

Green Intellectual Capital and Environmental Management Accounting : How Does It Influence Environmental Performance ?

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Article Info	Abstract
Received : 2024-01-08 Accepted : 2024-02-25 Published : 2024-09-30	Environmental Management Accounting (EMA) supports environmental and green resources management strategies. EMA can facilitate environmental actions from organizations or companies to create superior performance by aligning actions or behavior with the goals and values the organization or company wants to achieve. By aligning environmental resources and using an appropriate management accounting system, it is hoped to facilitate the management of green resources and support the achievement of strategic goals, resulting in increased sustainability performance. The hypothesis in this theoretical model is that the Environmental Management Accounting mechanism can help businesses coordinate, measure, and manage better, namely displaying GIC elements, green human capital, green structural capital, and green relational capital, which can improve Environmental Performance. Consequently, this study is inspired by resource orchestration theory and presents a new approach, natural resource orchestration. The purpose of this study to investigate how business rely on EMA to interpret GIC into Environmental Performance. A sample of forty firms was obtained, based on the data collected from the Annual Reports and Sustainability Reports of companies registered on the Indonesia Stock Exchange (BEI) and following PROPER working in the energy industry. The Statistical Package for the Social Sciences (SPSS version 20) was used to test the model theoretically and used path analysis. These results bolster the idea that EMA mediates the relationship between GIC and environmental performance.
Key words: environmental performance; green intellectual capital; management accounting; environmental management	

INTRODUCTION

A company has theoretical and practical interests to develop in the future. As awareness of environmental issues increases, companies begin considering their impact on the environment and society. Environmental awareness encourages companies to think continuously about how they can contribute to ecological preservation. Climate change, pollution, natural resource depletion, and other global environmental issues are increasingly becoming global concerns, so companies need to adapt to changes and find ways to reduce negative environmental impacts. “Nowadays, companies not only rely on intangible assets such as knowledge, networks, processes, and information systems but tend to develop their productive activities in a way that protects the environment” (López-Gamero et al., 2011; Massaro et al., 2018). “The significance of intellectual capital and its implications have long been discussed in research, there is still little discussion about the nature of green intellectual capital and its sustainability implications at this time, where environmental issues are in the first place” (Chang, C., & Chen, 2012b). Consumer demands on companies are increasingly critical of the products and services they purchase. Consumers tend to support companies that promote environmentally friendly business practices, which compels companies to develop green intellectual capital. Many countries have implemented strict environmental regulations encouraging companies to address environmental issues. Companies need to comply with new rules that require them to consider environmental impacts in their business strategies. Advances in green technology have opened up new

opportunities to innovate in various energy sectors. Companies that utilize technology and invest in research and development of green technology can develop significant green intellectual capital.

Indonesia has some problems related to energy sector companies, such as dependence on fossil energy (natural gas, coal, petroleum, etc.) This big problem makes Indonesia vulnerable to fluctuations in oil prices worldwide and produces greenhouse gas emissions that are detrimental to the environment. Exploitation of natural resources such as coal mining and oil drilling can lead to deforestation, water pollution, and soil degradation, among other damages. Here are some examples of cases that caused environmental pollution, both water pollution and air pollution, from 2022 - 2023, including issues regarding pollution of the Cibeet River in Wanakerta Village, West Telukjambe District, Karawang, West Java, resulting in blackened river water accompanied by a pungent foul odor. It is suspected that one of the companies in the area discharges waste into the Cibeet River every night (*Sindonews.com*, 2023), the air waste pollution that caused some East Aceh residents is suspected of being from the mines of oil and gas companies operating in the area. Since 2019 until the end of 2022, more than 13 residents have become victims and have to be treated at the Puskesmas (*DetikSumut*, 2023), and cases that occurred in Ketapang Village, Panjang District, Bandar Lampung City, many people complained about the presence of new stone waste polluting settlements. The waste came from the activities of PT Hasta Dwiustama. The smoke produced by burning coal makes residents short of breath (*Lampost.co*, 2022).

From the above cases, it is clear that the energy industry still faces many problems. Some companies are involved in criminal cases, and polluted companies are considered to have poor environmental performance. More importantly, under such circumstances, the nature of the management process by which a company can use its environmental resources for better performance could be more explicit. (Dumay & Garanina, 2013) Advocate for increasing firm value by prioritizing research related to intellectual capital to "navigate the knowledge created by countries, cities, and communities advocating how knowledge can be developed broadly. Thus bringing about a shift from a managerial focus to an ecosystem focus". Companies need to determine how to use environmental resources for better performance. In this case, environmental accounting research emphasizes the importance of Environmental Management Accounting in supporting green resources and environmental strategies (Gunarathne et al., 2021; Henri et al., 2010; Tashakor et al., 2019).

According to theory, Environmental Management Accounting can help transform an organization's environmental actions into better performance if the organization's structure and behavior are aligned with the organization's objectives and fundamental values. Specifically, EMA is able to improve aligning goals and values between individuals and organizations, help managers make environmental decisions, and promote learning (Arjaliès, D. L., & Mundy, 2013; Chaudhry et al., 2020). Consequently, it is imperative to study how EMA functions in translating GIC components into optimal environmental performance to address the above discrepancies.

In Indonesia, the government has begun considering macroeconomic policies related to environmental management and nature protection. Law Number 32 of 2009 concerning Environmental Protection and Environmental Management and the Regulation of the Ministry of Environment of the Republic of Indonesia contained in Number 3 of 2014 concerning the Company Performance Rating Assessment Program (PROPER). This program encourages companies to make structural adjustments in environmental management through information means. There are five environmental performance ratings: gold, green, blue, red, and black. Using color in the ranking can make distinguishing the ranking order categories and forms of communication easier when providing information to the public so that it is easier to understand and remember. Currently, in Indonesia, there are still companies ranked red and even black. The public may evaluate which businesses are reputable for their environmental management through PROPER and vice versa. Environmental performance management aims to fulfill all legal and environmental requirements completely.

As mentioned above, the credibility of Malaysian online news portals has become a There are two reasons to investigate this research. First, although much studies have been

conducted revelation of external environmental conditions, how companies use internal management processes such as EMA to put environmental disclosure programs into action (Lisi, 2015). Second, from a theoretical perspective, the stakeholder and agency cost views are two conflicting hypotheses that determine if there is a positive or negative relationship between environmental practices and performance. According to the stakeholder view, environmental strategies increase shareholder wealth since it is frequently in the best interests of shareholders to advocate for the interests of other stakeholders. “The stakeholder value creation approach says that ample empirical evidence supports the idea that environmental efforts can predict positive impacts on the organizational environment” (Peng et al., 2021; Tantalo & Priem, 2016).

The central proposition in this theoretical model is that Environmental Management Accounting mechanisms can support firms to synchronize better, measure, and manage the orchestrating elements of GIC, namely, green human capital, green structural capital, and green relational capital, which can improve environmental performance. “Thus, this study is inspired by resource orchestration theory” (Sirmon et al., 2007, 2011) and introduces natural resource orchestration, a fresh approach, to investigate how businesses use EMA to mediate GIC into Environmental Performance. “Resource theory states that organizations can only optimize their resources and capacities if they are effectively structured, combined, and managed” (Asiaei et al., 2021; Malik et al., 2021; Sirmon et al., 2011). Therefore, this study extends previous research on several important topics. These studies generally concentrate more on internal decision-making mechanisms and controls, such as EMA, than external reporting, which adds to environmental accounting research (Lisi, 2015). “This research explores the potential alignment between the components of GIC and EMA (natural resource orchestration), which carries significant implications for companies to control relevant and effective management to utilize their strategic green resources such as GIC” (Lisi, 2015; Solovida & Latan, 2017).

As the fastest-growing and most persistent country in the world, Indonesia can provide further insights into how environmental engagement matters across the globe. Therefore, this study extends previous research on EMA and GIC in developing countries by providing new evidence, such as the Indonesia Stock Exchange (IDX), which helps streamline the securities transaction process and supports and oversees all operations. In addition, there is evidence from Indonesia that can help corporate leaders, government agencies, international businesses, and academics push this green agenda and practices in Indonesia, where environmental accounting platforms are not structured (Rezaee et al., 2020). Studies like this, which are based on resource orchestration, are particularly important for Indonesia as there is not much information on how companies in Indonesia combine and synchronize supporting inputs (EMA) with strategic inputs (GIC) to ensure their business success. Looking at Indonesian data, even information on green assets and sustainability accounting shows this need for more knowledge. Therefore, this study extends the existing information on resource orchestration from a primarily emerging market research context to a developed market context. In particular, empirical research on resource orchestration theory needs to be improved in Indonesia. This study aims to determine the effect of green intellectual capital on environmental performance through environmental management accounting as mediation.

Green Intellectual Capital (GIC) is a form of intangible assets owned by the company through knowledge, experience, innovation, and company policies to protect the environment (Chen, 2008). The benefits of Green Intellectual Capital are to help companies follow regulatory requirements in the international environment and provide consumers with environmental awareness. Giving consumers an understanding of the environment can add a good image for companies. There are three Green Intellectual Capital groups: Green Human Capital, Green Relationship Capital, and Green Structural Capital (Chen, 2008).

Environmental Management Accounting is a subfield of accounting that focuses on the environmental impact of corporate activities and aims to provide information to management for decision-making purposes. According to the purpose of reporting, environmental accounting is divided into two parts: internal company management and external (shareholders). At the company's internal management, environmental accounting, often called EMA, aims to provide

information to help management make decisions. When environmental accounting is reported to external parties, the focus is more on the public, especially shareholders.

Environmental Performance is a form of company performance that focuses on company activities in protecting the environment and reducing the environmental impact caused by company activities.. Therefore, Environmental Performance is the company's performance that focuses on the company's activities in protecting the environment and reducing the environmental impact caused by the company's activities.

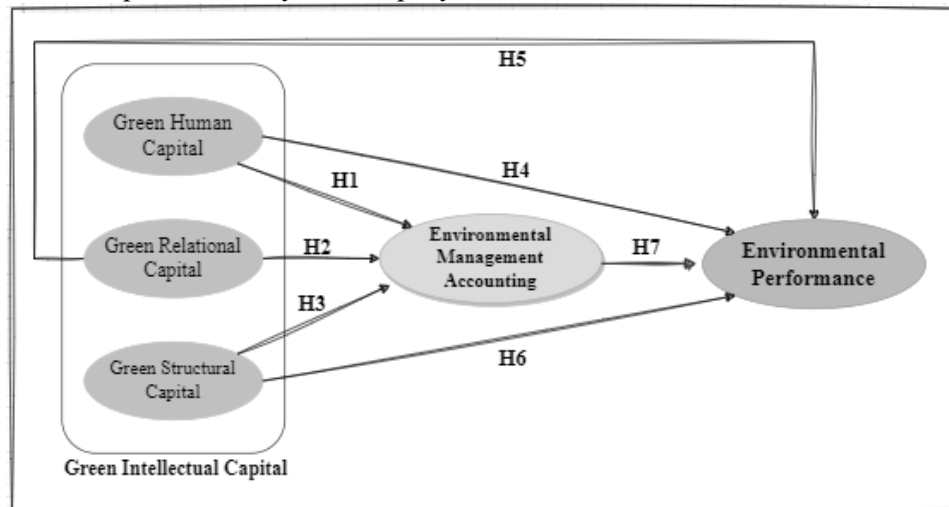


Figure 1 Conceptual Framework

Source: Author, 2023

The theoretical framework for this study is depicted in Figure 1, which combines resource orchestration theory with the natural resource-based view of the organization. This idea can show how firms adopt a particular control system, namely EMA, to translate Green Intellectual Capital into outcomes that benefit the firm. [Hart \(1995\)](#) says that sustainable competitive advantage comes from organizations synthesizing the natural environment into strategic procedures. One of the main assumptions of the theoretical framework proposed in this study is that proper implementation of management accounting systems (EMA) can help organizations align, measure, and control various elements of GICs, meaning that it will lead to environmental improvements.

This research draws on current research suggests that EMA not only plays a part in enabling in the implementation of sustainability projects by top management by encouraging fundamental sustainability principles, gauging sustainability performance, but also by lowering strategic risks related to sustainability, minimizing uncertainties around sustainability plans, and serving as a check on agency costs for shareholders

LITERATURE REVIEW

Effect of Green Intellectual Capital on Environmental Management Accounting

The business's environmental strategy which is a section of its business strategy effects how EMA is used in that business. EMA makes sure managers make the most of their current resources in order to enhance performance. Therefore, a system like this is made to help businesses achieve their environmental performance goals. Companies are sometimes expected must alter their accounting and reporting procedures. An innovation called EMA stresses a number of standard operating practices to boost environmental management's effectiveness. "Therefore, EMA is a technique for enhancing, analyzing, and using financial and non-financial information to improve a company's environmental and economic performance and assist sustainable business"([Ferreira et al., 2010](#)). Pérez et al., (2007)"state that there are two types of intangible assets considered in the continuous improvement process: (1) the integration of environmental issues into the strategic planning process and (2) the use of management accounting practices". "The greater the synergy between the two, the more likely the

environmental management system will create intangible assets that improve the company's environmental performance”(Solovida & Latan, 2017). Therefore, using EMA can gain the organization by offering pertinent data about its operations, especially those related to the environment, and this will result in improved environmental performance. The authors thus suppose that companies can quantify and measure GIC's true value using EMA in order to enhance environmental performance. With the above arguments, the authors propose the subsequent hypothesis:

H1 : Green Human Capital is related to Environmental Management Accounting

H2 : Green Relational Capital is related to Environmental Management Accounting

H3 : Green Structural Capital is related to Environmental Management Accounting

Specifically, GIC can foster cooperative ties with outside entities, such as clients or citizens advocating for environmental protection. This collaborative relationship can improve the company's image and reputation (Chuang & Huang, 2018; Wang & Juo, 2021). Taking internal ramifications into account, GIC can reduce environmental expenses and raise staff members' awareness of energy-saving technologies and green principles. Similarly, businesses can successfully comprehend the standards and requirements of national environmental laws. Chuang and Huang (2018) argue “that better environmental performance comes from the extent to which organizations actively gather environment-related knowledge and resources”. Therefore, this can bolster the theory that the environmental performance increases with increased investment in all facets of GIC :

H4 : Green Human Capital is related to Environmental Performance

H5 : Green Relational Capital is related to Environmental Performance

H6 : Green Structural Capital is related to Environmental Performance

The effect of GIC on ENP through EMA as mediation

Resource orchestration theory states that “a firm can benefit from its strategic assets only if it can effectively structure, combine, and manage those resources”(Sirmon et al., 2007, 2011). According to Helfat et al., (2007)”resource mobilization is at the core of the resource orchestration perspective, which states that mobilized resources are integrated into an effective structure to support better harmonization, synchronization, and direction for specific utilization”. The main obstacle in carrying out resource orchestration is finding channels through which management can mobilize and structure the fundamental assets of the organization (Asiaei et al., 2021). In this regard, the authors are inspired from the context of management accounting to hypothesize that promoting organizational control systems in general and EMA, in particular, is one of the plausible avenues for managers to mobilize resources (Asiaei et al., 2020; Lisi, 2015). The authors contend that EMA serves as a conduit for the more effective mobilization of a company's fundamental assets and capacities, such as GICs, in order to provide genuine value for the enterprise. More significantly, EMA assists businesses in reducing agency issues resulting from environmental engagement when green resources and talents may be converted into The aforementioned claims all point to the following theory :

H7 : The use of EMA mediates the relationship between GIC and ENP

METHOD

This research uses quantitative methods to examine specific samples and research instruments. This research focuses on energy sector companies listed on the Indonesia Stock Exchange (IDX) participating in PROPER for 2020 - 2022. The sample selection method in this study is using a purposive sampling method. Purposive sampling is a method in which predetermined benchmarks select the sample. The sample benchmarks used in this study are (1) energy sector

companies listed on the Indonesia Stock Exchange (IDX) for the period 2020 - 2023, (2) companies that publish Annual Report and Sustainability Report on the Indonesia Stock Exchange (IDX) at www.idx.co.id, (3) companies that follow PROPER seen from the list of company ratings that can be accessed on the official website of the Ministry of Environment and Forestry at proper.menlhk.go.id. The measurement of each variable can be seen in the appendix. This research is hypothesis testing and secondary data to explain the effect of Green Intellectual Capital on Environmental Performance through EMA as a mediating variable. The data collected is based on the Annual Report and Sustainability Report listed on the Indonesia Stock Exchange (IDX) and following PROPER, which is engaged in the energy industry, namely 40 companies.

Content analysis is carried out by reading the annual report of each sample company and coding the information contained in it based on the green intellectual capital indicator framework, MEMA, PEMA, and PROPER. The way to search is by using computer aids, so that the annual report is in pdf form that can be searched. The search is carried out using ctrl + F which then enters keywords. Words that are elements of the specified variable (Az'mi, 2020).

The analysis technique used is the classical assumption test and path analysis. This technique ensures that the regression equation obtained is accurate in estimation, unbiased, and consistent. The classical assumption test consists of normality, multicollinearity, and autocorrelation. The results of the classical assumption test show that the data used in this study meet all the classical assumption tests. The path analysis test is carried out after the classic assumption test is fulfilled. Path analysis is a technique used to analyze the causal relationship that occurs in multiple regression where the independent variable not only directly or indirectly affects multiple regression (Ghozali, 2018: 245).

$$Y = \alpha + \beta_1\text{GHC} + \beta_2\text{GRC} + \beta_3\text{GSC} + \beta_4\text{EMA} + e \quad (1)$$

$$Y = \alpha + \beta_1\text{GHC} + \beta_2\text{GRC} + \beta_3\text{GSC} + \beta_4\text{EMA} + \beta_5\text{ENP} + e \quad (2)$$

The independent variable used in this study is Green Intellectual Capital (GIC). Green intellectual capital has three components: green human capital, green relational capital, and green structural capital. Indicators of green intellectual capital disclosure can be seen in Appendix I. Green intellectual capital measurement is measured based on research (Chen, 2008), each item disclosed by the company is given a score of 1 and vice versa if not disclosed by the company is given a score of 0. Then, the amount declared is divided by the total of all criteria that must be disclosed. The dependent variable is the variable whose value is influenced by the independent variable. In this study, the dependent variable is Environmental Performance (ENP). Environmental performance assessment uses PROPER, officially issued by the Ministry of Environment. This ranking scores 1 – 5 (Meiyana & aisyah, 2019). PROPER ratings are grouped into five ratings, as seen in Appendix 1. Intervening variables are variables that theoretically affect the relationship between the independent variable (independent) and the dependent variable (dependent), as can be seen in Appendix I. This study's intervening variable is Environmental Management Accounting (EMA). The application of EMA is measured using content analysis. Measurement of the application of EMA using ten disclosure items that refer to the MEMA and PEMA information items by Burrit, Hahn, and Schaltegger (2002), where these items have been adapted to conditions in Indonesia, can be seen in Appendix I.

RESULTS

Descriptive statistics present data related to the character of the research variables, including the minimum value, maximum value, and average value. The results of descriptive statistics are presented in Table 2.

	N	Minimum	Maximum	Mean	Std. Deviation
GHC	40	0.40	1.00	0.9400	0.15819
GRC	40	0.00	1.00	0.8670	0.27003
GSC	40	0.67	1.00	0.9670	0.10026
EMA	40	0.60	0.90	0.7700	0.07232

ENP	40	2.00	5.00	3.8000	0.72324
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Table 2 Descriptive Stastics Results

Source: Author, 2023

Based on Table 2, the closer the value of GHC, GRC, and GSC is to 1, the higher the level of disclosure of GIC. The minimum and maximum values obtained are GHC 0.40 to 1.00, GRC 0.00 to 1.00, and GSC 0.67 to 1.00. The standard deviation value for the GHC, GRC, and GSC variables is smaller than the mean value, thus indicating the data is homogeneous. Whereas for other variables, namely EMA and ENP, the standard deviation value is higher than the mean, thus indicating heterogeneous data

Model I Path Coefficient

Table 3 EMA Coefficients Test

Model	Unstandardized Coefficients	t	Sig.
	B		
1 (constant)	0.911	6.957	0.000
GHC	0.118	1.686	0.101
GRC	-0.020	-0.483	0.632
GSC	-0.243	-2.243	0.031

Source: Author, 2023

Table 4 Model Summary

Model	R	R Square	Adjusted R Square	Sig.
1	0.450 ^a	0.203	0.136	0.041 ^b

Source: Author, 2023

From table 4, it can be seen that the significance value is 0.041 where this value is smaller than 0.05 so that GIC affects EMA. Referring to the output of Regression Model I in Table 3, it can be seen that the significance value of the GSC variable is 0.031 which is smaller than 0.05. These results provide the conclusion that regression model I, namely the GSC variable, has a direct effect of 0.337 on EMA. While GHC and GRC do not have a direct influence. The magnitude of the R2 or R Square value contained in Table 4 is 0.203. This shows that the contribution or contribution of the GIC influence on EMA is 20.3% while the remaining 79.7% is the contribution of other variables not included in the study. Meanwhile, the value of e1 can be found with the formula $e1 = \sqrt{1-0.203} = 0,8927$. Thus the structure model path diagram I is obtained as follows:

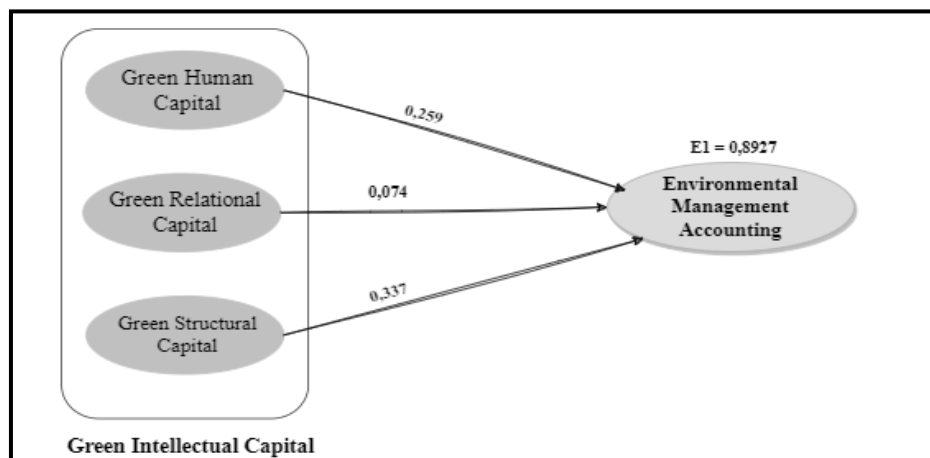


Figure 2 Path Diagram Model I

Source: Author, 2023

Model II Path Coefficient

Table 5 Test Coefficients ENP

Model	Unstandardized Coefficients	t	Sig.
	B		
1(constant)	0.015	0.007	0.994
GHC	1.928	2.664	0.012
GRC	0.309	0.760	0.452
GSC	1.467	1.276	0.210
EMA	0.372	0.225	0.823

Source: Author, 2023

Table 6 Summary Model

Model	R	R Square	Adjusted R Square	Sig.
1	0.487 ^a	0.237	0.150	0.045 ^b

Source: Author, 2023

From Table 4, it can be seen that the significance value is 0.041, where this value is smaller than 0.05, so GIC affects EMA. Referring to the output of Regression Model I in Table 3, it can be seen that the significance value of the GSC variable is 0.031, which is smaller than 0.05. These results conclude that regression model I, namely the GSC variable, has a direct effect of 0.337 on EMA. In contrast, GHC and GRC do not have a direct influence. The magnitude of the R2 or R Square value in Table 4 is 0.203. The results of the R square show that the contribution or influence of GIC on EMA is 20.3%, and the remaining 79.7% is the contribution of other variables not included in the research. Meanwhile, the value of e1 can be found with the formula $e1 = \sqrt{1-0.203} = 0,8927$. Thus, the structure model path diagram I is obtained as follows:

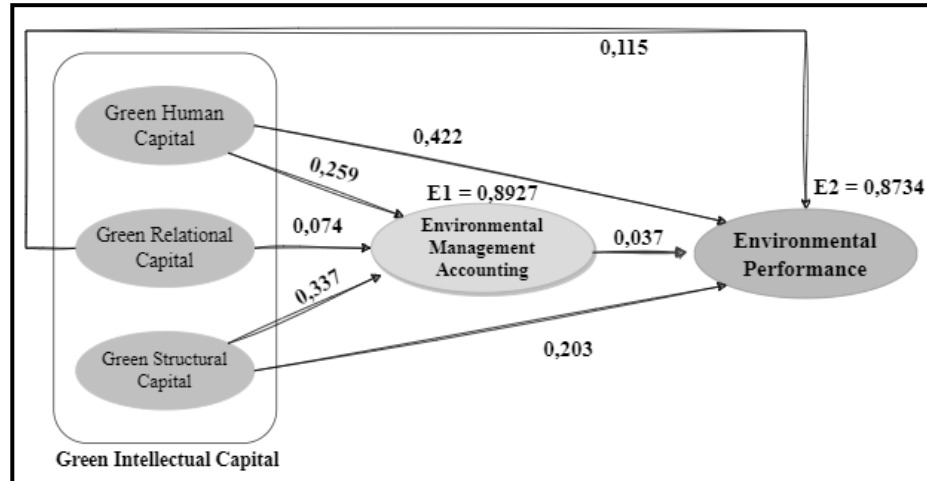


Figure 3 Path Diagram of Model II

Source: Author, 2023

This study is in line with the results of previous studies where environmental strategies and initiatives influence the use of EMA in the company” (Ferreira et al., 2010; Lisi, 2015; Solovida & Latan, 2017). “This finding highlights that environmentally oriented companies with greener intellectual resources tend to practice EMA” Sirmon et al., (2007, 2011). On the other hand, this finding is somewhat inconsistent with Henri and Journeault (2010) who observe that the effect of ecosystem control on economic performance is only supported under certain conditions (i.e. higher environmental disclosure, higher public awareness, more environmental issues, and larger firm size). From the analysis above, the significance value of GHC is 0.101 < 0.05. So, it can be concluded that, directly, there is no significant effect of GHC on EMA. GHC, as the first group, is the lifeblood of intellectual

capital. Human capital is a source of compensation centered on extensive skills and knowledge within a company or organization. Green Human Resources can be defined as the ultimate representation of knowledge, experience, wisdom, commitment, knowledge and creativity possessed by workers to protect green environmental innovation (Chen, 2008). Thus, mining sector companies in Indonesia use EMA to manage their companies. From the analysis above, the significance value of GRC is $0.632 < 0.05$. So, there is no significant effect of GRC on EMA. GRC means that a company can maintain good relationships with its partners, whether from quality and reliable suppliers, community company relations, or local government, to manage green innovation and environmental management. Thus, mining certification companies still need to use EMA with external parties to manage their environment.

From the analysis above, the significance value of GSC is $0.031 < 0.05$. So, GSC has a significant impact on EMA. GSC is the ability of a company or organization to fulfill the structure and activities of the company or organization in fulfilling the structure and activities of the company which encourages employee efforts in producing optimal intellectual work and overall business work, for example, production processes, operational systems, management philosophy, and intellectual capital owned by the company. Suppose someone has high intellectual capacity, but the company needs better procedures and systems. In that case, the company's intellectual capital will not be realized because potential utilization and performance are not optimal. Acquisition of scarce and valuable resources (GICs) does not guarantee company performance, according to resource orchestration theory. Instead, organizations need to align their valuable resources, such as GICs, with other strategic practices, EMA, in order to achieve greater competitive advantage and good organizational outcomes, such as better environmental performance.

Effect of Green Human Capital, Green Relation Capital, Green Structural Capital on Environmental Performance.

These results follow previous research, which states that GHC is the knowledge, skills, values, and experience of employees that are recognized as essential elements for achieving sustainability (Massaro et al., 2018) and “encouraging innovation with social and environmental practices” (Yusoff et al., 2019). From the analysis above, the significance value of GHC is $0.012 < 0.05$. So, there is a significant direct effect of GHC on ENP. From the analysis above, the significance value of GRC is $0.452 < 0.05$. Chuang and Huang (2018) argue that better environmental performance comes from the extent to which organizations are actively engaged in gathering environment-related knowledge and resources. So, it can be concluded that, directly, there is no significant effect of GRC on ENP. From the analysis above, the significance value of GSC is $0.210 < 0.05$. So, there is no significant influence between GSC and ENP. With previously published studies, this result is in contrast to some studies such as Delgado-Verde et al., (2014) who found that GSC is not directly related to green innovation but is highly dependent on the existence of collaborative relationships between employees. Specifically, the results showed a relationship between GHC and ENP. Although these results are consistent with some previous studies (Chang & Chen, 2012; Chen, 2008; Delgado-Verde et al., 2014; Huang & Kung, 2011), these results are inconsistent with some previous studies (Chuang & Huang, 2018). The inconsistency of the results of this study is because (Chuang & Huang, 2018) state that structural capital is recognized as the company's capacity to meet market needs, namely the business's ability to adapt to environmental changes.

Effect of Green Human Capital, Green Relation Capital, Green Structural Capital through Environmental Management Accounting on Environmental Performance

This result can be explained by the fact that GIC has become the cornerstone of competitive advantage in today's sustainable world (Chen, 2008). The direct effect of GHC on ENP is 0.012. Meanwhile, the indirect impact of GHC through EMA on ENP is the multiplication of the beta value of GHC on ENP with the beta value of EMA on ENP, namely: $0.422 \times 0.422 = 0.178$. Then, the total effect GHC gives on ENP is the direct and indirect effects, namely: $0.012 + 0.178 = 0.190$. Based on the results of the above calculations, the immediate effect value is

0.012, and the indirect impact is 0.190, which means that the direct effect value shows that indirectly, GHC through ENP has a significant influence on EMA. When viewed, simultaneous EMA mediates between GIC and ENP. Companies must have a strategic environmental management system like EMA to improve environmental performance. This result supports the central premise of the resource orchestration theory, which states that effective synchronization and alignment, i.e., orchestration of various strategic resources within the firm, such as GIC and EMA, can significantly support the organization to derive maximum benefits from those resources which in turn will improve firm performance. These results are consistent with several previous studies in the literature ([Gunarathne et al., 2021](#); [Lisi, 2015](#)), implying that organizations need appropriate organizational control systems to effectively translate their strategies and environmental resources into profitable organizational outcomes. These results confirm the assumption that using EMA supports firms to address challenges and opportunities related to sustainability and lower agency expenses by making operating procedures more accountable and transparent.

The research hypothesis test results show that green intellectual capital positively correlates with environmental performance and environmental management accounting as mediation. In particular, GIC can encourage collaborative relationships with external bodies, such as customers or citizens advocating for environmental protection. The collaborative relationships can improve the company's image and reputation ([Chuang & Huang, 2018](#); [Wang & Juo, 2021](#)). Taking into account the internal ramifications, GICs can reduce environmental expenses and raise staff members' awareness of energy-saving technologies and green thinking. In the same way, companies can effectively understand the norms and expectations of government environmental regulations. In order to investigate the degree to which businesses depend on EMA to convert GIC into environmental performance, this study presents a novel methodology called nature resource orchestration, which draws inspiration from resource orchestration theory ([Sirmon et al., 2007, 2011](#)). The stakeholder view holds that environmental initiatives boost shareholder wealth because it is frequently in the best interests of shareholders to advocate for the interests of other stakeholders. On the other hand, sustainability involvement may be viewed as including environmental strategies from an agency standpoint. Here, managers engage in these activities excessively and for their own benefit ([Krüger, 2015](#); [McWilliams et al., 2016](#)). The study's findings are consistent with other research showing that environmental activities and strategies within the organization have an impact on the use of EMA ([Ferreira et al., 2010](#) ; [Lisi, 2015](#) : [Solovida & Latan, 2017](#)).

CONCLUSION

From the series of discussions above, it can be concluded that GIC affects ENP mediated by EMA. When viewed partially from the three GIC measurements that affect ENP mediated by EMA, namely Green Human Capital (GHC), this means that the hypothesis can be accepted. In Indonesia, the government has begun to consider macroeconomic policies related to environmental management and nature protection. The Ministry of Environment of the Republic of Indonesia has regulated the Company Performance Rating Assessment Program (PROPER) by Regulation Number 3 of 2014, and Law Number 32 of 2009 concerning Environmental Protection and Environmental Management. This program aims to encourage companies to make structural adjustments in environmental management through information means. Because disclosures related to the environment are still mandatory, some companies have not made full disclosures, so regulations need to be made so that companies can disclose related to their environmental disclosures. The limitation of the study is that companies in Indonesia that participate in PROPER are still small so that the samples used are still small. Research suggestions based on the research results are that it is hoped that further research will re-examine the variables that are not significant using different company sample data, and add other variables that affect environmental performance.

REFERENCES

- Arjaliès, D. L., & Mundy, J. (2013). The use of management control systems to manage CSR strategy: A levers of control perspective. *Management Accounting Research*, 24(4), 284–300.
- Asiaei, K., Rezaee, Z., Bontis, N., Barani, O., & Sapiei, N. S. (2021). Knowledge assets, capabilities and performance measurement systems: A resource orchestration theory approach. *Journal of Knowledge Management*, *In press*.
- Asiaei, K., Bontis, N., Alizadeh, R., & Yaghoubi, M. (2020). Green intellectual capital and environmental management accounting: Natural resource orchestration in favor of environmental performance. *Business Strategy and the Environment*, 31(1), 76–93. <https://doi.org/10.1002/bse.2875>
- Az'mi, Y. ulul; S. (2020). Determinan Pengungkapan Modal Intelektual Pada Perusahaan yang Tergabung Dalam Indeks LQ-45 di Bursa Efek Indonesia. *Simposium Nasional Akuntansi, XIX*(April), 1–24.
- Chang, C., & Chen, Y. (2012a). The determinants of green intellectual capital. *Management Decision*, 50(1), 74–94.
- Chang, C., & Chen, Y. (2012b). The determinants of green intellectual capital. *Management Decision*, 50.
- Chaudhry, N. I., & Amir, M. (2020). From institutional pressure to the sustainable development of firm: Role of environmental management accounting implementation and environmental proactivity. *Business Strategy and the Environment*, 29(8), 3542–3554.
- Chen, Y.-S. (2008). The positive effect of green intellectual capital on competitive advantages of firms. *Journal of Business Ethics*, 77(3), 271–286.
- Chuang, S. P., & Huang, S. J. (2018). The effect of environmental corporate social responsibility on environmental performance and business competitiveness: The mediation of green information technology capital. *Journal of Business Ethics*, 150(4), 991–1009.
- Dumay, J., & Garanina, T. (2013). Intellectual capital research: A critical examination of the third stage. *Journal of Intellectual Capital*, 14(1), 10–25. <https://doi.org/10.1108/14691931311288995>
- Ferreira, A., Moulang, C., & Hendro, B. (2010). Environmental management accounting and innovation: An exploratory analysis. *Accounting, Auditing and Accountability Journal*, 23(7), 920–948. <https://doi.org/10.1108/09513571011080180>
- Gunarathne, A. N., Lee, K. H., & Hitigala Kaluarachchilage, P. K. (2021). Institutional pressures, environmental management strategy, and organizational performance: The role of environmental management accounting. *Business Strategy and the Environment*, 30(2), 825–839.
- Hart, S. L. (1995). *Tilburg University A natural resource-based view of the firm* Hart, S.L. 986–1014.
- Helfat, C., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D., & Winter, S. (2007). *Dynamic capabilities: Understanding strategic change in organizations*.
- Henri, J. F., & Journeault, M. (2010). Eco-control: The influence of management control systems on environmental and economic performance. *Accounting, Organizations and Society*, 35(1), 63–80.
- Huang, C., & Kung, F. (2011). Environmental consciousness and intellectual capital management: Evidence from Taiwan's manufacturing industry. *Management Decision*, 49(9), 1405–1425.
- Lisi, I. E. (2015). Translating environmental motivations into performance: The role of environmental performance measurement systems. *Management Accounting Research*, 29, 27–44.
- López-Gamero, M. D., Zaragoza-Sáez, P., Claver-Cortés, E., & Molina-Azorín, J. F. (2011). *Sustainable development and intangibles: building sustainable intellectual capital*. 20(1)(Bus. Strateg. Environ.), 18–37.
- Malik, M., Ghaderi, H., & Andargoli, A. (2021). A resource orchestration view of supply chain

- traceability and transparency bundles for competitive advantage. *Business Strategy and the Environment*, 1–16.
- Massaro, M., Dumay, J., Garlatti, A., & Dal Mas, F. (2018). Practitioners' views on intellectual capital and sustainability: From a performancebased to a worth-based perspective. *Journal of Intellectual Capital*, 19(2), 367–386.
- Peng, B., Chen, S., Elahi, E., & Wan, A. (2021). Can corporate environmental responsibility improve environmental performance? An intertemporal analysis of Chinese chemical companies. *Environmental Science and Pollution Research*, 28, 12190–12201.
- Rezaee, Z., Alipour, M., Faraji, O., Ghanbari, M., & Jamshidinavid, B. (2020). Environmental disclosure quality and risk: The moderating effect of corporate governance. *Sustainability Accounting, Management and Policy Journal*, In press.
- Sirmon, D. G., Hitt, M. A., & Ireland, R. D. (2007). Managing firm resources in dynamic environments to create value: Looking inside the black box. *Academy of Management Review*, 32(1), 273–292.
- Sirmon, D. G., Hitt, M. A., Ireland, R. D., & Gilbert, B. A. (2011). Resource orchestration to create competitive advantage: Breadth, depth, and life cycle effects. *Journal of Management*, 37(5), 1390–1412.
- Solovida, G. T., & Latan, H. (2017). Linking environmental strategy to environmental performance: Mediation role of environmental management accounting. *Sustainability Accounting, Management and Policy Journal*, 8(5), 595–619.
- Tashakor, S., Appuhami, R. and Munir, R. (2019). Environmental management accounting practices in Australian cotton farming: The use of the theory of planned behaviour. *Accounting, Auditing & Accountability Journal*, 32 No. 4, 1175–1202.
- Wang, C. H., & Juo, W.-J. (2021). An environmental policy of green intellectual capital: Green innovation strategy for performance sustainability. *Business Strategy and the Environment*, 1–14.
- Yusoff, Y. M., Omar, M. K., Kamarul Zaman, M. D., & Samad, S. (2019). Do all elements of green intellectual capital contribute toward business sustainability? Evidence from the Malaysian context using the Partial Least Squares method. *Journal of Cleaner Production*, 234, 626–637. <https://doi.org/10.1016/j.jclepro.2019.06.153>