will be responsible during the period.

3. Inspection and corrective action

   In ISO it is known as corrective action or corrective action as well as in this fourth principle which refers to regular procedures for monitoring and measuring the main characteristics of activities and operations including procedures for handling non-conforming situations, specific record maintenance procedures and environmental management system performance audit procedures.

4. Management Review

   When the company adopts ISO 14001, the company must also be ready to commit to periodic assessment and review of the implementation of this system whether the management of environmental impacts is appropriate, is it effective enough to deal with the risks and changes that occur.

Environmental Performance

Environmental performance is the company's effort to create a good or green environment. PROPER (Corporate Performance Rating Program in Environmental Management) can be used to assess environmental performance, and the results are represented by colours: gold, green, blue, red and black. Companies with a gold rating in Environmental Performance demonstrate Environmental Excellence (Kinansih, 2021).

Environmental performance is one of the important measurements in supporting the success of the company. Environmental performance is also a form of corporate social obligation to external parties and must be part of company policy (Derchi, et al 2013).

Environmental Accounting

The concept of environmental accounting emerged since the 1970s in European countries. One of. the hopes with the emergence of environmental accounting is to increase the efficiency of environmental management by assessing the performance of the company's environmental activities. The emergence of environmental accounting is one of the goals to be achieved is to improve the efficiency of environmental management by evaluating the company's environmental activities. According to Bell and Lehman (1999) that environmental accounting includes elements of identifying, measuring, evaluating, and disclosing costs related to the company's environmental operations.

3. Methodology

This research design uses an explanatory quantitative type. Explanatory quantitative research is research that aims to explain the relationship between one variable and another to test a hypothesis. Meanwhile, this type of research uses survey techniques. The survey technique aims to determine the conformity between events and actual conditions in the field (Sekaran and Bougie, 2016).

Population and Sample

The population in this study were mining employees in the Central Halmahera district of North Maluku province totalling 110 employees.

Through ESDM (Ministry of Energy Resources Minerals) geoportal data on Mining companies registered as having IUP (Mining Business License) in North Maluku Province as many as 14 companies.

Data obtained from the distribution of questionnaires. The sampling technique uses purposive sampling which is a non probability sampling method. According to Sugiono (2015), 'Purposive sampling is a sampling technique with certain considerations, including:

1) Respondents are employees who are still actively working in mining companies until this research.
2) Respondents are mining employees with at least a high school and undergraduate education.
3) Respondents are mining employees working for at least less than 2 years and understand the implementation mechanism of CSR and ISO 14001 on environmental performance with Enviromental Accounting.

The total population of mining employees is 8000 in geoportal data. However, researchers used 1 mining company with the largest population of 4500 mining employees, namely Pt Iwip Wedabay Nikel as many as 2000 employees.

In this study, the sample size was determined using the Slovin formula, following the Slovin formula:

$$1. \qquad n = \frac{N}{1 + N(e)^2 n}$$

Data Analysis Technique

Descriptive statistics aim to describe the data profile of the research sample. Descriptive statistics will contain data regarding the minimum, maximum, mean, and standard deviation related to the research. Researchers used the Smart PLS SEM 3.0 programme in carrying out the calculations (Ghazali, 2011).

Hypothesis Testing

Hypothesis testing aims to determine the direction of the relationship that occurs in the independent variable with the dependent variable. This test uses a path test on the model that has been made (Ghazali, 2006). The equation formation in basic structural measurement according to (Schumaker and Lomax, 2010), as follows:

$$Yi = \beta Xi + \varepsilon i$$

Description:

Yi = Endogenous variable value in the i-th sample

β = Regression coefficient between exogenous and endogenous variables

Xi = Value of exogenous variable in the i-th sample

εi = Estimation error.

4. Empirical Findings/Result

Mining in the Halmahera district of North Maluku province is an area where there is a distribution of mineral and/or coal-bearing rock formations, and/or mineral reserve data as a mining area. Mining in the Halmahera region consists of 14 mining companies that have Mining Business Licences (IUP), one of which is Indonesia Weda Bay Industrial Park (IWIP), as a large mining company and has more employees than other mining companies.

The existence of mining companies in Halmahera Regency, North Maluku Province, benefits every employee because it is easy to find work. As a result, mining companies play an important role in the daily lives of the local population. Environmental pollution, such as pollution, flooding and environmental damage, however, also present negative opportunities for the surrounding communities.

Descriptive Statistical Test
Descriptive statistics aim to see an overview of the research data in order to provide information about the research variables in general including: CSR, ISO 14001 Environmental Accounting this analysis includes mean, maximal, minimum, standard deviation kurtosis, skewness and others. The following is a descriptive statistical analysis based on the data obtained.

The hypothesis in this study was tested using the Partial Least Square (PLS) method. Partial Leasts Square (PLS) testing is a testing method with variance-based Structural Equation Modeling (SEM). This study uses the Smart-PLS 3.0 test tool which is specifically designed to estimate structural equations on a variance basis. There are 2 methods used in this study, namely the outer model and the inner model. Outer model is used to test validity and reliability. The validity test used is AVE and discriminant validity, while the reliability test uses Cronbach alpha and composite reliabilities. For testing the inner model using the R Square test and hypothesis testing.

The figure shows that the construct of CSR variables is measured using 4 indicators, namely X1.1, X1.2, X1.3, X1.4, ISO 14001 variables are measured by 4 indicators, namely X2.1, X2.2, X2.3 For the construct of environmental performance variables measured using 4 indicators, namely Y1.1, Y1.2, Y1.3, Y1. 4, Environmental accounting variables are measured by 5 indicators, namely M1.1, M1.2, M1.3, M1.4, M1.5 The direction of the arrow between the indicator and the latent construct towards the indicator indicates that this study uses reflective indicators that are suitable for measuring environmental performance. The relationship under study (hypothesis) is denoted by arrows connected between constructs.

Validity Test
Convergent Validity
The corvengent validity value is the loading factor value on the latent variable with its indicators. The standard used in corvengent validity is> 0.7 for the outer loading value and> 0.5 for the AVE value.

Table 1. Outer Loadings

	CSR	Environmental Accounting	ISO 14001	Environmental Performance
M1.1		0,888		
M1.2		0,887		
M1.3		0,863		
M1.4		0,892		
M1.5		0,811		
X1.1	0,876			
X1.2	0,878			
X1.3	0,907			
X1.4	0,764			
X2.1			0,849	
X2.2			0,897	
X2.3			0,904	
Y1.1				0,843
Y1.2				0,883
Y1.3				0,753
Y1.4				0,729

Table 2. Average Variance Extracted (AVE)

	Average Variance Extracted (AVE)
CSR	0,736
Environmental Accounting	0,755
ISO 14001	0,780
Environmental Performance	0,647

The table above shows the outer loading test value> 0.7 and the AVE value> 0.5 For the Average Variance Extracted (AVE) value of each construct is the first construct CSR 0.736 (>0.5). ISO 14001 0.780 (>0.5). Environmental performance 0.647 (>0.5) and Environmental accounting 0.755 (>0.5). Based on the test results, it shows that the value of AVE on each construct has a value of more than 0.5. This shows the meaning that the value of AVE is declared valid.

Reliability Test
In this study, the construct reliability test was measured based on two criteria, namely. Cronbach's alpha and composite reliability of the indicator block that measures the construct.

Table 3. Cronbach's alpha

	Cronbach's Alpha
CSR	0,879
Environmental Accounting	0,918

ISO 14001	**0,859**
Environmental Performance	**0,816**

The table above shows the value of each Cronbach's alpha construct is more than 0.6. CSR value 0.879 (> 0.6), ISO 14001 0.859 (> 0.6), Environmental performance 0.871 (> 0.6); and Environmental accounting 0.918 (>0.6). From the Cronbach's alpha value above, it shows that the data in this study are reliable in terms of the Cronbach's alpha of each construct of more than 0.6.

Table 4. Composite reliability

	Composite Reliability
CSR	**0,917**
Environmental Accounting	**0,939**
ISO 14001	**0,914**
Environmental Performance	**0,879**

The table above shows the value of composite reliability on each construct with a value of more than 0.8. the value of CSR 0.917 (>0.7). ISO 14001 0.914 (>0.7), environmental performance 0.879 (>0.7), and environmental accounting 0.879 (>0.7). Environmental performance 0.879 (>0.7), and environmental accounting 0.939 (>0.7). The composite reliability value above can show that the data in this study have a value of more than 0.8 for each construct and it can be concluded that the data in this study are reliable in terms of composite reliability.

Inner Model
R-Square
Evaluation of the inner model or structural model in PLS is assessed using the R-Square table. The following are the results of the R-Square test table in this study:

Table 7. R Square

	R Square
Environmental Accounting	0,733
Environmental Performance	0,728

Hypothesis Testing
Hypothesis testing pays attention to 3 points in the structural test with bootstrapping including the original sample, t-statistic and p-values. Each point has a different function, including: the original sample is used to determine the effect of the direction of the relationship between constructs, the t-statistic is used to measure the level of significance in the hypothesis, and the last is p-values which is used to measure the level of significance of the hypothesis at different levels of significance. T-statistics and p-values are jointly used to determine the level of significance between variables, in other words, if the t-statistic exceeds the t-table, the p-value will automatically be significant, but at a certain level. The inner model or structural model in this study can be seen in the table below:

Table 8. Hypothesis Test Result

	Original Sample (O)	T Statistics (|O/STDEV|)	P Values
CSR -> Environmental Accounting	0,37	2,16	**0,03**
CSR -> Environmental Performance	0,76	6,36	**0,00**
Environmental Accounting -> Environmental Performance	-0,20	1,74	**0,08**
ISO 14001 -> Environmental Accounting	0,53	3,27	**0,00**
ISO 14001 -> Environmental Performance	0,29	2,17	**0,03**

The results of the hypothesis testing show that CSR has a significant impact on environmental accounting, with a beta coefficient of 0.37, a t-statistic of 2.16 (>1.960 at the 5% level), and a p-value of 0.03 (<0.05), confirming that the first hypothesis is accepted. Similarly, CSR also influences environmental performance, with a beta coefficient of 0.76, a t-statistic of 6.36 (>1.960 at the 5% level), and a p-value of 0.000 (<0.05), leading to the acceptance of the second hypothesis. However, environmental accounting does not significantly affect environmental performance, as the beta coefficient is -0.20, the t-statistic is 1.74 (<1.960), and the p-value is 0.08 (>0.05), meaning the third hypothesis is rejected. Furthermore, ISO 14001 was found to have a positive impact on environmental accounting, with a beta coefficient of 0.53, a t-statistic of 3.27 (>1.960), and a p-value of 0.00 (<0.05), supporting the acceptance of the fourth hypothesis. Finally, ISO 14001 also significantly influences environmental performance, with a beta coefficient of 0.29, a t-statistic of 2.17 (>1.960), and a p-value of 0.03 (<0.05), leading to the acceptance of the fifth hypothesis.

5. Discussion

The first hypothesis posits that **Corporate Social Responsibility (CSR)** has a positive effect on **environmental accounting**. The results of the analysis reveal that CSR significantly influences environmental accounting, with a beta coefficient of 0.37, a t-statistic value of 2.16 (greater than the critical value of 1.960 at the 5% significance level), and a p-value of 0.03 (which is less than the 0.05 threshold). This suggests that CSR implementation is crucial in enhancing environmental accounting practices within companies. More specifically, firms that engage in CSR and report these activities in their **Sustainability Reports** demonstrate a stronger commitment to environmental responsibility. Such companies are better positioned to manage and preserve environmental benefits in line with government regulations. The act of CSR disclosure, particularly focusing on the economic, environmental, and social aspects, not only garners public sympathy but also strengthens their financial performance (Angelina & Nursasi, 2021). These findings are consistent with **Institutional Legitimacy Theory**, which posits that firms engage in CSR to meet societal expectations and ensure legitimacy (Chelli, Durocher, & Richard, 2014).

The relationship between CSR and environmental accounting is also supported by earlier research by **Derchi, Burkert, and Oyon (2013)**, who emphasized the

importance of environmental management accounting systems in improving sustainability and corporate transparency. Similarly, studies by **Wahyuni, Meutia, and Syamsurijal (2019)** indicate that companies in Indonesia, particularly in the mining and energy sectors, have reported improved environmental performance when adopting green accounting principles. This further reinforces the idea that CSR practices, particularly through the lens of **green accounting**, can positively affect both environmental and financial outcomes.

Moreover, the implementation of **ISO 14001** certification, as discussed by **Aprilasani, Said, and Munandar (2017)**, contributes to environmental improvements by establishing a standardized approach for managing environmental impacts. This supports the notion that **environmental performance**—fueled by CSR—also positively correlates with a company's overall performance, as highlighted in earlier works by **Susanto and Rina (2018)**, who explored CSR's impact on the environmental performance of Indonesian companies.

Additionally, companies that disclose CSR activities tend to attract more attention from stakeholders, which ultimately contributes to improved **financial performance**. As argued by **Arthur et al. (2017)**, the transparency of performance indicators in sustainability reports helps in shaping stakeholder perceptions, thus increasing trust and financial gains. This finding is also echoed by **Sen, Mukherjee, and Pattanayak (2011)**, who noted that corporate environmental disclosure practices enhance the company's reputation and facilitate positive financial outcomes in India.

Furthermore, the **institutional legitimacy** provided by CSR is particularly crucial in maintaining a firm's standing in the eyes of its stakeholders, especially in sectors where environmental impact is a key concern, such as the **mining industry**. The findings by **Ranängen, Zobel, and Bergström (2014)** on the implementation of CSR through ISO 26000 in the mining industry underscore the importance of aligning environmental and social goals with corporate strategies.

These results also highlight the importance of **environmental accounting** as a strategic tool for sustainability. **Ghazali (2006)** and **Ghazali (2011)** highlight the significance of accounting systems in interpreting the environmental impacts of business activities and ensuring these impacts are appropriately reported. **Suyudi (2013)** adds to this by introducing the concept of the **quadrangle bottom line (QBL)**, which integrates economic, environmental, social, and governance factors in evaluating business performance.

In conclusion, the results of this study confirm that CSR and environmental accounting are positively interrelated, with CSR not only enhancing environmental performance but also improving financial outcomes. The findings also align with the theoretical perspectives of **Institutional Legitimacy Theory** and **Stakeholder Theory**, further emphasizing the role of CSR in meeting societal expectations and ensuring organizational legitimacy.

6. Conclusions

Based on the research and discussion, several key conclusions can be drawn. First, CSR has a significant effect on environmental accounting, highlighting the importance of corporate responsibility in shaping environmental management practices. Second, CSR is also found to positively influence environmental performance, suggesting that companies engaged in CSR activities tend to perform better in terms of environmental sustainability. However, environmental accounting does not appear to have a direct effect on environmental performance, indicating that while accounting practices are important, they may not be sufficient on their own to drive improvements in environmental outcomes. Fourth, the implementation of ISO 14001 significantly impacts environmental accounting, underscoring the role of standardized environmental management systems in enhancing corporate environmental practices. Finally, ISO 14001 also affects environmental performance, further emphasizing the importance of certifications and structured environmental management frameworks in improving organizational sustainability.

For future research, it is recommended to explore the potential moderating or mediating effects of other factors, such as organizational culture, leadership commitment, or industry-specific variables, on the relationship between CSR, environmental accounting, and environmental performance. Additionally, future studies could investigate the long-term impacts of CSR and ISO 14001 on both financial and environmental outcomes, as well as the role of government policies and regulations in shaping these relationships.

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