

Investigating Environmental Strategy and Environmental Uncertainty: The role of Environmental Management Accounting

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ABSTRACT: This study is to investigate how corporate environmental performance is affected by the combination of environmental uncertainty, and environmental management strategy, with an emphasis on the function of environmental management accounting (EMA). We gather sample data from 100 replies respondents. These environmental management strategy and environmental uncertainty have a favorable and significant impact on environmental performance and results show that EMA is a valuable and significant informational tool for helping Indonesian businesses achieve better corporate environmental performance. The findings of this research also explain that EMA can be useful in identifying, classifying, allocating and measuring the impact of a company's products which is very useful in more structured and precise measurements.

KEYWORDS -Environmental Management Accounting, Environmental Strategy, Environmental Uncertainty, Sustainability, Path Analysis

I. INTRODUCTION

Environmental accounting is gaining momentum in the midst of sustainability issues and the search for organizations that pay attention to sustainable business models (Christ & Burritt, 2015). This is caused by pressure from stakeholders on managers to focus on paying attention to environmental issues and evaluating environmental performance (Rodrigue et al., 2013). To achieve this synergy requires implementing a company strategy that is in close contact with environmental issues. The implementation of environmental management accounting (which was later shortened to EMA) has been recognized as a competitive advantage for many companies (Gunarathne & Lee, n.d.). Environmental management accounting as part of monetary, physical flows and informatively provides qualitative information relevant to business activity can be used for reporting, public accountability and decision making both internally and externally (Qian et al., 2018); (Schaltegger et al., 2017).

In developing countries, the implementation of a company's strategy is very dependent on the tone of the top leadership which will directly influence the pattern of strategy implementation to increase the company's competitive advantage (Latan et al., 2018) (Yang Spencer et al., 2013). The process towards world-class environmental performance requires the involvement of company resources which includes commitment top management, a planning process capable of integrating company strategy with environmental issues, and the use of environmental management accounting (EMA). However, until now empirical testing of this relationship has not been extensive and has not taken into account the realities of developing countries such as Indonesia. Previous research mostly reviews the comparison of sustainability and/or environmental accounting concepts between concepts and field practice, then describes gaps in implementation and provides recommendations for results. There are still not many studies that highlight EMA as a strategy that can create competitive advantages (and even strategies). sustainable competitive (Chapple & Moon, 2005). The main motivation in this research is testing the conceptual framework regarding the impact of environmental strategy, environmental uncertainty and top management commitment to improving the company's environmental performance by considering the role played by EMA. Empirically, this research seeks to provide an understanding of the direct and indirect impacts of EMA in bridging the company's environmental strategy and environmental performance by involving the effects of environmental uncertainty.

The choice of strategy used by management is influenced by whether or not there is added value (value added) provided by the strategy from the values of previous strategies (which have been adopted). Environmental performance measurements in many research studies are often associated as a good signal given by a company in maintaining its reputation in the eyes of the public. This has an indirect effect, cannot

necessarily be a basis for a strong enough assessment because there will be many factors that influence the creation of reputation value by external stakeholders and the company's reputation. According to Sharma and Vredenburg (Vredenburg, 1998) in research on Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities, a review of strategies that come from internal sources, such as combining various economic resources into an adequate and unique capability for a company, provides added value for development. the company's own strategy. In research, Sharma and Vredenburg stated that specific capabilities possessed by a company can have the effect of reducing costs, improving operations, improving product quality, product differentiation, increasing employee morale and at the same time increasing the level of the company's positive reputation as a sustainable impact. Interestingly, this statement is in line with the NRBV theory through 3 value creation relationships for a company's competitive advantage in facing environmental uncertainty faced by the company.

A simple literature review provides evidence of the use of NRBV theory in viewing strategic management decisions that can create sustainable competitive advantages for companies (McDougall et al., 2022)(Mishra & Yadav, 2021)(Mady et al., 2023) involving strategic management as an internal decision has not been explored further, theoretically management accounting is an internal decision within the company which then results from that decision can be measured with a measurement proxy or measurement dashboard such as a balanced scorecard, however The level of importance of a strategy that is fit, can be implemented and has an impact is believed to have a significant influence. Considering this, EMA monitoring is considered very useful in capturing environmental costs and performance (Schaltegger et al., 2017). So, EMA in this research is placed as a mediating variable that can mediate the effect of EMA on the relationship between proactive business strategy towards sustainable issues and the company's environmental performance.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Literature Review and Hypothesis Development

Natural Resource-based view (NRBV)

This study uses a natural resource-based view lens as proposed by Hart(S. Hart, 1995) to support the framework model that will be tested. NRBV argues that competitive advantage can be achieved or maintained only if there is an ability to create profits supported by resources that are not easily duplicated by competitors. This strategy consists of three interrelated strategies, namely: (1) pollution prevention; (2) product stewardship; and (3) sustainable development. Each has environmental drivers of varying strength based on different primary resources, and they have different sources of competitive advantage. For example, removing pollutants from production processes can increase efficiency by (a) reducing required inputs, (b) simplifying processes, and (c) reducing costs and compliance obligations (S. L. Hart & Dowell, 2011). Product stewardship broadens its scope to include prevention pollution throughout the value chain or "life cycle" of a company's product system. Through top management commitment, it can be effectively integrated into the product development process, creating potential competitive advantages from the strategies adopted. Finally, sustainable development strategies not only seek to reduce environmental damage, but also reduce adverse impacts on the environment to truly produce sustainable environmental performance in the future in a way that can be maintained.

Several studies have shown evidence through the NRBV lens and concluded that these three strategies can produce sustainable competitive advantages. However, (S. L. Hart & Dowell, 2011) re-evaluated the NRBV theory based on existing empirical research, and concluded that most of the propositions constructed by Hart (1995) were supported. However, how firms' combination of resources affects environmental performance has not been explored further. An example of recent research that failed to use a combination of organizational resources in its analysis is the work of Wijethilake (2017), who recently tested the mediating influence of EMA on the relationship between proactive sustainability strategy and corporate sustainability performance.

Environmental management strategy, EMA and environmental performance

Environmental management strategy can be defined as a set of actions aimed at reducing and/or overcoming the impact of company operations on the environment. Operations in production, processes and various company policies in carrying out its operations, such as energy consumption, waste, use of renewable energy resources and implementation of environmental management information systems(Bansal & Roth, 2000). Understanding the urgency of environmental management strategies gives rise to the idea that planning is already should be implemented proactively rather than reactively to overcome the negative impacts of failure to mitigate existing risks(Vredenburg, 1998). Management's concern for controlling issues surrounding environmental impacts and the proactive strategies implemented will ultimately be able to improve environmental performance (Rodrigue et al., 2013). Furthermore, in the era of the industrial revolution, developments will lead to the autonomy of environmental risk control systems which cannot be developed without the presence of EMA in the development and implementation of corporate strategy. Based on the thoughts above, temporary estimates regarding the relationship pattern of each variable can be described in the following hypothesis:

H1a: Environmental management strategies have a positive effect on environmental performance

H1b: EMA mediates the relationship between environmental management strategies and environmental performance

Accounting as a business language is an art in combining various business languages with the aim of being a decision making tool. In this context there are many influencing factors, internally it has been explicitly described by the NRBV and EMA theories. However, it cannot be denied that there are uncertainty factors which can massively influence whether or not a strategy can even fail to be adopted and then implemented, let alone used as a strategy. a competitive advantage for the company's capabilities.

Pondeville stated that uncertainty in business is a situation that cannot be predicted with certainty such as climate change, natural disasters, stock market values, future consumer taste preferences, challenges from competitors and technological changes. The faster and more precisely management responds to this element of uncertainty, the more it will affect the company's business operations in the present and future (Pondeville et al., 2013). Environmental uncertainty is a challenge for every company today, and this is related to the lack of information regarding environmentally friendly accounting. and the speed of environmental information as a factor that limits action. In conditions of high uncertainty, sophisticated information can help managers improve the quality of decisions and reduce environmental impacts, because this information provides several alternatives and solutions. For example, accountability and transparency in decision making regarding environmental management actions (Leifer & Huber, 1977). Several previous studies argued that environmental uncertainty factors were sufficient to influence environmental strategy and environmental accounting practices in companies, but Chang and Deegan found evidence that this was the reason why EMA was present. in business to overcome this uncertainty but by adding legal considerations, taxes, regulations, availability of substitute goods and behavioral factors of consumers and competitors in applying the business (Chang & Deegan, 2008). Based on the explanation above, the hypothesis is built as follows:

H2a: Perception of environmental uncertainty has a positive effect on environmental performance

H2b: EMA mediates the relationship between environmental uncertainty and environmental performance

III. METHODS

This research uses covariance analysis with path analysis using SMART PLS. This method is used to measure unmeasurable (non-observable) variables, the relationship between the independent variable and the dependent variable through direct effects and indirectly using mediating variables.

Respondents in this research are managers and employees of entities involved in the entity's operations, finances and employees who handle risks and/or the company environment. Specifically, employees are limited to at least three years working for the entity. We choose companies that have implemented environmental standards according to those set by the Ministry of the Environment and organizations that work on environmental issues (ISO, GRI), care about environmental problems and have a strong concern commitment to environmental responsibility. Data collection carried out using surveys questionnaire used to measure each research variable. There were 100 entity respondents surveyed in this research, which included the company PT Pupuk KaltimGroup. The research team sent a questionnaire online, then made an appointment to conduct an interview regarding the operational process and matters related to the research issue being studied. The research team implemented a more personal approach with call the intended respondent. In addition, the confidentiality of respondents is guaranteed. The duration of time given to respondents to complete the questionnaire is 2 weeks.

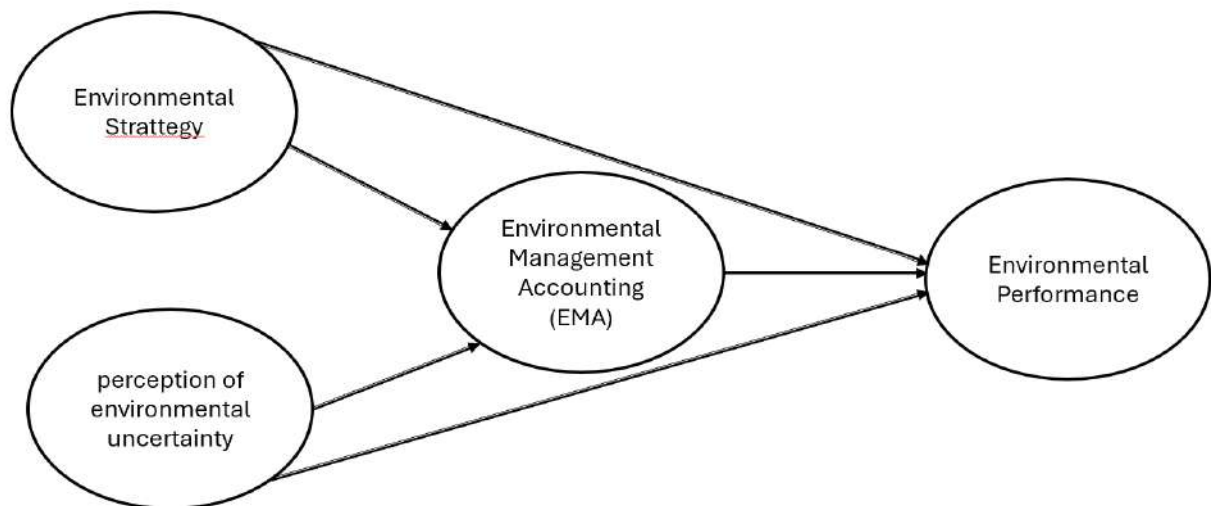


Figure 1. Research Model

Table 1. Indicators

No	Variable	Sumber	Indikator
1	Environmental Performance (Y)	(Lisi, 2015)	<ol style="list-style-type: none"> 1. Compliance with regulations 2. Prevention and mitigation of environmental crises 3. Opportunity cost of repairs 4. Limit environmental impacts 5. Improved reputation 6. Social benefits 7. Increase competitive advantage
2	Environmental Management Strategy (X1)	(Phan, 2008)	<ol style="list-style-type: none"> 1. Air, waste, water and energy performance indicators 2. Investment in environmental research and development 3. ISO certification 4. Commitment to long-term environmental care
3.	Perceprion of Environmental Uncertainty(X2)	(Pondeville et al., 2013)	<ol style="list-style-type: none"> 1. National/international environmental legal regulations 2. Environmental tax policy 3. Sectoral policies 4. Availability of substitute products 5. Demand for products 6. Changes in production processes and markets 7. Changes in competitor strategies
4	EMA (mediation)	(Christ & Burritt, 2013) (Ferreira et al., 2010)	<ol style="list-style-type: none"> 1. Identify environmental costs 2. Estimation of environmentally related contingency costs 3. Classification of environmental costs 4. Allocation of environmental costs related to the production process 5. Allocation of environmental costs related to the product 6. Development of environmental cost management 7. Creation and use of environment 8. KPI for the use of environmental activities

			9. Product life cycle cost assessment 10. Product inventory analysis 11. Product impact analysis 12. Product improvement analysis 13. Assessment of potential environmental impacts associated with capital investment decisions
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IV. RESULT AND DISCUSSION

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Table 2. Relationship between variables

Structural path	Coef (b)	S.D	P Values	Conclusion
EMS to EP	0.230	0.080	0.000	H1a supported
EMS to EP through EMA	0.225	0.101	0.010	H1b supported
PEU to EP	0.353	0.090	0.000	H2a supported
PEU to EP through EMA	0.370	0.102	0.000	H2b supported

We tested the hypothesis with a view of the coefficient parameter and the significant value generated from the 95% bias corrected confidence intervals of each independent variable. All path coefficients provide significant value (at the p= 0.05 level).

In accordance with the results of hypothesis testing, we found that environmental management strategies influence environmental performance directly or mediated by Environmental Management Accounting. This is in line with the NRBV theory (S. Hart, 1995). The company's concern for company actions that can have an impact on the environment plays an important role in making the environmental strategy implemented by the company proactive in overcoming and even mitigating environmental risks that will occur. The company's environmental management strategy has indicators for measuring the performance of air, water, waste and energy from operations. Concrete evidence can be found in PT Pupuk Kaltim's 2023 sustainability report which has revealed how to overcome the risks of waste and climate change. EMA as mediation is considered more detailed and technical in translating the language of the company's environmental strategy into a more standard and measurable system (Christ & Burrirt, 2015). As an indirect influence, the possibility of a slightly lower EMA value is influenced by the presence of several statements in the questionnaire which state that there is no special account with a specific name that separates the components of environmental costs and costs referred to in general accounting. However, in general, company employees stated that in the report there had been special account treatment and presentation even though the name was still generally included in the "environmental care" component.

Companies are always faced with issues of environmental uncertainty, both material and political issues. Policy as a product of political decisions is considered capable of encouraging and influencing the economic actions taken by companies in carrying out their business operations. The implementation of regulations related to the environment and tax policy as an incentive (plan) is allegedly the most influential in the company's efforts to adopt and simultaneously develop EMA to support the company's environmental performance (Gunarathne & Lee, n.d.). when confronted with unpredictable situations. EMA provides data that results in environmental performance achievement metrics. The outcomes corroborate Lewis and Harvey's (2001) findings that environmental uncertainties influence changes in an organization's accounting procedures.

V. CONCLUSION

This research produces support for the statement that strategy is an asset that can become a company's competitive advantage. Environmental management strategies provide space to accommodate environmental issues and environmental uncertainty that can affect the company's environmental performance. This research shows the significance of EMA's role in identification, classification, estimation, allocation and even product impact analysis which can have an impact on cost reduction and increasing company reputation.

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