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THE EFFECT OF ENVIRONMENTAL MANAGEMENT ACCOUNTING ON CORPORATE SUSTAINABILITY

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Abstract:

The purpose of this research is to look into the impact of Environmental Management Accounting on company sustainability. The sample in this study was taken using a purposive sampling technique. The research sample is a company registered on the IDX for the 2018-2021 period. Out of a total of 740 existing companies, only 16 companies met the criteria, so the number of samples in this study were 16 companies observed in four observation years, namely 2018 - 2021. All of these companies were INCO, PTBA, BUMI, ANTM, ITMG, TINS, PTRO, ANJT, JPFA, AALI, PGAS, JSMR, ABMM, WIK, INTP and ASII. The research data were obtained from the company's financial statements and analyzed using panel regression analysis techniques. The findings of this study show that environmental management accounting positively impacts corporate sustainability in terms of both social and environmental factors. companies that have low Environmental Management Accounting.

Keywords:

Environmental Management Accounting, Eco-Efficiency, Sustainability.

Introduction

Environmental management issues continue to be a concern for various parties. Scientists are anxiously observing weather patterns in the Arctic. Temperatures in the Arctic region reached 38 degrees Celsius and became the all-time highest temperature in the history of temperatures in the Arctic region. The World Meteorological Organization (WMO) has verified this and warned about changes in the earth's climate (Kompas.com, 2021). The impact of these high

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temperatures causes permafrost that is permanently frozen underground to begin to melt, carbon dioxide and methane that were previously locked underground to be released into the air. If left unchecked, humans and nature will be hit by catastrophic-scale warming characterized by increasingly severe droughts, rising sea levels, and the extinction of large numbers of species.

One of the environmental damages is caused by the existence of industrialization. The tendency is that companies pay less attention to environmental issues. Companies pay more attention to making the maximum profit without paying attention to the waste left over from production. In order to strengthen its production system, the industry must maintain the three primary pillars of sustainable development—economic profit, ecological balance, and corporate social responsibility (Tu & Huang, 2015).

Therefore, a management accounting system is needed that can consider environmental issues and costs involved in environmental management. One of the management accounting information systems that can be used is Environmental Management Accounting (EMA). Management decisions will be influenced by the limited information about the environment that is not available in management accounting. For instance, if information about whether an entity's activities affect the environment is not readily available, judgments might be made that later damage the company's reputation and sustainability. As a result, EMA implementation gives businesses a competitive edge and boosts company value (corporate social responsibility value) (Tanc &; Gokoglan, 2015).

Lisi (2015) conveys the correlation between lower environmental costs and better environmental performance. Latan, et.al (2018) explains that businesses that perform excellent in terms of the environment are more likely to share data that is reliable, corroborated, and difficult to duplicate. In addition to positive research, there are also some contradictory studies. Qiu, et.al (2016) and Nazari, et.al (2017) shows the impact of environmental information disclosure on environmental performance is negative or negligible.

Various studies on environmental management accounting have actually been carried out. Several studies have been conducted in several countries, such as in Malaysia (Fuzi, et al, 2016), Iraq (Chicha, Mohammed, & Alabdullah, 2021), and Germany (Buritt, et al, 2019). On the other hand, research in Indonesia has also been carried out (Agustia, 2020). However, there hasn't been extensive research on environmental management accounting using eco-efficiency as an indicator and its effects on environmental performance, particularly in businesses in the manufacturing sector. This kind of research needs to be done because it can provide information about how environmental management accounting is applied to manufacturing companies in Indonesia and influence the sustainability of the company. In addition, the findings obtained can be the basis for development research and can also be used by companies as a basis for implementing environmental management accounting.

Literature Review

Environmental Management Accounting

Environmental Management Accounting (EMA), a subset of environmental accounting, is capable of helping decision-makers better comprehend and quantify environmental issues by overcoming the drawbacks of traditional management accounting (Burritt et al., 2002). EMAs

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have been specifically introduced to help companies manage natural resources, energy, and pollution (Burritt et al., 2019). EMA is an important management tool to be adopted by businesses in responding to environmental challenges (Doorasamy &; Garbharran, 2015) which is used in improving the company's financial and environmental performance to achieve sustainability.

EMA is categorized into two main elements, namely physical terms and monetary terms (UNDSD, 2013; Burritt et al., 2002). In the category of physical information that is the focus is not only monetary data but also non-monetary data, so as to properly assess costs. Non-monoter data in question such as working hours and material usage. Burritt, et al (2002) give examples such as the number of kilograms of materials used in serving customers, and the energy used in one unit of goods produced. In the category of monetary information related to environmental aspects of company activities expressed in money, for example the cost of paying fines for violating environmental rules and the monetary value of environmental assets owned by the company.

Fuzi, et al (2016) reviewed the connection between environmental accomplishment and EMA in the industrial sector. Environmental expenses, environmental safety, ongoing improvement, and management commitment make up EMA. The connection between EMA practice and environmental accomplishment was examined using the Structural Equation Modeling (SEM) technique, and it was discovered that there is a positive association between the two. This result likewise shows that natural resources, energy, and materials all contribute to environmental accomplishment.

To measure the extent to which EMA affects corporate sustainability, this study uses ecoefficiency indicators (World Business Council for Sustainable Development, 2015). It is one of the strategies that an organization uses to claim that it is an ecologically friendly organization. Environmental and economic accomplishments serve as indicators of eco-efficiency. The following is a mathematical description of it:

$$eco - efficiency = \frac{product\ or\ service\ value}{environmental\ influence}$$

In this study, the value of a product or service is measured by net sales. Total energy consumption is used to gauge environmental impact. Data on energy is derived from the business's sustainability reports.

Corporate Sustainability

The concept of sustainability was initially put out by Meadows et al. (1972), who argued that local initiatives should prioritize social solutions to environmental and economic issues. This societal reaction is anticipated to satisfy the requirements of both the current and next generations (WCED, 1987). Currently, the idea of sustainability is expanding and being used in relation to business sustainability (Pemer et al., 2020). According to Artiach et al. (2010) and Pemer et al. (2020), corporate sustainability as a business and investment strategy may enhance company operations by balancing the demands of current and future stakeholders. By achieving a balance between the economic, social, and environmental aspects of firm performance, this idea highlights the interests of stakeholders.

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Elkington & Rowlands (1999) developed the Triple Bottom Line (TBL), which is typically used to assess corporate sustainability. TBL has three different aspects: economic, social, and environmental. Companies can advance toward sustainability development, according to Pemer et al. (2020), by incorporating TBL into management strategies. TBL-focused businesses may boost a company's competitive edge, as demonstrated by Markley and Davis (2007) and Pemer et al (2020).

The sustainability of the firm is evaluated in this study using content analysis. Content analysis offers an alternative viewpoint. Researchers can inform practical activities or better understand problematic events. The number of disclosures is calculated using the word, phrase, and page counts (Aras, Tezcan, Kutlu Furtuna, &; Hacioglu Kazak, 2017). Since the subject cannot be improved reliably when words are utilized, sentences are a significantly more dependable coding medium than other units of analysis (Ahmad, 2018). The research object conducts and reports content analysis using a score or weighting technique to evaluate environmental and social accomplishments. A value of "1" or "0" will be assigned to each action taken by the research object and to its reporting of those actions. If not, it will be made public. The overall value of the entity is determined after balancing the values of each piece separately. Then an index is obtained with the following calculation:

$$CSDI = \frac{Total\ corporate\ sustainability\ disclosed}{Sustainability\ disclosure\ items}$$

Methods

In order to draw a conclusion, this study is using a quantitative technique, specifically a research method based on positivistic (concrete data), research data in the form of numbers that will be tested using statistics as a counting test instrument (Sugiyono, 2018). The secondary research data that was examined came from the sample firms' financial, annual, and sustainability reports found on the website of the Indonesia Stock Exchange.

Table 1: Sample Selection Process

No	Criteria	Count
1.	Companies listed on the Indonesia Stock Exchange for the 2018-2021 period	740
2.	Companies that do not have a 2020 Sustainability Report with GRI Standard based on the Global Carbon Foundation's 33 Earth ESG Factors.	(101)
3.	Companies that are not directly related to natural resource management.	(45)
4.	Companies that do not publish sustainability reports in the environmental and social fields consecutively from 2018 to 2021.	(29)
	Total Sample	16

Source: Indonesia Stock Exchange (2023)

The sample in this study was taken using a purposive sampling technique, the research sample is a company registered on the IDX for the 2018-2021 period that has a 2020 Sustainability Report with GRI Standard based on the 33 Earth Global Carbon Foundation ESG Factors,

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directly related to natural resource management and publishes sustainability reports in the environmental and social fields consecutively from 2018 to 2021. Out of a total of 740 existing companies, only 16 companies met the criteria, so the number of samples in this study were 16 companies observed in four observation years, namely 2018 – 2021 These companies are INCO, PTBA, BUMI, ANTM, ITMG, TINS, PTRO, ANJT, JPFA, AALI, PGAS, JSMR, ABMM, WIK, INTP and ASII.

The variables examined in this study consist of Environmental Management Accounting (EMA) and Corporate Sustainability variables. Measurement of Environmental Management Accounting in this study uses eco-efficiency indicators (World Business Council for Sustainable Development, 2015), while Corporate Sustainability is measured through the Triple Bottom Line (TBL), this concept was developed by Elkington & Rowlands (1999). There are three dimensions of TBL, namely economic, social and environmental. However, in this study, to measure corporate sustainability using social and environmental dimensions. The following is the formula for calculating EMA and corporate sustainability:

$$eco - efficiency = (product\ or\ service\ value)/(environmental\ influence) \ldots\ldots (1)$$
$$CSDI = (Total\ corporate\ sustainability\ disclosed)/(Sustainability\ disclosure\ items) (2)$$

The data analysis process in this study was carried out using the STATA tool. The research data were tested using panel regression analysis method. The analysis process started from selecting the regression model through Chow test, Hausman test, and LM test, because in panel regression there are three types of estimation methods, namely Common Effect Model, Fixed Effect Model and Random Effect Model. Next, classical assumption tests were performed in the form of heteroscedasticity test and autocorrelation test, then t test, F test and coefficient of determination calculation were performed. The results of the regression analysis will produce the following regression equation:

$$Corporate\ sustainability = \alpha + \beta\ EMA \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Results And Discussion

Descriptive analysis provides an overview of the value of research variables through the minimum, maximum, mean and standard deviation values. The results of the analysis in table 2 show that the Environmental Management Accounting (EMA) of sample companies during the period 2019 – 2021 has a minimum value of 47355.7 and a maximum of 3,260,000,000 with an average of 114000000 and a standard deviation of 479000000. Furthermore, the Corporate sustainability data is the average data efficiency environment and social efficiency have a minimum value of 4% and a maximum of 92.5% with an average of 37.93% and a standard deviation of 20.74%.

Table 2: Descriptive Statistics

Variable	N	Mean	SD	Min	Max
Efficiency Environment	64	38.22%	24.12%	6.00%	96.00%
Efficiency Social	64	37.64%	20.38%	4.00%	89.00%
Corporate Sustainability	64	37.93%	20.74%	6.50%	92.50%

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EMA	64	114000000.0	479000000.0	47355.7	3260000000.0

Source: Data Analysis (STATA, 2023)

The panel regression analysis method was used to examine the impact of Environmental Management Accounting (EMA) on company sustainability in this study. The selection of the panel regression model is the first step in the panel regression analysis. The Random Effect model is chosen as the best regression model based on the findings of the Chow test, Hausman test, and Lagrange multiplier test in Table 3. However, the panel regression model's random effect model was estimated using the GLS approach since the heteroscedasticity test findings showed that there was heteroscedasticity in the model.

Table 3. Panel Regression Result

	Model 1	**Model 2**	**Model 3**
Chow Test	0.615***	0.495***	0.570***
	-9.2800	-11.1100	-10.0200
Hausman Test	-0.0821	-0.0770*	-0.170**
	(-1.38)	(-2.06)	(-3.22)
LM Test	64	64	64
Spesification	Heteroskedastic No Autocolrelation	Heteroskedastic No Autocolrelation	Heteroskedastic No Autocolrelation

Source: Data Analysis (STATA, 2023)

The results of the regression analysis in table 4 show that in both model 1, model 2 and model 3, EMA has a positive and significant effect on the company's corporate sustainability, the results of the analysis show that both on environmental and social aspects, high Environmental Management Accounting can support company sustainability in the future, companies with Environmental Management Accounting tend to have better corporate sustainability than companies with low Environmental Management Accounting. The relationship between EMA and corporate sustainability can be described in one regression equation, namely:

Y = -0,0821 + 0,615 X .....overall model
Yenv = -0,070 + 0,495 X .....environment model
Ysoc = -0,170 + 0,570 X .....social model
X = EMA Y = corporate sustainability;Yenv = environment efficiency; Ysoc = Social efficiency

Previous academics have conducted studies on the impact of environmental management accounting on company sustainability multiple times, but with varied approaches to measuring environmental management accounting. The findings of a study (Pratiwi et al., 2020) on Indonesian enterprises in the mining, agricultural, building and construction materials, energy, textile, and clothing industries from 2014 to 2018 demonstrate that EMA has a favorable impact on corporate sustainability. A high EMA will help the firm's sustainability in the future and will have a very positive influence on corporate performance, according to the findings of

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another research done by Runlei et al. (2020a). (Yang et al., 2020) in his research also suggests that in an uncertain financial situation, the company's high EMA from time to time will maintain the company's sustainability in the future. (Abdelhalim et al., 2023) in his research also shows the results that one of the company's corporate sustainability is determined by the company's EMA value, in this era of digitalization, digital environmental management is also needed to strengthen the relationship between EMA and corporate sustainability. The results of the study (Runlei et al., 2020b) also show results that there is a positive contribution of EMA to corporate sustainability. (Solovida & Latan, 2021) in this study also highlights the positive impact of EMA on corporate sustainability. Other research results that are also supported by the results of this study are research (Burritt & Christ, 2016; ENDIANA et al., 2020; Gunarathne & Lee, 2021; Hutchings & Deegan, 2022; Johnstone, 2020; Köseoglu et al., 2021; Lee , 2011; Nzama et al., 2022; Qian et al., 2018; Scarpellini et al., 2020; Schaltegger et al., 2017; Schaltegger & Csutora, 2012; Schaltegger & Wagner, 2006; UYAR, 2020; Wicaksono & Tarisa , 2022).

Table 4. Panel Regression Analysis Results

	Model 1	Model 2	Model 3
EMA	0.615***	0.495***	0.570***
	-9.2800	-11.1100	-10.0200
Constant	-0.0821	-0.0770*	-0.170**
	(-1.38)	(-2.06)	(-3.22)
Observations	64	64	64

Source: Data Analysis (STATA, 2023)

Conclusion

This study looked at how Environmental Management Accounting (EMA) affected the corporate sustainability of businesses in Indonesia that were directly involved in natural resource management. The study's findings demonstrated that EMA significantly and favorably impacted company sustainability in terms of both social and environmental factors. This indicates that a company's level of corporate sustainability increases with its EMA. Businesses with higher EMAs typically exhibit greater corporate sustainability than those with lower EMAs.

The findings of this study are in line with those of a few other studies, including Pratiwi et al. (2020), Runlei et al. (2020a), Yang et al. (2020), Abdelhalim et al. (2023), Runlei et al. (2020b), and Solovida & Latan (2021), which likewise discovered a favorable impact of EMA on business sustainability. The stakeholder theory, which contends that businesses should take into account the needs and interests of various stakeholders, including the environment and society, is further supported by the study's findings. Businesses can quantify and report on the environmental benefits and costs resulting from their operations by putting EMA into practice. By doing this, businesses may increase productivity, lessen their negative effects, and contribute value for the community and environment.

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This study has some limitations and weaknesses that can affect the validity and reliability of the research results, such as:

1) The relatively small sample size, which is only 16 companies out of 740 companies listed on the Indonesia Stock Exchange. This is caused by the quite strict sample criteria, which must have a 2020 Sustainability Report with GRI Standard based on 33 ESG Factors of Global Carbon Foundation.
2) The relatively short observation period, which is only four years from 2018 to 2021. This is caused by the limited availability of sustainability report data in Indonesia.
3) The source of data that comes from financial reports, annual reports, and sustainability reports of companies that may contain bias or errors in reporting. This can affect the quality and accuracy of the data used in this study.
4) The assumption of panel regression model that assumes that the relationship between dependent and independent variables is linear and constant. This can simplify the complexity of the phenomenon under study and ignore other factors that can affect corporate sustainability.

Future research related to this topic can do the following:

1) Increase the sample size by using other sampling techniques that are wider or more flexible, such as stratified sampling or cluster sampling.
2) Extend the observation period by using older or newer sustainability report data, if available.
3) Use other sources of data that are more objective and independent, such as data from government agencies, research institutions, or private institutions related to environment and social.
4) Use other methods of data analysis that can accommodate non-linear or dynamic relationships between dependent and independent variables, such as non-parametric regression, spline regression, or dynamic panel regression.

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