Carbon Management Accounting, Green Intellectual Capital, Carbon Tax Policy Initiative And Firms Market Performance In Mining Companies Indonesia

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Abstract

This study aims to investigate carbon management accounting (CMA) and Green intellectual capital (GIC) on Carbon Tax Policy Initiatives and Firms Market Performance (FMP) This study uses a population of mining sector companies on the Indonesia Stock Exchange from 2021-2023. The purposive sampling method with a sample size of 15 companies. Analysis tools using Eviews 13 and panel data regression. The results showed that CMA and GIC had a positive effect on CTPI, but CMA and CTPI had no positive effect on FMP. When conducting research, there are limitations in terms of measuring CMA and GIC which depend on annual and ongoing reports with a certain level of subjectivity. This study does not use moderation and mediation variables so that the driving factors and direct and indirect relationships are unknown; and the object of this research focuses on mining listed on the IDX 2021-2023 This research is expected to make a positive contribution to the development of stakeholder theory and new insights about sustainability, especially CMA and GIC, in designing CTPI which affects FMP in the context of mining companies in developing countries Indonesia amid the pressure of global warming.

Keywords: *Carbon Manageent Accounting,Green Intellectal Capital2, Carbon Tax Policy Initiative,Firms Market Performance.*

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INTRODUCTION

The lack of cooperation between companies in the fight against global warming has increased the risk of global carbon emissions for global warming (Akkaya & Bakkal, 2020). Global warming is a consequence of the accumulation of carbon dioxide (CO_2) in the atmosphere (van der Ploeg & Withageny, 2015). The Earth's temperature has increased by 4°C, between 2011 and 2020 (Renata et al., 2024), while CO_2 concentrations may increase by between 75%-350% above pre-industrial levels in the twenty-first century (Dilasari et al., 2022). If CO_2 emissions are not reduced, global temperatures could increase between 1.4-5.80 C by 2100 (Dilasari et al., 2022). As a result, all corporate activities have become a special priority for most countries, as they threaten sustainability. The United Nations Framework Convention on Climate Change (UNFCCC) has united to reduce carbon emissions as a cause of global warming (Renata et al., 2024). So to mitigate this

climate change, the Indonesian government has voluntarily made a commitment to reduce national greenhouse gas emissions (Dilasari et al., 2022). Indonesia contributes 51% of CO_2 emissions from coal and is the world's 4th largest CO_2 GHG emitter in Gigatons (Gt) from 2016 to 2019 (Filzah Primardiningtyas, 2025; Dilasari et al., 2022). Following up on global agreements, one of which establishes a tax on carbon emissions for industrial operations. The implementation of carbon tax on companies is significant (Filzah Primardiningtyas, 2025), because carbon tax is one of the best options to reduce global warming (Dilasari et al., 2022). Indonesia is relatively slow in adopting carbon tax policies compared to other countries such as Japan (Renata et al., 2024). The long time span from the signing of the Paris agreement in 2016 to the enactment of the Harmonization of Tax Regulations Law in 2021 on carbon tax has made Indonesia not serious about preventing carbon gas emissions. As a result, until now, accounting standards that adopt IFRS have not made the regulation mandatory (Shodiq & Febri, 2015).

Meanwhile, global demands are getting higher and triggering companies to disclose carbon tax policies in sustainability reports (Filzah Primardiningtyas, 2025). The integration of carbon tax into the sustainability report is a business strategy to gain trust in the global market (Renata et al., 2024), although it is still voluntary (Shodiq & Febri, 2015). The carbon tax is considered to add to the financial burden and image of environmental care and has no direct effect on sustainable performance (Shodiq & Febri, 2015). Whereas carbon tax is an integral part of operational strategy within the sustainability value framework, (Filzah Primardiningtyas, 2025). Based on the above, this study examines two factors that trigger the implementation of carbon tax policies as a company's contribution to the environment such as GIC (Abreu et al., 2017; Susandya et al., 2019; Obeidat et al., 2021; Jabbour & Jabbour, 2016; Stovel & Bontis, 2002; Y. S. Chen, 2008; Huang et all, 2011; Chen et al., 2012; Jabbour & De Sousa Jabbour, 2016; Asiaei et al., 2020; Asiaei & Bontis, 2020; Muhammad et al., 2020; Filzah Primardiningtyas, 2025) and the role of Carbon management accounting in decision making (Shodiq & Febri, 2015; Filzah Primardiningtyas, 2025).

Green Intellectual capital has attracted several researchers such as (Sumaryo et al., 2024; Sumaryo et al., 2023; Yadiati et al., 2019; Shah et al., 2021; Sidik et al., 2019; Malik et al., 2020; Zéghal & Maaloul, 2010; Clarke et al., 2011; Andreeva & Garanina, 2016; Obeidat et al., 2021; Barney & Hesterly, 2012; Busch et al., 2015; Rezaei et al., 2016; Susandya et al., 2019; Lu et al., 2021). GIC as a key factor for environmental regulatory compliance (Chang and Hen, 2012; Rezaei et al., 2016; Yusoff et al., 2019; Obeidat et al., 2021). The implementation of GIC by Indonesian companies is still below 50% (Suhardjanto & Wardhani, 2010; Barus & Siregar, 2015; Setiawati & Agustina, 2016). Especially in the Indonesian mining sector and is still rare (Sumaryo et al., 2024; Sumaryo et al., 2023). GIC is relevant to the integrality of reports that have aspects of profit, planet and people (Smith & Sharicz, 2014; Al Farooque & Ahulu, 2017; Dewi & Edward Narayana, 2020; Bunget et al., 2020). GICs can be an appropriate and comprehensive solution for sustainable companies (Sroufe & Remani, 2018). GICs are in line with sustainable development (Global Sustainability Standards Board, 2013), as green assets for pollution prevention due to exploitation of natural resources (Lako, 2018; Dewi & Edward Narayana, 2020). GIC practices are related to the use of human resources and the physical environment (Morant et al., 2016; Huang et all, 2011; Chen et al., 2012;; Rezaei et al., 2016; Yousef Obeidat et al., 2017; Asiaei et al., 2020; Asiaei & Bontis, 2020) to achieve sustainability performance

(Susandya et al., 2019). Research (Yusoff et al., 2019) states that GIC in companies is a determining factor for environmental recovery (M. Y. C. Chen et al., 2012; Lu et al., 2021). The practice of GIC in Indonesia still refers to PSAK no. 19 (revised 2000) as part of Intangible Assets that are used to address environmental pollution and encourage value creation (Bontis, 1998; Stovel & Bontis, 2002; Asiaei & Bontis, 2020). GIC measurement with the GIC index (Bombiak, 2021; Singh & Van der Zahn, 2007) in six categories, namely: (1) employees; (2) customers; (3) information technology; (4) processes; (5) research and development; and (6) strategic statements. In addition to Singh and Zahn (2007) included in the management report to stakeholders is voluntary (Cotter et al., 2019). The second factor, carbon management accounting (CMA) has an important role in controlling pollution from business activities (Hansen & Mowen, 2006; Yunita & Selfiani, 2021; Ghofar & Sardar MN Islam, 2015; Qian et al., 2018; Ulupui et al., 2020). CMA assists company management in making decisions to reduce pollution (Duke et al., 1992; Lako, 2018a; Seetharaman et al., 2010; Fakoya & Imuezerua, 2021). The use of CMA is still debatable today (Toding et al., 2024; Hansen & Mowen, 2006; Yunita & Selfiani, 2021; Ghofar & Sardar MN Islam, 2015; Qian et al., 2018; Ulupui et al., 2020).

The use of CMA to determine carbon tax policy (Sofiyati & Hernawan, 2023). The application of CMA has a positive effect on carbon tax and market performance (Salsaibila, 2023). However, different results were shown by (Musthafa, 2024) that CMA had a negative effect on market performance. Research results Sofiyati & Hernawan, (2023) carbon implementation policies by companies are determined by CMA. Although some investors tend not to be interested in the carbon tax policy resulting from the CMA (Alsaifi et al., 2020). Other findings. Derwall et al., 2004) that shows that the implementation of corporate green policies in Australia shows the existence of higher CMA practices on the environment with more positive effects on market value than companies without CMA. CMA affects market performance (Siddique et al., 2021) and also affects carbon tax policy (Musthafa, 2024; Salsaibila, 2023; Akkaya & Bakkal, 2020; Derwall et al., 2004). The same findings were made by Reshetnikova et al., (2023) stating that CMA makes it easier for management to make IKCT and also has a positive effect on market performance. However, different findings were made (Alsaifi et al., 2020; Sofiyati & Hernawan, 2023). That CMA has a negative effect on FMP.

This research is expected to make a positive contribution theoretically and practically on the issue of the use of carbon management accounting by the management of Indonesian mining companies in designing effective policies to reduce carbon emissions. In addition, this research is important for the development of carbon tax GIC and market performance. The novelty of this research lies in the use of GIC and CMA in total in influencing the application of carbon tax in Indonesian mining companies which is relatively new and voluntary and has an impact on market performance in contrast to previous researchers focusing on each element of GIC, such as (Y. S. Chen, 2008) Yusoff et al., 2019) (Chang & Chen, 2012) (Busch et al., 2015; Khan et al., 2019). The GIC measurement adopts (Sumaryo et al., 2024; Sumaryo et al., 2023). The next novelty lies in the use of carbon management accounting including; 1) Carbo emission trading information; 2) Energy consumption information, 3) Savings information from the aspect of zero carbon product labeling; 4) corporate carbon emission reporting (Gibassier & Schaltegger, 2015) is a source of green and scarce assets used for the implementation of carbon taxes and market

performance enhancement based on secondary data annual reports in the context of mining companies in Indonesia.

Stakeholders Theory

This theory explains that companies do not only carry out activities only for the company itself. Instead, the company should provide benefits to all stakeholders (Freeman R.E, 1984). Stakeholder support for the company affects the existence of the company. Good relationships with its stakeholders will be a source of strength for the company. This relationship forms the company's harmonious relationship with external parties (Pratama, 2021). This harmonious relationship helps the company to achieve sustainability (Freeman R.E, 1984), whether individual or in the form of a group (R. E. Freeman & Dmytriyev, 2017) has an impact on increasing public trust in the company (Freeman R.E, 1984). This means that the use of stakeholder theory in the context of this study is an access door to information on company activities related to the use of green intangible assets in the form of GIC and CMA (Sumaryo et al., 2024) as an important factor in determining Carbon Tax policy initiative (CTPI) and Firm Market performance / (FMP).

Carbon Tax policy initiative (CTPI)

Carbon Tax policy initiative (CTPI) is an internal company policy mechanism related to operational activities that cause carbon emissions (Dilasari et al., 2022). CTPI aims to reduce greenhouse gas emissions and support the government's commitment to tackling climate change. Carbon emissions are also known as greenhouse gases, which are the output of daily human actions. Meanwhile, CTPI is a form of pigouvian tax to compensate for negative externalities generated by carbon emission activities (Akkaya & Bakkal, 2020; Salsaibila, 2023; Akkaya & Bakkal, 2020). IKCT makes the hidden social costs of carbon emissions visible. CTPI effectively mitigates global warming (Akkaya & Bakkal, 2020). The Indonesian government has attempted to slow climate change by passing Law No. 7 of 2021 on Harmonization of Tax Regulations (HPP Law) (Renata et al., 2024), Article 13 paragraphs (8) and (9) on the lowest carbon tax rate of IDR 30 per kilogram of CO_2e or equivalent units. The HPP Law is an instrument to control climate change in Indonesia starting in 2025. The implementation of this law is relatively slow compared to other Asian countries, such as Japan and Singapore (Renata et al., 2024). The HPP Law (Republik Indonesia, 2021) contains a number of points as follows: carbon emission reduction strategy, priority sector targets, alignment with new and renewable energy development and alignment between various policies (Dilasari et al., 2022). Until now, CTPI is still voluntary (Shodiq & Febri, 2015) and there is no accounting standard that adopts IFRS as mandatory (Shodiq & Febri, 2015). CTPI is a net zero emission strategy (Renata et al., 2024) for climate change control (Filzah Primardiningtyas, 2025). Previous research results have not been solid (Reshetnikova et al., 2023). Some studies suggest that CTPI brings confidence in the global market (Renata et al., 2024; Sofiyati & Hernawan, 2023). CTPI also affects FMP (Salsaibila, 2023; Akkaya & Bakkal, 2020).   However, findings differ that CTPI is detrimental to investors because it reduces profits and profitability (Alsaifi et al., 2020; Sofiyati & Hernawan, 2023). CTPI can have a higher influence on market performance than companies without CTPI (Derwall et al., 2004). The reason is that CTPI is determined by the use of green intangible assets such as GIC (Sumaryo et al., 2024), and CMA (Salsaibila, 2023; van der Ploeg & Withageny, 2015; Droege, 2011).

Carbon Management Accounting (CMA)

Carbon Management Accounting (CMA) can have a positive role in environmental control (Hansen & Mowen, 2006). Companies will not be sustainable if there is no environmentally friendly management accounting practices (Jorge Alves Gomes, 2023). An important issue in management accounting is related to sustainable development due to business operations (Jorge Alves Gomes, 2023). Management accounting can integrate environmental information into the decision-making process (Hansen & Mowen, 2006; Schaltegger et al., 2012; Jorge Alves Gomes, 2023). Management accounting is, specifically, a part of accounting science for use by internal parties in making decisions ((Hansen & Mowen, 2006; Jorge Alves Gomes, 2023)). Management accounting affects the environmental performance and financial performance of the organization (Hansen & Mowen, 2006; Jorge Alves Gomes, 2023). Management accounting for internal and external decision making (Hansen & Mowen, 2006; Jorge Alves Gomes, 2023). Management accounting is an effective tool for communicating company performance comprehensively, having an impact on increasing stock returns (Lako, 2019). The existence of management accounting can foster systemic trust in order to increase the company's market value (Drice & Nuryani, 2022).

Green intellectual capital (GIC)

Green intellectual capital (GIC) is a green intangible asset to control the environment (Sumaryo et al., 2024; Abreu et al., 2017; Susandya et al., 2019; Obeidat et al., 2021; Jabbour & Jabbour, 2016; Stovel & Bontis, 2002; Y. S. Chen, 2008; Huang et all, 2011; Chen et al., 2012; Jabbour & De Sousa Jabbour, 2016; Asiaei et al., 2020; Asiaei & Bontis, 2020; Muhammad et al., 2020; Filzah Primardiningtyas, 2025.; Chandra & Augustine, 201); Lako, 2018b). GIC is important for knowledge growth (Chen et al., 2012). GIC provides added value to the organization and an important source of the company ((Yousef Obeidat et al., 2017). This is in line with the results of research (Rezaei et al., 2016; Yousef Obeidat et al., 2017; Obeidat et al., 2021) that GIC is a hidden green asset in the company and is important and must continue to work and produce performance even though, the employee leaves the company (Rezaei et al., 2016). GIC includes three components namely GHC, GSC and GRC (Stovel & Bontis, 2002; Y. S. Chen, 2008; Huang et all, 2011; Chen et al., 2012;, Asiaei et al., 2020; Asiaei & Bontis, 2020).

Firms' market performance (FMP).

Firms' stock market performance (FSM) is a crucial variable for the assessment of investors in accordance with the goal of maximizing profits (Nafiah & Sopi, 2020; Rahman et al., 2020; Bunget et al., 2020; Maaloul et al., 2018; Herawaty, 2018), if profitablity is high because the company has tinnngi green intangible asset performance assets as well (Sumaryo et al., 2024; Sumaryo et al., 2023; Bombiak, 2021) and carbon disclosure has been done well (Alsaifi et al., 2020). This reflects the condition of sustainable companies and reflects the level of public trust (Bunget et al., 2020; Maaloul et al., 2018). Therefore, FSM reflects the company's achievements (Nafiah & Sopi, 2020), the higher the FSM ratio, it means that the market believes in the prospect of the company being able to use green intangible assets in operational activities, especially for controlling carbon emissions by the company.

METHODOLOGY

The research population focuses on mining sector companies on the Indonesia Stock Exchange from 2021-2023 that conduct sustainability reports published by the company. Sample with purposive sampling method. There are several statistical tests carried out including; descriptive statistical testing, model selection testing, classical assumption testing, model feasibility testing, hypothesis testing and panel data regression analysis. The sample selection method is purposive sample, with the following criteria; companies are mining sector companies listed on the Indonesia Stock Exchange for the 2021-2023 period, obtained as many as eighty-seven (87). Sixty-six (66) non-coal mining sector companies. Companies that did not publish audited annual financial reports during the 2021-2023 period were sixteen companies. The number of research samples was 15 companies for 3 years so that the observation data was 45.

Operational and measurement variables

Firms market performance (FSM) is the value of the company's market performance as measured using ROA (Marantika, 2018). FSM measurement uses a ratio scale (Nafiah & Sopi, 2020; Yunita & Selfiani, 2021). Variable carbon tax policy initiative (CTPI) is an internal company policy related to activities that use fossil fuels or activities that cause carbon emissions, including; 1) emission reduction strategies carbon; 2) target priority activities, 3) alignment with renewable energy development and; 4) alignment between various policies (Dilasari et al., 2022). CTPI measurement with an index derived from the number of item scores divided by the total number of items studied, if there is a CTPI indicator, it is scored one. If there is no indicator, it is zero. The variable carbon management accounting (CMA) is the management activity of doing; (1) disclosure of carbon emission trading information; (2) disclosure of energy consumption information; (3) disclosure of savings information from the aspect of zero carbon product labeling; and (4) reporting of corporate carbon emissions (Gibassier & Schaltegger, 2015). Measurement with the ratio index is obtained by dividing the number of items obtained divided by the total number of indicator items studied. This adapts research (Chandra & Augustine, 2019; Pratama, 2021.; Maychandra & Nelvirita, 2023). GIC is a green asset contained in a sustainable company report including 19 indicators from the aspects of green human capital, green structural capital and green relational (Sumaryo et al., 2024; Sumaryo et al., 2023).

The effect of carbon management accounting (CMA) on carbon tax policy initiative (CTPI).

Carbon management accounting (CMA) has a positive role on carbon tax. CMA can help management identify operational efficiency, and improve the competitiveness of companies in the global market. The implementation of CMA by the company means that the company fulfills all stakeholder interests. This is in line with the stakeholder theory (Freeman R.E, 1984) that companies should contribute positively to all stakeholders. The use of CMA means providing easy access to information to all parties to the company, such as strategies to reduce emissions ((Hansen & Mowen, 2006; Jorge Alves Gomes, 2023)). Empirically, this can be seen in the company's annual report (Jorge Alves Gomes, 2023), such as information on renewable energy activities, optimization of production processes, or energy efficiency, emission control and carbon tax costs. CMA is an effective tool for comprehensively communicating company performance (Hansen & Mowen, 2006; Gibassier & Schaltegger, 2015; Jorge Alves Gomes, 2023), which has an impact on

increasing the trust of all parties to the company as seen from the increase in CTPI in its annual report. Based on this description, the thesis is
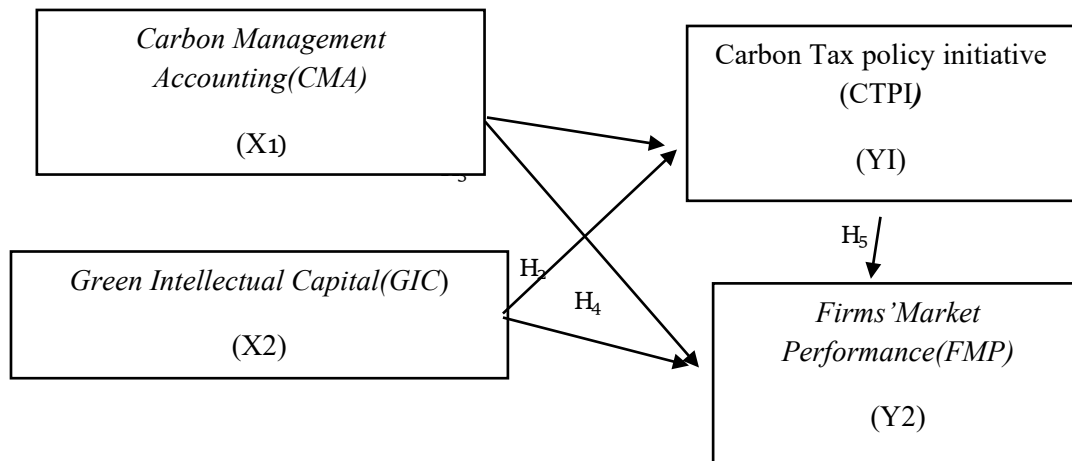
H1: CMA has a positive effect on CTPI.
H2:   GIC has a positive effect on CTPI
H3:   CMA has a positive effect on FMP
H4: GIC has a positive effect on FMP
H5; CTPI has a negative effect on FMP

RESULTS AND DISCUSSION

Descriptive Statistics

Table.1; Summary of Descriptive Statistics Results

Uraian	CMA	GIC	CTPI	FMP
Mean	0.2702	0,891,	0,503	0,931228
Maximum	1,000	1,000	0,81	0,5623
Minimum	0,250	0,412	0.240	0,455789
Std. Dev.	0.534181	0,124	0,1047782	0,931228
Observations	45	45	45	45

Sumber; Proses data Eviews.13.2025

Obtained CMA variable has a maximum value of 1, meaning that the company carries out all indicators obtained by PT A, PT BA Tbk, PT M Tbk, and PT AT Tbk. The average value (mean) is 0.2702, and the standard deviation value is 0.53529. This condition describes a relatively small data distribution, and data values are more homogeneous or consistent, because the standard deviation is smaller than the average value. GIC variable has a maximum value of 1, meaning that the company carries out all indicators obtained by PT A, PT BA Tbk, PT M Tbk, and PT AT Tbk. The average value (mean) is 3.8283, and the standard deviation value is 0.53529. This condition describes a relatively small data distribution, and data values are more homogeneous or consistent, because the standard deviation is smaller than the average value. The CTPI variable has a maximum value of 1, meaning that the company has carried out all the indicators obtained by PT A, PT BA Tbk, PT M Tbk, and PT AT Tbk. The average value (mean) is 3.8283, and the standard deviation value is 0.53529. This condition describes a relatively small data distribution, and the data values are more homogeneous or consistent, because the standard deviation is smaller than the average value. The Firm Market Performance (FMP) variable as the dependent variable Y2. is obtained from the calculation of profitability with the ROA

(Return of Assets) proxy with the formula of current year profit divided by total assets, so that the lowest value in FMP is 0.5623 obtained by PT G. Tbk. While the maximum value in FMP is 0.455789 obtained by PT BR Tbk. The mean value of FMP is 0.8434 and the standard deviation value is 0.931228. This shows some things that are not good, the data distribution is relatively large, and the data values are more heterogeneous, because the standard deviation is greater than the average value.

Testing the selection of Panel Data Regression Estimation Model.

Model panel pertama	Hitung	P value	Keputusan
Chow Test(CEM Vs FEM)	Fhitung = 38.843674	0.0000	FEM
Haussman Test (FEM Vs REM).	Chi-Sqstatistic=6.059439	0.295	*REM*
Lagrange Multiplier Test (CEM Vs REM)	Breusch-Pagan=321.7868	0.000	*REM*
Model panel kedua	Hitung	P value	Keputusan
Chow Test(CEM Vs FEM)	Cross-section F =4.13727	0.0000	FEM
Haussman Test(FEM Vs REM)	Chi-Sq statistic =5.381569	0.6135	*REM*
Legrange Multiplier Test(CEM Vs REM)	*Breusch-pagan =42.0296*	0.0000	*REM*

Sumber; Proses data Eviews.13.2025

Based on Table 3, the first panel data regression model selection test, the Chow test results, the p value is 0.0000 <significant value of 0.05. The Hausman test results obtained a p value of 0.295 greater than the significant value of 0.05. Then the Legrange Multiplier test results, obtained a value of 0.000 greater than the significant value of 0.05. Looking at the results of the Chow test, Hausman test and LM, the selected model in the first panel data regression estimation model is REM. Furthermore, the results of the selection of the second panel data regression model by looking at the results of the Chow test, Hausman test and LM, the selected estimation model in the second panel data regression model is the REM model.
Classical Assumption Test Results

Model pertama	Jenis pengujian	Keimpulan
Jumlah data observasi (n) = 45		
Uji Normalitas		
Regresi panel	Jarque Bera= 3, 85971351 .Probability=0,14516	distrubsui Normal
Multikolinieritas Test; Variance Inflation Factors		
Variabel		
CMA	*Centered VIF=* 1.2825	Memenuhi
GIC	*Centered VIF=*1.5799	Memenuhi
CTPI	*Centered VIF=*1.808	Memenuhi
Heteroskedastisitas test ;Breusch Pagan Godfrey		
Regresi panel	Obs*R-squared = *21*,1843, *Probability=*0.1758	Memenuhi
Uji outokorelasi; Durbin Watson		
Model	DW Statistik	Indikator Keputusan
Model panel	1.089103	1<Dw< 3, Memenuhi

Proses data Eviews.13.2025

above that the first panel data regression model is normally distributed as measured by the Jarque Bera value = 3.8597135. Probability = 0.14516 > 0.05. The

results of the Multicollinearity Test are measured by the Variance Inflation Factors value below 10, meaning it is free from multicollinearity. The results of the Heteroscedasticity test are measured by Breusch Pagan Godfrey with an Obs * R-Squared value of 21.1843, and a prob value of 0.1758, meaning there is no heteroscedasticity. The results of the autocorrelation test are measured by the statistical DW value of 1.089103 located in position 1 <DW < 3. So it can be concluded that the panel data regression model is free from autocorrelation.

Summary of classical assumption testing of second panel data regression

Model1	Jenis pengujian	Keimpulan
Jumlah data observasi (n) = 45		
	Uji Normalitas	
regresi panel	Jarque Bera= 0.789116 . Probability=0,67397	distrubsui Normal
Multikolinieritas Test; Variance Inflation Factors		
Regresi panel		
CMA	*Centered VIF=1.9911*	Memenuhi
GIC	*Centered VIF=1.6145*	Memenuhi
CTPI	*Centered VIF=1.998*	Memenuhi
FMP	*Centered VIF= 2.224*	Memenuhi
Heteroskedastisitas test ;Breusch Pagan Godfrey		
Regresi panel	Obs*R-squared = 19.84458. *Probability*=0.2273	Memenuhi
Uji outokorelasi; Durbin Watson		
Model	DW Statistik	Indikator Keputusan
Model panel	1.314489	1<Dw< 3, Memenuhi

Testing the selection of the second panel data regression model, obtained the second panel data regression model is normally distributed as measured by the Jarque Bera value = 0.789116, probability = 0.6737 > 0.05. The results of the Multicollinearity Test are measured by the Variance Inflation Factors value below 10, meaning it is free from multicollinearity. The results of the Heteroscedasticity test are measured by the Breusch Pagan Godfrey with the Obs * R-Squared value, of 19.84458, and the prob value of 0.2273, meaning there is no heteroscedasticity. The results of the autocorrelation test are measured by the statistical DW value of 1.3144898 located in position 1 <DW < 3. So the panel data regression model is free from autocorrelation.

Summary of hypothesis testing

Struktur	*Variabel*	*Prediksi*	*Koefisien (β)*	*Prob.*	Keputusan
Model 1	CMA→ CTPI	+	0.236904	0.0013	H1, Diterima
	GIC→ CTPI	+	0.055228	0.0100	H2, Diterima
	Constant		0.633311	0,0000	
	Adjusted R-squared		0.524291		Cukup
	S.E. of regression		11.50470		
	F-statistic		6.413388		
	Prob(F-statistic)		0.000000		Layak
Model 2	CMA→ FMP	+	0.032583	0.2007	H1, Ditolak
	GIC→ FMP	+	0.236904	0.0013	H2, Diterima

	CTPI→ FMP	+	0.014756	0.3512	H_2, Ditolak
	Constant		0.382521	0,0000	
	Adjusted R-squared		0.5147		Cukup
	S.E. of regression		0.063342		
	F-statistic		3.480454		
	Prob(F-statistic)		0.009313		Layak

Obtained coefficient value ☐1 for variable CMA of 0.236904, and Prob value of 0.0013 <α 0.05, meaning that variable CMA has a positive effect on CTPI, then hypothesis (H1) is accepted. Variable GIC has a prob value of 0.0100 <α 0.05, coefficient value ☐2 of 0.055228, meaning that GIC has a positive effect on CTPI, then hypothesis (H2) is accepted. Based on table 6 above. Then the first panel data regression equation is written as follows; CTPIit= 0.633311 + 0.236904 (CMA)+0.055228 (GIC)+ Eit

Furthermore, the second panel data regression in table 6 above provides information that the CMA variable has a significance value (p-value) of 0.2007 greater than 0.05, a coefficient value (☐3) of 0.03253. This means that CMA does not have a positive effect on FMP. This result is not in accordance with the proposed hypothesis, so H3 is rejected. The GIC variable has a significance value (p-value) of 0.0013 less than 0.05 and a coefficient value (☐) of 0.236904. This means that GIC has a positive effect on FMP. This result is in accordance with the proposed hypothesis, so H4 is accepted. The CTPI variable has a significance value (p-value) of 0.315 which is greater than 0.05 and a coefficient value (☐) of 0.0147, meaning that CTPI does not have a positive effect on FMP. This result is not in line with the proposed hypothesis, so H5 is rejected. Based on table 6 above, the second panel data regression equation can be written;
FMPit= 0.382521+ 0.032583 (CMA)+ 0.236904 (GIC)+)+ 0.014756 (CTPI)+Eit

The Influence of Carbon Management Accounting (CMA) on the Carbon Tax Policy Initiative (CTPI).

Based on the statistical results in table 6, Carbon Management Accounting (CMA) has a positive effect on the Carbon Tax Policy Initiative (CTPI). Because the significant value is smaller than 0.05. This shows that the implementation of CMA in a mining company is significant in determining the carbon tax policy initiative. The implementation of CMA will provide complete information in line with the information needs of stakeholders such as carbon emission trading information, energy consumption information, savings information from the aspect of zero carbon product labeling, and reporting of company carbon emissions.

The Influence of Green Intellectual Capital (GIC) on Carbon Tax Policy Initiative (CTPI) Based on the results of the statistical test in table 6 above, it shows that Green Intellectual Capital (GIC) has a positive influence on the carbon tax policy (IKCT). Because GIC obtains a significant value of less than 0.05. These results prove that GIC in mining companies in Indonesia can be used to reduce carbon emissions and improve sustainability performance, so that carbon tax policies become more effective. Companies with strong GICs that focus on sustainability will have an impact on improving IKCT better.

The influence of carbon management accounting (CMA) on firms market performance (FMP).

Based on the results of the statistical test in table 6 above, CMA has no effect on FMP. The amount of CMA of a company will not increase the company's profitability. The implementation of CMA in the short term by management has not produced stable information needed by management. The results of the score obtained from the four CMA indicators found in the sustainability report include, in carbon emission trading information, energy consumption information, savings information from the aspect of zero carbon product labeling, reporting of company carbon emissions is still insufficient to improve the company's market performance because most are still below average. In addition, there are differences in perspective by users of the CMA report. Although the average CMA is greater than the average, it does not guarantee an increase in FMP. This happened to PT AT Tbk which had a perfect CMA, but low FMP performance, while PT IT Tbk which had a CMA of three indicators, actually had higher FMP performance. This reflects that CMA is still treated differently by and has not been the main variable for decision making.

The Influence of Green Intellectual Capital GIC on Firms Market Performance (FMP).

Based on the results of the statistical test in table 6 above, it shows that Green intellectual capital (GIC) has a positive influence on FMP. Because GIC obtained a significant value of less than 0.05. These results prove that GIC in mining companies in Indonesia can be used to predict market performance with the ROA profitability proxy. Green intellectual capital has a positive effect on firms market performance with ROA (Return on Assets) measurements because GIC increases the company's ability to compete in the market, reduces costs operational through environmental efficiency, and improve positive image in the eyes of consumers and stakeholders.

The Effect of Carbon Tax Policy Initiative (CTPI) on Firms Market Performance (FMP).

Based on the results of the t-test listed in table 6, the results of the study indicate that CTPI has no effect on FMP. The amount of CTPI of a company will not affect the increase in company profitability. The results of the CTPI indicator scores found in the sustainability report include carbon emission reduction strategies, explanations of priority activity targets, analysis of Alignment with renewable energy development and alignment between various policies are still not enough to improve the company's market performance because most are still below the average of 75%. CTPI included by management in the sustainability report has no effect on FMP.

CONCLUSION

This study found that CMA has a positive effect on CTPI. The use of CMA helps various parties, especially management in designing the company's carbon tax policy scheme. This is an effort to improve the image and trust of external parties towards mining companies that actively participate in reducing carbon emissions. This is in line with stakeholder theory, that companies are not only for internal interests, but also for external interests. However, the results of the study also show that CMA has no effect on Firm Market Performance (FMP) measured by Return on

Assets (ROA) because CMA in sustainability reports has a high level of subjectivity, and is not directly proportional to FMP. FMP is contained in the financial statements resulting from the accounting cycle process with a high level of objectivity. The results of the next study showed that Green Intellectual Capital (GIC) has a significant positive effect on both CTPI and Firm Market Performance (FMP) measured by Return on Assets (ROA) of Indonesian mining companies, during the period 2021-2023. This means that the management of GIC as a green intangible asset to the maximum in its implementation is always directly proportional to the increase in Firm Market Performance (FMP) in the short term. In addition. This study also found that CTPI included by management in the sustainability report has no effect on FMP. CTPI is a policy that is still voluntary and tends to reduce profits in the short term. Carbon tax policies can increase operating costs. This can reduce profitability and, as a result, reduce FMP as measured by ROA. Determination of CTPI can lead to increased energy prices. For companies that use fossil energy, it can have a direct impact on increasing production costs and decreasing net profits which ultimately reduce FMP.

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