The Role of Green Accounting and Social Disclosure as an Effort to Improve Environmental Performance with ISO 14001 Qualification Standards as Mediation Variables: Study of Mining Companies in Halmahera Regency, North Maluku Province

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ABSTRACT

Halmahera Regency, which is in North Maluku Province, currently has a large mining company that can cause environmental pollution. If this happens continuously, the surrounding environment will likely become unhealthy, due to pollution and easy flooding. So that the local government needs to pay attention not to let the condition of this area not be controlled, especially from an environmental safety point of view. This study aims to 1) To examine the effect of green accounting on the environmental performance of mining companies: 2) examine the effect of social disclosure on the environmental performance of mining companies; 3) test the ISO 14001 qualification standard on the environmental performance of mining companies; 4) To test green accounting for environmental performance mediated by ISO 14001 qualification standard variables; 5) To test social disclosure on environmental performance is mediated by ISO 14001 qualification standard variables. This research design uses an explanative quantitative type. The hypothesis in this study was tested using the Partial Least Square (PLS) method. Partial Least Square (PLS) testing is a test method with variance-based Structural Equation Modeling (SEM). This study uses the Smart-PLS 4.0 test tool specifically designed to estimate structural equations based on variance. The results of this study indicate that green accounting has no effect on environmental performance but can be mediated by ISO 14001 qualification standards. In addition, social disclosure affects environmental performance and can be mediated by ISO 14001 qualification standard.

Keywords: SmartPLS SEM, Mining environmental performance, ISO 400, Social Disclosure, Green accounting

INTRODUCTION

Until now, social and environmental issues have become a public concern. This issue has been widely discussed throughout the world and has become a topic in the business world. Over the last few decades, various environmental problems such as air pollution, global warming, depletion of the ozone layer, water pollution, and overexploitation of nature have become the attention of the nation and the international community. (Wahyuni, dkk, 2019). The existence of a company will be very closely related to the surrounding environment. The company's operational activities have positive and negative consequences. Judging from the positive impact, it can be in the form of job opportunities for the surrounding community. Meanwhile, negative impacts can be in the form of environmental pollution (air, water, noise, soil, and flooding) as well as environmental damage (Arthur *et al.*, 2017).

Mining companies, for example, cause environmental pollution and environmental damage such as waste, flooding, and pollution. Mining companies are one of the businesses that have a big impact on the environment and the sustainability of the surrounding environment because mining companies are companies that directly explore and exploit natural resources which cause environmental damage that affects people's lives, where the larger the scale of the company's activities, the greater also the impact on the environment (Sen, et.al 2011).

Therefore, to assess the environmental impact of company policies, Green accounting is needed because it is seen as an important tool to gain an understanding of the company's role in the economy towards environmental safety and community welfare. Green accounting is green accounting that has a modern accounting concept to support the green movement in business by recognizing, measuring, and covering environmental contributions to business enterprises. Green accounting also provides data, highlighting the contribution of business enterprises to economic well-being, costs incurred in the form of pollution or degradation of resources, and contributions to society. (Maama and Appiah, 2019).

Environmental management as a form of corporate concern is now an important discussion. Especially for companies engaged in the mining sector. Companies involved in the processing of nickel commodities must be able to create sustainable concepts that are integrated, comprehensive, and efficient as well as environmentally friendly industries. The goal of green accounting is to reduce environmental impact costs or social costs so that the business does not need to incur these costs if they have been anticipated at the start of production (Faizah, 2020).

In Indonesia, the government has also encouraged the industry to use green accounting by implementing green industry practices. One of the government's initiatives is to give awards to companies that practice the green industry. Unfortunately, the use of green accounting in Indonesia is still lacking, this could be due to weak legal sanctions related to the application of green accounting, even though the application of green accounting which is included in environmental information will result in good environmental performance. Research from (Zulhaimi, 2015) shows that there are still few companies that apply green accounting in their environmental performance. Research result (Khoirina, 2016) and (Khoiruman, Haryanto 2017) explains that disclosure of environmental costs to management has a positive effect on environmental performance. Similar research results were also found regarding the application of green accounting to improve environmental performance (Hendratno, 2016).

In addition to green accounting, there is also social disclosure or social disclosure. The difference between green accounting and social disclosure is from the aspect of strategy

because social disclosure can develop strategies that will ensure long-term performance such as education, health, economics, and social environment and can reduce the risk of negative impacts on the social environment of society, companies need to carry out responsible activities in the corporate environment because the problems that are very concerned by investors and more importantly the government are environmental problems. Increasing public awareness about social and environmental activities has put pressure on businesses to communicate environmental information and meet several requirements set by stakeholders. As a result, corporate social and environmental reporting policies have become an important issue for companies wishing to build and strengthen their legitimacy in dealings with various stakeholders, including, employees, organizations, social communities, and the environment. (Khlif, et.al. 2015).

Environmental performance is the result of work in quality and quantity by the company as a performance related to the environment, especially related to environmental impacts. Environmental performance can be seen through the measurement results of the environmental management system, which is related to the control of environmental aspects (Angelina and Nursasi, 2021). If the environmental performance is good then it can support the company's development and operations using having an overall environmental management system.

This environmental management system is like the ISO 14001 qualification standard, which is an environmental management system standard with the basis of how a company or organization can continue to develop along with awareness to maintain natural balance and be responsible for environmental impacts. ISO 14001 aims to provide organizations with a framework for protecting the environment and responsiveness to changing environmental conditions in balancing socio-economic needs. This International Standard specifies the requirements that will enable an organization to achieve the desired results it has established for its environmental management system. Company benefits that can be obtained from ISO 14001 include improving overall environmental performance, producing a framework in efforts to prevent pollution, increasing efficiency and potential cost savings, and enhancing corporate image. (Aprilasani, et.al 2017).

Halmahera Regency, for example, which is in North Maluku Province, currently has a large mining company that can cause environmental pollution. If this happens continuously, the surrounding environment will likely become unhealthy, due to pollution and easy flooding (Lako, 2017). So that the local government needs to pay attention not to let the condition of this area not be controlled, especially from an environmental safety point of view.

METHODS

This research was conducted at mining companies in Halmahera Regency, North Maluku Province, which worked for at least less or more than 2 years until now and have a minimum education of Senior High School & Bachelor and can understand the mechanisms for implementing green accounting & social disclosure on environmental performance with standards ISO 14001 qualification. Held in December 2022-January 2023. The type of data used is primary data, or data that has been processed by researchers so that it is used in this study comes from statements (questionnaires) through the online media google form which

are given to respondents who work as mine employees. This study uses the Smart-PLS 4.0 test tool specifically designed to estimate structural equations based on variance.

Figure 1. Mining research location map
Source: Map of Indonesia, Weda, Lelilef Village, North Maluku Province

This research design uses an explanative quantitative type. Explanative quantitative research is research that aims to explain the relationship of a variable with other variables to test a hypothesis. Meanwhile, this type of research uses survey techniques.

Population and Sample

Sugiyono in his book, explains that the population is a generalization area consisting of objects/subjects that have certain qualities and characteristics then applied by researchers to be studied and conclusions drawn. The research target is the population, which can be a family or a collection of objects. Thus, the research population is the totality of research objects, which can include people, animals, symptoms, values, events, attitudes, and so on. These objects can be used as a source of research data. All information that is relevant to us during the time and space we choose is considered a population (Limbong, 2019).

Through geoportal data ESDM (Ministry of Energy Resources Minerals) there are 14 mining companies registered with IUP (Mining Business Permits) in North Maluku Province, that is:

Table.1 Unit of Analysis

No	North Maluku Mining IUP	Regency	Production	Total Employees
1	Halmahera Sukses Minerals	Haltim/Halteng	Nickel	500
2	Wirabudi Putra Perkasa	Halut	Metallic Minerals/Sand	500
3	Nusa Halmahera Minerals	Halut	Gold	1000
4	Tri Usaha Baru	Halbar	Gold	500
5	Obi Putra Mandiri	Halsel	Nickel	250
6	Makmur Jaya	Haltim	Nickel	250
7	Pasir Besi Akearu	Halut	Iron Metal	250
8	Fajar Bakti Lintas Nusa	Halteng	Nickel	250
9	Gebe Indutry Nikel	Halteng	Nickel	250
10	Wanatiara Persada	Halsel	Nickel	250
11	Aneka Tambang Tbk	Haltim	Nickel	250
12	Nitera	Haltim	Nickel	250
13	HPAL (Halmahera Persada Lygend)	Halsel	Nickel	1500
14	IWIP wedabay nikel	Halteng	Nickel	2000
Total				8000

Source: geoportal.esdm.go.id

Before conducting the number of samples, the authors conducted interviews with employees in the 3 companies. From the results of these interviews, it can be seen that as many as 150 people meet the criteria as mining employees who are still actively working for a minimum of less or more than 2 years, and have high school & bachelor's degree education and can understand the mechanisms for implementing Green accounting and Social disclosure on environmental performance and ISO 14001 Qualification Standards.

In this study, the sample size was determined using the Slovin formula, while the Slovin formula is as follows:

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

n = Sample Size
N = Population Size
e = Standard error 5%

Based on the Slovin formula, the sample size is obtained as follows:

$$n = \frac{150}{1 + 150(0,05)^2}$$

$$n = \frac{150}{1,375} = 110$$

By using the Slovin formula, 110 respondents were obtained from the number of samples that would be used as respondents in this study.

Variable Operational Definition

Each variable used in the study is described in the operational definition of the variable. Variables according to Sekaran and Bougie (2016) are anything that can differentiate or change values

Table.2 Research instrument grid

Latent Variable	Indicator	Measurement Scale	Instrument
Independent Variable **Green Accounting (Source: Parida 2019)**	1. Material 2. Energy 3. Water 4. Emissions 5. Waste	Likert scale	Questionnaire
Social Disclosure **(Source: mine iwip.co.id)**	1. Educational Performance 2. Health Performance 3. Economic Performance 4. Social and Environmental Performance	Likert scale	Questionnaire
Dependent Variable **Environmental Performance (Source: Parida 2019)**	1. Quality of Life 2. Environmental Burden 3. Biodiversity 4. Environmental Risk	Likert scale	Questionnaire
Mediation/Intervening Variables **ISO 14001 Qualification Standard (Source: King Arthur 2017)**	1. Improve environmental performance 2. Fulfilling structuring obligations 3. Achieve environmental goals	Likert scale	Questionnaire

Data analysis techniques

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. The researcher uses the Smart PLS SEM 4.0 program in carrying out the calculations (Ghazali, 2011).

a. Validity test

The validity test in this study consisted of two types of validity stages, namely convergent validity, and discriminant validity. The convergent validity value is the factor loading value on the latent variable with its indicators. The expected loading factor value is > 0.7 on the Outer Loading value and > 0.5 on the Average Variance Extracted (AVE) value. While the value of discriminant validity is a cross-loading factor whose function is to find out whether the construct has a valid discriminant or not. The way to assess it is by comparing the loading value in the intended construct and it must be greater than the loading value in the other constructs (Ghazali, 2011).

b. Reliability Test

After testing the validity, the next test is reliability. Reliability is a test that aims to measure the internal consistency of measuring instruments. The reliability test is carried out by looking at reflection indicators based on composite reliability data which has a value of > 0.7 so that it can be stated to have high reliability and Cronbach's alpha which is expected to have a value of > 0.6 in all the constructs studied. According to Chin (Ghazali, 2011) related to the value of Cronbach's alpha in PLS it is said to be good if the value of Cronbach's alpha is greater than 0.5 and is said to be sufficient if the value of Cronbach's alpha is greater than 0.3.

c. Evaluation of the structural model (inner model)

Structural model analysis (inner model) in principle is to test the effect of each latent variable with other latent variables both exogenous and endogenous. Structural model test (inner model) can also be said as a way to test the hypothesis of each latent variable with other latent variables (Ghazali, 2011). The equation form of the structural model is as follows:

$$\eta = \eta\beta + \xi\Gamma + \zeta$$

Description:
η = Endogenous latent construct matrix
ξ = Exogenous latent construct matrix
β = Coefficient matrix of endogenous variables
Γ = Coefficient matrix of exogenous variables
ζ = Inner model residual matrix

Evaluation of the inner model can be seen from several indicators, including the coefficient of determination (R^2) for the dependent construct, the Stone-Geisser Test (Q^2) for predictive relevance and significance, and the t-test of the structural path parameter coefficients. The test is done by looking at the percentage of the variant described. The R^2 results will indicate whether the model is in the good, moderate, or weak category. Whereas the dependent latent variable that is modeled is influenced by the independent latent variable by using the stone-geyser Q square test (Q^2) where the Q^2 value > 0 indicates that the model under study has predictive relevance and if the Q^2 value <0 then indicates that the model lacks predictive relevance. Meanwhile, if the quantity Q^2 has a value range of $0 < Q^2 < 1$ where the closer to 1 it means the better. Besides that, you can also see the magnitude of the structural path coefficient (Ghazali, 2011).

d. Hypothesis test

Hypothesis testing aims to find out how 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). Equation formation in basic structural measurements according to tot (Schumaker and Lomax, 2010), as follows:

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

Description:

Yi = Endogenous variable values in the i-th sample

β = Regression coefficient between exogenous and endogenous variables

Xi = Exogenous variable values in the i-th sample

εi = Estimation errors

RESULTS AND DISCUSSION

General Description of The Research Object

Mines in the Halmahera district of North Maluku province are areas where there is a distribution of mineral and/or coal-bearing rock formations, and/or mineral reserve data as mining areas. The mines in the Halmahera region consist of 14 mining companies that have Mining Business Permits (IUP), one of which is Nusa Halmahera Minerals, Halmahera Persada Lygend, and Indonesia Weda Bay Industrial Park, is a large mining company and has a larger number of employees compared to other mining companies.

The existence of a mining company in the Halmahera district of North Maluku province is a positive opportunity for every employee because getting a job is very easy, therefore a mining company is an important aspect of the life of the local community. But some opportunities have a negative impact including environmental pollution, such as pollution, flooding, and environmental damage.

Profile of Respondents

Respondents in this study were employees of the PT Nusa Halmahera Minerals, Pt Halmahera Persada Lygend, and Pt Iwip wedabay nickel mines in the Halmahera district, North Maluku province. Respondents were determined based on a purposive sampling technique with certain criteria. The characteristics of the respondents in this study were classified based on age, gender, last education, and work as employees of a mining company.

Research Result

The hypothesis in this study was tested using the Partial Least Square (PLS) method. Partial Least Square (PLS) testing is a test method with variance-based Structural Equation Modeling (SEM). This study uses the Smart-PLS 4.0 test tool specifically designed to estimate structural equations based on variance. There are 2 methods used in this study, namely the outer model and the inner model. The outer model is used to test the validity and reliability. The validity test used was AVE and discriminant validity, while the reliability test used Cronbach alpha and composite reliability. For testing the inner model using the R Square test and hypothesis testing.
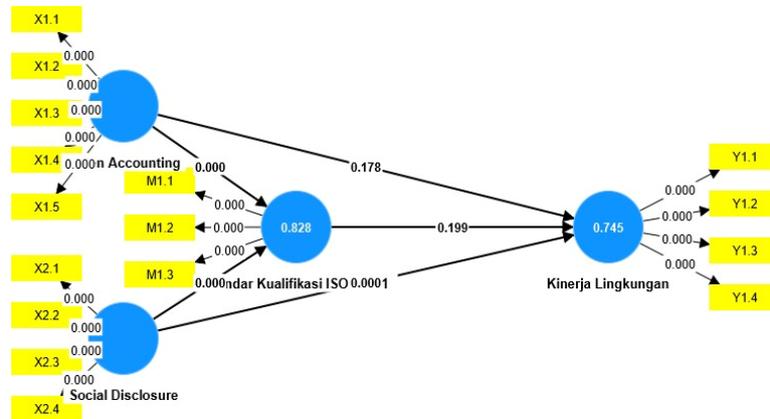
Fig.2 Structural Model
Source: Data Processed SmartPLS 4.0 2023

Figure 2 above shows that the construct of the green accounting variable is measured using 5 indicators namely X1.1, X1.2, X1.3, X1.4, X1.5, the Social Disclosure variable is measured using 4 indicators namely X2.1, X2. 2, X2.3, X.2.4. For the construct variable environmental performance is measured using 4 indicators namely Y1.1, Y1.2, Y1.3, Y1.4, ISO 14001 qualification standard variables are measured using 3 indicators namely M1.1, M1.2, M1.3. The direction of the arrow between the indicator and the latent construct towards the indicator indicates that this study uses appropriate reflective indicators to measure environmental performance. The relationship studied (hypothesis) is denoted by an arrow connected between the constructs.

Validity test

Nilai *corvengent validity* merupakan nilai loading faktor pada variabel laten dengan indikator-indikatornya. Standar yang digunakan pada *corvengent validity* adalah > 0.7 untuk nilai *outer loading* dan > 0.5 untuk nilai AVE .

Table. 3 Outer Loading Test

	Average Variance Extracted (AVE)
Green Accounting	0.759
Social Disclosure	0.786
Environmental Performance	0.725
Qualification Standards ISO 14001	0.832

The table.3 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, the first green

accounting construct is 0.759 (> 0.5). Social Disclosure 0.786 (>0.5). Environmental Performance 0.725 (>0.5) and ISO 14001 Qualification Standard 0.832 (>0.5). Based on the test results, shows that the value of AVE in 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.4 *cronbach,s alpha*

	Cronbach's Alpha
Green Accounting (X1)	0,920
Environmental Performance (Y)	0,871
Social Disclosure (X2)	0,909
Qualification standard ISO 14001 (M)	0,899

The table above shows the value of each Cronbach's alpha construct of more than 0.6. Green accounting value 0.920 (> 0.6), Social disclosure 0.909 (> 0.6), Environmental performance 0.871 (> 0.6); and ISO 14001 qualification standard 0.899 (>0.6). 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 which is more than 0.6.

Inner models

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

Table. 5 Inner models

	R Square
Environmental Performance (Y)	0,745
Qualification standard ISO 14001 (M)	0,828

Based on the table above, it can be seen that the R^2 value of the environmental performance variable is 0.745, which means that 74.5% of the variance of consumer satisfaction can be explained or influenced by independent variables, while the 25.5% variance of consumer satisfaction is explained by other factors. The R^2 value for the ISO 14001 qualification standard variable is 0.828, which means that 82.8% of the variance of

the interest variable can be explained or influenced by independent variables, while 17.2% of the ISO 14001 qualification standard variable is explained by other factors.

Hypothesis testing

Hypothesis testing pays attention to 3 points in the structural test with bootstrapping including the original sample, t-statistics, 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 significance level of the hypothesis, and the last is the p-values which are used to measure the significance level of the hypothesis at the hypothesis level. varying 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, then 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 following table:

Table. 6 the original sample, t-statistics, and p-values

	original samples (O)	T statistics ($|O/STDEV|$)	P values
Green Accounting -> Environmental Performance	-0.158	1.347	0.178
Green Accounting -> ISO 14001 Qualification Standard	0.425	4.422	0.000
Social Disclosure -> Environmental Performance	0.814	6.615	0.000
Social Disclosure -> ISO 14001 Qualification Standard	0.534	5.999	0.000
ISO 14001 Qualification Standard -> Environmental Performance	0.195	1.285	0.199

Source: data processed by SmartPLS SEM 4.0 2023

Based on the original sample table, t-statistics, and p-values above, the test results for each hypothesis are as follows:

Hypothesis 1: The results of testing calculations using SmartPLS 4.0 show that green accounting does not affect environmental performance with a beta coefficient of -0.158, a t-statistic value of 1.347 or <1.960 or at the 5% level, and a p-value of 0.178 or > 0.05. This shows that green accounting has no effect on environmental performance, thus the first hypothesis in this study is "rejected".

Hypothesis 2: The results of testing calculations using SmartPLS 4.0 show that green accounting has an effect on ISO 14001 qualification standards with a beta coefficient value of 0.425, a t-statistic value of 4.422 or > 1.960 or at the 5% level, and a p-value of 0.000 or

<0.05. this shows that green accounting has an effect on ISO 14001 qualification standards thus the second hypothesis in this study is "accepted"

Hypothesis 3: The results of testing calculations using SmartPLS 4.0 show that social disclosure affects environmental performance with a beta coefficient value of 0.814, a t-statistic value of 6.615 or > 1.960 or at the 5% level, and a p-value of 0.000 or <0.05. this shows that social disclosure affects environmental performance thus the third hypothesis in this study is "accepted"

Hypothesis 4: The results of the test calculations using SmartPLS 4.0 show that social disclosure affects the ISO 14001 qualification standards with a beta coefficient value of 0.534, a t-statistic value of 5.999 or > 1.960 or at the 5% level, and a p-value of 0.000 or <0.05. This shows that social disclosure affects the ISO 14001 qualification standards, thus the fourth hypothesis in this study is "accepted".

Hypothesis 5: The results of testing calculations using SmartPLS 4.0 show that the ISO 14001 qualification standard does not affect environmental performance with a beta coefficient value of 0.195, a t-statistic value of 1.285 or <1.960 or at the 5% level, and a p-value of 0.199 or > 0.05. This shows that the ISO 14001 qualification standard has no effect on environmental performance, thus the fourth hypothesis in this study is "rejected"."

CONCLUSION

Based on the results of data analysis, hypothesis testing, and discussion analysis that has been carried out related to the role of green accounting and social disclosure variables as an effort to improve environmental performance with ISO 14001 qualification standards as a mediating variable: studies on mining companies in the Halmahera district of North Maluku province, it can be conclusions are drawn as follows; The results of this study indicate that green accounting does not affect environmental performance, this can be seen through the results of respondents' answers which state that some respondents think that green accounting cannot improve environmental performance. This is because the damage to the green environment is getting out of control in the IWIP Wedabay Nickel mining area, such as the logging/removal of more and more trees and excavation of the land as a result of which floods easily occur and have an impact on environmental pollution of mining companies.

The Green accounting variable has a positive direction with the ISO 14001 qualification standard. This can be seen from the respondents' answers stating that ISO 14001 as a qualification standard can mediate Green accounting so that it can influence and maintain a good environment. With the ISO 14001 qualification standard, benefits such as improving the image of mining companies, and continuous improvement and maintaining company image. The existence of green accounting can have a positive impact, as evidenced by its ability to assist companies in completing business tasks. Green accounting examines how accounting as a unified system can be more friendly to economic and business systems, society, and the environment; The social disclosure variable has a positive direction with environmental performance. This can be seen through the answers of respondents who stated that social disclosure can affect environmental performance. Social disclosure has an important role for mining companies to provide a process of communicating to the community as a whole such as education, health, economics, and social environment to gain

strategic importance; The results of this study indicate that social disclosure affects the ISO 14001 qualification standard. This can be seen from the answers of respondents who stated that ISO 14001 can mediate and influence social disclosure because ISO 14001 is an environmental management system as an organized management approach to preserving the environment. With good environmental performance, it can create a healthy environment to build the company's image in the eyes of stakeholders and realize concern for the environment. So this also has an impact on the company because it must be morally or ethically responsible for actions that improve the standard of living of people or society, that is what is meant by social responsibility. Social responsibility is integrated self-regulation carried out by business companies that can generate long-term entrepreneurship. (Padhi, 2013); Variables ISO 14001 qualification standards cannot mediate and influence environmental performance. This can be seen from the answers of respondents who stated that the ISO 14001 Qualification Standard cannot mediate environmental performance. ISO 14001 is an environmental management system standard with the basis of how a company or organization can continue to develop along with awareness to maintain the balance of nature and be responsible for environmental impacts. ISO 14001 is very well used in NHM and HPAL mining companies. But unable to mediate environmental performance due to weak ISO 14001 qualification standards in mining companies such as IWIP Weda Bay Nickel.

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