

2nd Global Conference on Business and Social Science-2015, GCBSS-2015, 17-18 September 2015, Bali, Indonesia

The Effect of GHG Emission, Environmental Performance, and Social Performance on Financial Performance of Listed Manufacturing Firms in Indonesia

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Abstract

The study aims to understand the effect of GHG emissions, environmental performance (EP), and social performance (SP) on financial performance (FP) of listed manufacturing firms in Indonesia. Sampling was based on the availability of the firms' annual reports 2011 and interview feedback about the type and amount of fossil fuels and electricity consumed by the firms in 2011. Firm FP was measured in return on assets (ROA). GHG emissions were measured in CO₂e intensity. Firm EP was measured in a dummy variable of PROPER rating. Firm SP was measured as social reporting scores developed through a content analysis. We found that CO₂e intensity and social reporting scores have a positive and significant effect on ROA. The coefficient of PROPER rating was not significant.

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Peer-review under responsibility of the Organizing Committee of the 2nd GCBSS-2015

Keywords: GHG emissions; environmental performance; social performance; financial performance; Indonesian listed manufacturing firms.

1. Introduction

Prior studies on firm SP examine the relationship between firm SP and firm FP (for example Gray, 2006; Van Beurden and Gössling, 2008; and Margolis et al., 2009). Firm EP was included in the firm SP itself. The increasing concern about environmental issues motivates many researchers to separate environmental dimensions from social dimensions. Accordingly, studies (for example Al-Tuwaijri et al., 2004; Montabon et al., 2007; and Nakao et al., 2007)

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were conducted which separately measured firm SP and firm EP. Most of the prior studies using environmental dimensions do not capture the issues of GHG emissions. In recent years, in line with the growing concern about the issues of climate change, there have been increasing efforts in research to use GHG emissions as one of the measurements of firm EP, as these emissions can have a significant effect on the business environment and firm operations. The existing research has been conducted to examine the relationship between GHG emissions and firm FP (Busch and Hoffmann, 2011; Iwata and Okada, 2011; Hatakeda et al., 2012; Delmas and Nairn-Birch, 2010). GHG emissions may have an effect on firm performance in several ways. Firstly, the Kyoto Protocol ratification may drive a systematic change in the business environment which impacts firm performance. Furthermore, governments may introduce carbon regulations, such as a carbon tax (in Australia), a carbon trading scheme (in the EU), or energy management (in Indonesia) as part of their commitment to reduce GHG emissions as mandated in the Kyoto Protocol. The carbon tax, carbon trading scheme or the introduction of energy management would increase costs and risk to firm operations (Busch and Hoffmann, 2011). Secondly, firm stakeholders such as governments, customers, trading partners, employees, investors and creditors become more concerned about the issues of climate change (Brinkman et al., 2008). These factors may increase firm costs (Busch and Hoffmann, 2011). To be successful in the long run, firms need to address these issues and manage their business by incorporating climate change into their strategic decisions (Kolk and Pinkse, 2005). While there are enormous study to examine the relationship between firm SP and firm FP, between firm EP and firm FP; there are limited studies that have been conducted to examine the relationship between GHG emissions and firm FP. This study, therefore, proposes to fill the significant gap in the literature by providing empirical evidence of the relationship between GHG emissions and firm FP. The remainder of the paper is organized as follows. Section 2 reviews theory and hypotheses. Section 3 describes the methodology and data. Section 4 presents results and analysis. The last section describes the conclusion.

2. Theory and hypotheses

2.1. Relationship between GHG emissions and firm financial performance

The relationship between firm GHG emissions and firm FP can be explained by instrumental stakeholder theory (Jones, 1995), which suggests that if a firm wants to be more successful in the long run, it must pay attention to stakeholders' interests. Stakeholders can be defined as 'any group or individual who can affect or is affected by the achievement of the organization objectives' (Freeman, 1984, p. 46). Ignoring stakeholders' interests will make it difficult for a firm to achieve its goals (Jensen, 2001), as the negative reactions of stakeholders are likely to increase costs (Berman et al., 1999). The introduction of climate regulation and the shifting behaviours of environmentally conscious stakeholders cause GHG emissions to become a more notable risk to firms, with a growing movement towards a low-carbon economy. Climate regulation and stakeholders' pressure on firms to respond to GHG emissions may affect FP if firms do not respond to the pressure. This will make it easy or difficult for a firm to achieve its objective of 'maximising firm value' through improving FP, and vice versa. Further, Porter and van de Linde (1995) suggest that firms may earn benefits because the government imposes powerful environmental regulations. Such regulations play a role in motivating firms to innovate and innovation allows firms to reduce costs and improve their competitiveness. In contrast, where regulations are ineffective, firms tend to delay their response to the development of a low-carbon economy (Porter and van der Linde, 1995), which may not result in serious legal problems. It can be concluded that with stakeholders' pressure and powerful environmental regulations, GHG emissions will have a negative effect on FP. Conversely, with a low level of stakeholders' pressure and ineffective environmental regulations, GHG emissions will have a positive effect on firm FP. To examine this statement, the following hypothesis is proposed.

Ha₁ CO₂e intensity of firms has a significant effect on ROA

2.2. Relationship between firm EP and firm financial performance

To connect firm EP and firm FP, Porter's competitive advantage theory can be used. An increase in stakeholders' pressure drives firms to be more responsible for minimising their negative effects on the environment. Failure to respond to the pressure will make it difficult for firms to achieve their goals. In contrast, success in responding to pressure will allow firms to more easily achieve their goals by recognising the opportunities in environmental issues. Porter and van de Linde (1995) suggest that firms must start to recognise the opportunity to make money from

environmental issues rather than viewing them as detrimental costs or threats. To do so, they can implement a least-cost strategy of competitive advantage theory (Hoffman, 2006) through the implementation of eco-efficiency and environmental cost leadership (Orsato, 2006), which stress the reduction of the costs of production and waste disposal. It allows firms to reduce or change their emissions and waste discharge through better housekeeping, material substitution and recycling in the production process. Accordingly, an increase in the efficiency of production will result in better utilisation of inputs, replacement of polluting inputs, savings from recycling or reusing materials, and a reduction in waste disposal costs (Schmidheiny, 1992). This may also enable firms to cut compliance and liability costs by committing to reduce emissions well below the required levels (Porter and van der Linde, 1995). However, it will not be the case if stakeholders are less concerned about environmental issues (i.e., as long as the firm does not break the law) than their profitability. The improvement of the firm EP following an increase in costs will be responded negatively by stakeholders. It can be concluded that firm EP will have either a positive or negative effect on firm FP. In this research, environmental performance will be measured using a PROPER rating. To examine the effect of firm EP on firm FP, the following hypothesis meets this objective:

Ha₂ PROPER rating of firms has a significant effect on ROA.

2.3. Relationship between firm EP and firm FP

When a firm fails to contribute to social development, preserve environmental sustainability and deliver financial benefits despite stakeholders' pressure, it can damage its reputation. Investors and creditors will lose confidence and this will consequently increase the cost of equity and debt. Absenteeism and staff turnover may also increase because of poor working condition. Local communities and NGOs may take legal action if the firm does not comply with social rules and environmental regulations. Further, the government may impose penalties. Accordingly, this will increase the costs of the firm. Conversely, if a firm can fulfil stakeholders' expectations, it is likely to achieve benefits, including maximising profits and increasing the value of the firm (Jensen, 2001, Andriof and Waddock, 2002). In instrumental stakeholder theory, Jones (1995) argues that firms that work on the basis of honest, trusting and ethical relationships will be rewarded by stakeholders in terms of positive reputation effects, thereby making these firms suitable business partners. By extension, firms that are high/low in firm SP should benefit/be at a disadvantage financially from their positive/negative interactions with stakeholders. Hence, firm SP will have a positive/negative effect on firm FP. To examine the effect of firm SP on firm FP, the following hypothesis is established:

Ha₃ Social performance reporting scores have a significant effect on ROA.

3. Data

This study uses primary data to measure GHG emissions. The primary data were collected by interviewing a key person from each firm who had knowledge about the type and the amount of fossil fuels and electricity consumed by the firms in 2011. These data were converted into the kilogram of CO₂e by using the UK calculation system of Guidance on How to Measure and Report Your GHG Emissions (DEFRA, 2011). However, this research excluded indirect emissions that are not under the control of the firm, such as the activities associated with outsourced activities. The data of PROPER rating were secondary data published by the Indonesian Ministry of Environment. The data of social performance is collected from the firms' annual report in 2011 through content analysis. The sampling frame for this study comprises all listed manufacturing firms in Indonesia. Sampling was based on the availability of firms' annual reports in 2011, and the interview feedback. Of the 131 listed manufacturing firms that published their annual report in 2011, 102 firms provided feedback.

4. Methodology

4.1. Dependent variables

The dependent variable in this study is firm FP, which is measured by ROA. ROA is the ability of a firm to utilise its total assets to produce profits for shareholders, bondholders and creditors (Carton and Hofer, 2006). ROA in this research is computed using Formula 1 which has been proposed by Carton and Hofer, 2006. ROA is noted for return

on assets; NI is noted for net income; TA is noted for total assets; i is noted for firm i; 2011 is noted for end of year 2011; 2010 is noted for end of year 2010.

$$ROA_{i,2011} = \frac{NI_{i,2011}}{\frac{TA_{i,2011} + TA_{i,2010}}{2}} \quad (1)$$

4.2. Independent variables

Independent variables in this study is CO₂e intensity as the proxy of GHG emissions, a dummy variable of PROPER rating as the measurement of firm EP, and social reporting scores assessed through content analysis to measure firm SP.

CO₂e intensity is measured as the ratio of kilogram of CO₂e to cost of goods sold. CO₂e intensity measures how efficient every unit currency of cost of goods sold to produce GHG emissions; the higher the CO₂e intensity, the lower the efficiency. CO₂e intensity is formulated as follows where carbon intensity is CO₂e intensity; CO₂e is carbon dioxide equivalent; CGS is cost of goods sold; and i is firm i.

$$CO_2e \text{ Intensity}_{i,2011} = \frac{\text{Kilogram of } CO_2e_{i,2011}}{\left(\frac{CGS_{i,2011} + CGS_{i,2010}}{2}\right)} \quad (2)$$

Firm EP is measured in a dummy variable of the PROPER rating assessed by the Indonesian Ministry of Environment. In the PROPER rating system, firm EP is shown using five colours from the lowest to the highest ranking: black, red, blue, green and gold. Black is awarded for firms that have facilities without pollution control efforts. Red is awarded for those that have made some efforts to control pollution, but have insufficient reporting. A firm with facilities that meet legal standards and that provides reasonably regular reporting is given a blue rating. Green is given to firms that are proactive in reducing pollution and when the level of pollution produced is significantly below legally required standards. Further, they also maintain their equipment and regularly report activities associated with their efforts to reduce pollution and work on environmental issues. Finally, a gold rating is granted to firms that comply with the legal requirements that are set to achieve a green rating, and that fulfil some additional requirements, such as the use of clean production technology, waste minimisation and pollution prevention activities. They also conform to international standards of excellence (Kementrian Lingkungan Hidup, 2011). The PROPER program assesses firms based on several criteria, including water and air pollution control, management of hazardous waste and toxic materials, and the implementation of EIAs. Although air pollution control is introduced in the PROPER program, the criteria assessment of air pollution is based on the applicability of the regular control of air emissions and the availability of installed tools to monitor the concentration of SO₂ and particulates released through smokestacks. GHG emissions acknowledged by the IPCC include CO₂, N₂O, CH₄, SF₆, PFC₅ and HFC₅ which cause climate change are not calculated in the PROPER assessment. The PROPER assessment does not assess the amount of CO₂e produced by a factory in which CO₂e is closely related to the level of factory consumption of fossil fuel energy and electricity. Hence, there may be no problems associated with the issue of multicollinearity between the variable of GHG emissions and firm EP, as is statistically required in the multiple regression analysis. In this study, firms with PROPER ratings of blue, green and gold were categorised as high and were given value of one. This classification has been chosen because the blue rating is the minimum required standard for meeting the regulations. Firms with PROPER ratings of red and black, and firms with no PROPER rating were categorised as low and were given value of zero.

Firm SP is measured in social reporting score collected through content analysis from the firms' annual report in 2011. Content analysis is a technique that involves organising text into categories based on selected criteria. The ultimate goal of this method is to transform qualitative material into quantitative scales that allow further analysis (Weber, 1990). Besides focusing on the overall volume of the disclosed items or words, this research also focuses on the quality of the disclosed information or activities. The quality is assessed based on four coding schemes: content, forms of disclosure, timescale and type of news as developed by Placke et al. (2010). Firstly, the disclosed information is codified based on their content. To codify it, this research follows the guidelines provided by the Global Reporting Initiative (GRI, 2013). This research only includes the contents of social responsibility; it omits environmental and economic contents to avoid the problem of multicollinearity with the measurement of firm EP. The social indicators are grouped into four groups: labour practices and acceptable workplace environment, human rights, society, and product responsibility. Secondly, the disclosed information is codified based on forms of disclosure, which are classified into two categories: qualitative content (words) and quantitative content (numbers, tables, diagrams).

Thirdly, the disclosed information is codified based on timescale, which is divided into three timeframes: past, non-time and future. Past content means that certain activities are related to past events. Non-time content means that certain information is neutral information that is not related to past or future events. Future content means that certain activities are related to future events (Placke et al., 2010). Fourthly, the disclosed information or activities are codified based on type of news, which is divided into three subcategories: good, bad and neutral news (Placke et al., 2010). After establishing the analysis scheme, a weighting is developed to overcome the problems associated with unbalanced revelations between past and future events, between qualitative and quantitative data, and between good and bad news. The detailed weight for each theme is provided in Appendix A. Each disclosed data or information are assigned a score. This research uses a seven-point Likert scale to assign a score. Score ‘zero’ is assigned for no mention of a given social indicator. Score ‘one’ is assigned if a given social indicator is mentioned but only in reference to another document or statement. Score ‘two’ is assigned if a given social indicator is briefly mentioned. Score ‘three’ is assigned if a given social indicator is discussed with some detail but not extensive detail. Score ‘four’ is assigned if a given social indicator is discussed in detail. Score ‘five’ is assigned if a given social indicator is discussed with details that comprise more than 50 per cent of the document text (Placke et al., 2010). Score ‘six’ is assigned if a document is completely dedicated to the discussion of a given social indicator.

This research also includes three control variables in the analysis: firm size, firm risk (leverage), and firm capital intensity. Firstly, firm size is a determinant that influences the ability and propensity of a firm to make voluntary GHG disclosures and to improve its pollution-abatement performance (Freedman and Jaggi, 2005). In this research, firm size is measured as the logarithm natural (LN) of a firm’s sales in 2011 to make the data smoother. The formulation of firm size is as Formula 3, where Ln is logarithm natural; NS is net sales, and i is firm i.

$$\text{Firm Size}_{i,2011} = \frac{\text{Ln}(\text{NS}_{i,2011}) + \text{Ln}(\text{NS}_{i,2010})}{2} \quad (3)$$

Secondly, this research uses the firm leverage ratio as the proxy for firm risk as suggested by Iwata and Okada (2011). Leverage measures the extent to which a firm’s assets are financed by debt. It is a measurement of firm long-term risk. Leverage is computed using Formula 4, where, D is total debt; TA is total assets, and i is firm I (Citibank, 1994):

$$\text{Leverage}_{i,2011} = \frac{D_{i,2011}}{\left(\frac{TA_{i,2011} + TA_{i,2010}}{2}\right)} \quad (4)$$

Thirdly, firm capital intensity is the amount of money invested in order to receive one dollar of output. This is measured as the ratio of assets to sales (Russo and Fouts, 1997). Firms that are considered more capital-intensive produce the same units of production but need more invested capital. A Capital intensity can be computed using Formula 5. Where, TA is total assets; NS is net sales; and i is firm name.

$$\text{Capital Intensity}_{i,2011} = \frac{TA_{i,2011}}{\frac{NS_{i,2011} + NS_{i,2010}}{2}} \quad (5)$$

To examine the relationship between independent and dependent variables, this research develops a multiple regression model. The multiple regressions conducted to test the proposed hypotheses are to perform the goodness-of-fit test, the F test and the t test. The regression model used in this study can be seen as follows, Where: β_0 is noted for constant variable; $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are noted for regression coefficients; i is noted for firm name; t is noted for time t; \mathcal{E} is noted for error term.

$$\text{ROA}_{i,t} = \beta_0 + \beta_1 \text{CO}_2 \text{Intensity}_{i,t} + \beta_2 \text{Dummy of PROPER rating}_{i,t} + \beta_3 \text{Social reporting score}_{i,t} + \beta_4 \text{Firm size}_{i,t} + \beta_5 \text{Firm leverage}_{i,t} + \beta_6 \text{Capital intensity}_{i,t} + \varepsilon_i \quad (6)$$

Before conducting regression analysis, a series of tests for normality of residuals, multicollinearity, heteroscedasticity and linearity will be conducted to fulfil the classical assumptions of multiple regression analysis (Gupta, 1999). The regression model that meets the classical assumption will be assigned for the purpose of analysis in this research.

5. Results and Analysis

Descriptive statistics of each variable are reported in Table 1. The sample size is no longer 102 because there are some cases omitted due to outliers. Although several data are omitted, the rest samples are still big enough as Kline (2005) recommends that a realistic target of a sample size is considered to have a ratio 10: 1 of independent variables. If a model includes six independent variables, then the sample size should be minimum sixty cases.

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
LNROA	90	.602950	.799570	.72547844	.032853845
LNCO ₂ eINTENSITY	90	-12.487850	-4.258030	-9.39699367	1.465040470
LNSOCIAL	90	-.51793	2.10531	.9810168	.54707343
LN FIRMSIZE	90	23.8974	32.7221	27.972530	1.6426169
LNLEVERAGE	90	-1.9356	1.1393	-.692835	.5186757
INCAPINT	90	-1.26833	1.22043	-.0222553	.51492496
Valid N (listwise)	90				

Source: Computed data

Table 2 presents the estimation results that the regression is already tested from classical assumption.

Table 2. Summary of Regression Coefficients and the Sig Value

Constant	.604	t Sig	.000
LN CO ₂ e intensity	.005	t Sig	.008**
PROPER	-.013	t Sig	.070
Social Reporting Score	.012	t Sig	.041**
LN Firms size	.005	t Sig	.007**
LN Leverage	-.027	t Sig	.000**
LN Capital Intensity	-.025	t Sig	.000**
F	12.746	F Sig	.000**
R ²			.480
No. of firms			90

Source: Computed data

** Significance at the 5 per cent level

5.1. The effect of CO₂e intensity on ROA

The effects of CO₂e Intensity are statistically significant on ROA but the sign is positive. It means that the increase in GHG emissions is followed by the increase in ROA significantly. This result is not in line with the results of Busch and Hoffmann (2011), who used carbon intensity as the measurement of carbon performance. The results show that carbon performance has no relation to ROA. Further, the results of this study are not in line with the findings of Iwata and Okada (2011) either, who found that GHG emission has a significant negative effect on ROA. Meanwhile, the results of this study are in line with Hatakeda et al., (2012), who found that GHG emissions have a positive significant effect on profitability. This research is also in line with the result of Delmas and Nairn-Birch (2010), who suggested that firms with lower carbon footprints earn smaller ROA, vice versa. They argue that carbon regulation is not enforced in the US, so firms with high GHG emissions can still generate more profit (Delmas and Nairn-Birch, 2010). In such conditions, firms will increase their revenue if they increase their GHG emissions because they have not internalised the costs associated with carbon. Further, to date, no financial incentives have been provided for firms to reduce their GHG emissions (Delmas and Nairn-Birch, 2010). The reasoning behind the positive effect of GHG emissions on firm FP in these studies is similar to the reasoning of the present study conducted in Indonesia. In Indonesia, financial incentives are provided, but they are not enough to compensate the costs of forcing firms to reduce their GHG emissions. The reasons for the positive significant effect of GHG emissions on firm FP can be explained as follows. Although the Indonesian government established Regulation No. 70/2009 regarding 'energy management', which calls for industrial sectors to contribute to reducing their GHG emissions, the regulation appears to be ineffective in forcing firms to reduce their emissions. Many firms are still not concerned about the regulation. According to the Indonesian Directorate of Energy Conservation, most participating firms in 'energy management' are reluctant to

complete energy audit recommendations because of the requirement of expensive investments (APEC, 2012). Indonesia imposes penalties on firms that do not meet the regulation (Kementerian Energi dan Sumber Daya Mineral, 2012). The penalty imposed to firms that do not meet the regulation when one month after the second warning is received but the firms still disregard the warning. The fine is set at twice the value of the wastage caused. The value of wastage refers to 5 per cent of the energy costs consumed by the user for a one-year reporting period (Kementerian Energi dan Sumber Daya Mineral, 2012). Surprisingly, although the government imposes penalties, firms still appear to disregard the regulation. This may be because the penalties for infringement seem to be very light. According to Sitepu (2013), based on the 2010 data of Indonesian statistics, the contribution of fossil fuels and energy costs to the total cost of production is about 2.69 per cent for fossil fuels and 2.70 per cent for electricity. Hence, the contribution of fossil fuels and electricity costs to the total cost of production is about 5.39 per cent. This condition will make firms weigh whether the benefit of non-compliance is more than the cost of non-compliance. Additionally, the incentive provided seems unattractive. The unattractive incentives may be because the energy-audit recommendation requires a large investment (APEC, 2012). To finance the investment, firms need large commercial loans that require collateral. The Indonesian government seems to lack reasonable financial incentives, so firms disregard GHG emissions. This condition will make firms decide whether the benefit of compliance is more than the cost of compliance. If they do not comply with the regulation, the penalties appear to be affordable, but if they decide to comply with the regulation, they must invest in expensive technology that is difficult to meet.

5.2. *The effect of PROPER rating on ROA*

The announcement of the PROPER rating by the Indonesian Ministry of Environment was intended to encourage firms to be more responsible to the environment. Based on instrumental stakeholder theory (Jones, 1995), it may be concluded that if a firm has a good PROPER rating, it may obtain good access to funding, as the Indonesian Central Bank obligates commercial banks in Indonesia to assess firm EP (The Central Bank of Indonesia, 2005). This means that firms with good EP may receive a lower interest rate. This will lead to lower cost of debt. Further, the Ministry of Environment may take legal action against firms that receive and ignore a black rating (Kementerian Lingkungan Hidup, 2011). Consequently, such firms face high risks; either they have to improve their EP following the government's recommendation or they must close their facilities (factories) if they fail to meet the recommendation. Further, firms with good EP may improve their reputation by increasing trust-levels among their consumers (Carbon Trust, 2005). However, the statistical results show that the coefficient is not significant. The result of this study is in line with several studies conducted in Indonesia that use the PROPER rating as the measurement of EP (see Sarumpaet, 2005; Muliati et al., 2014; Saridewi, and Koesrindartoto, 2014). Conversely, this result does not support the result of Hart and Ahuja (1996) and Russo and Fouts (1997). Firms may receive benefit from preparing a PROPER rating but they may also incur costs to prepare the PROPER rating. This could explain why the coefficient of PROPER rating is not significant. On the one hand, it is mandated for commercial banks to assess firm EP in giving loans. Indeed, a good PROPER rating increases the points of environmental assessment given by a bank. Nevertheless, PROPER rating is not the only assessment of EP. Firms may have another rating of EP, such as ISO 14001 or EMAS. Furthermore, if firms do not have a PROPER rating or do not have ISO 14001 or EMAS certification, commercial banks may assess firm EP based on firm reports about environmental impact analysis (known as AMDAL). Based on the Indonesian Government Regulation No. 27/1999 renewed with the Indonesian Government Regulation No. 27/2012, firms are mandated to provide an AMDAL report periodically to the local governments. The report is not published publicly. Good assessment of EP will reduce costs of debt that eventually will increase profits. On the other hand, Indonesian consumers do not require a PROPER certificate to ensure that the product is safe and meets the required standard in Indonesia. They require a certificate that is called Indonesian National Standard (Badan Standarisasi Nasional, 2012). Furthermore, for international customers, they do not require a PROPER certificate; they usually require an international certification such as ISO 14001 and EMAS. It is known that preparing a PROPER report costs firms both money and time. In fact, the PROPER rating is voluntary and it is not mandated by the government or customers locally or abroad. These opposing factors between the benefits from having a PROPER rating and the costs of preparing the PROPER report may offset each other. This situation causes the PROPER rating to not have a significant effect on firm FP. The justification described in this part is strengthened by the finding of Sarumpaet's study (2005) concluded that ISO 14001 has a positive and significant relationship with firm FP but PROPER rating does not have a significant relationship with firm FP.

5.3. The effect of social reporting score on ROA

The social reporting score has a positive significant effect on ROA. The better the social reporting score, the better the firm FP. The way that firms manage labour practices and provide acceptable workplaces, and their stance on human rights, and social and product responsibility have a positive effect on firm FP. There are two channels of firms' social performance that affect firm FP: an increase in revenues and a decrease in costs. The improvement of product responsibility may retain loyal customers and draw new customers so that sales increase. By treating consumers and trading partners well, providing consumers with excellent service, ensuring that products are safe, and meeting the expectations of consumers and trading partners, consumers and trading partners will respond to firms' efforts by buying the products repeatedly. Further, how firms manage labour practices, human rights issues and social responsibility may reduce labour turnover and absenteeism, and a lower level of work accidents may increase labourers' productivity because of increased satisfaction. Conversely, unacceptable workplaces, disrespect human rights, and unacceptable social and product responsibility will directly cost firms. Firms that treat their labourers poorly are vulnerable to strike actions, which will result in declining production levels, increasing penalties from shipment delays and failure to meet promises made to customers. This result is in line with studies by Griffin and Mahon (1997), Setiawan and Darmawan (2011) and Margolis et al. (2007), who concluded that firm social responsibility has a positive effect on ROA.

6. Conclusion

This section described a regression model used to test the study's hypotheses. The dependent variable of firm FP was measured in ROA. Further, there were six independent variables: CO₂e intensity, dummy variable of PROPER rating, social reporting score, firm size, firm leverage, and capital intensity. The main objectives of this paper were to examine effects of GHG emissions, firm EP, and firm SP on firm FP.

The results have shown that CO₂e intensity has a significant positive effect on ROA. The positive significant effect of CO₂e intensity on ROA implies that Indonesia lacks reasonable financial incentives for reducing GHG emissions and low penalties for increasing GHG emissions. Current condition of Indonesia described above creates an uncertainty so that in the short run, running business as usual may be the best way for Indonesian firms. Nevertheless, to be survive in a long-run, firms should reduce the uncertainty. Firms should incorporate GHG emissions into their strategic decision. Hence, firms with machines or technology that the economic life is nearly finished should replace them with an efficient one. This research therefore has policy implications. This research may help the Indonesian government and policy makers in supporting their manufacturing industries to deal with the climate change and GHG emissions, particularly to deal with Regulation No. 70/2009. The main objective in supporting the manufacturing industry is to encourage this industry to be actively involved into the initiative of the government to reduce GHG emissions without destroying and even enhancing their competitiveness. Win-win solution is the main purpose of the initiative. The reduction targets of GHG emissions can be achieved while the industries' competitiveness is still able to grow and be enhanced. Besides, strong law enforcement, a powerful and influential regulation can be a critical driver for achieving this goal. Therefore, it is important for the Indonesian government and policy makers to develop a powerful and influential regulation. The result also shows that the coefficient of dummy variable of PROPER rating was not significant. It implies that the PROPER rating publication did not benefit participating firms because the coefficient was negative. This may be because the participatory of PROPER program is voluntary. This has implication for policy. The government should formulate a regulation that enforce firms to participate in the PROPER program. Finally, the result also shows that social reporting score has a positive and significant effect on ROA. It implies that the GRI guidelines can be used to assess firm SP. Hence, it may be concluded that in business practices firms could be benefited if they meet the GRI guidelines to deal with social activities.

Our results have some implications for future research. Although our results are new to the existing literature, there is a caution to the one year data in 2011. A one-year period may not capture the long-term effects of GHG emissions. This is because the Indonesian government had just started to pay attention to GHG emissions in the industrial sector which is manifested by the introduction of Regulation No. 70/2009 about '*energy management*.' Using a longer panel data may improve the weakness of this research. Time series data will provide the trend of GHG emissions produced by firms. Further, future studies may compare between before and after the Regulation No. 70/2009 was released. Comparing different periods will provide information regarding whether there has been a reduction of GHG emissions after the implementation of the regulation.

Acknowledgements

The authors would like to thank the funding support of the Indonesian Directorate General of Higher Education (Dikti) provided in this project.

Appendix A: Detailed weight for each theme

Themes of Contents based on the GRI framework of Social Performance		Subsectional Weighting Reporting	Weighting Reporting
Social Performance			50%
Labour practices and acceptable workplace environment		30%	
	Employment		
	Labour/management relations		
	Health and safety		
	Training and education		
	Diversity and opportunity		
	Equal remuneration		
Human rights		15%	
	Non-discrimination		
	Assessment		
Society		35%	
	Community		
	Anti-corruption and bribery		
	Anti-competitive behaviour		
	Compliance with regulation		
Product responsibility		20%	
	Customer health and safety		
	Product service labelling		
	Customer satisfaction		
	Marketing communication		
Form of Disclosure			20%
	Qualitative	60%	
	Quantitative	40%	
Timescale			10%
	Past	45%	
	Non-time (neutral)	25%	
	Future	30%	
Type of News			20%
	Good	60%	
	Bad	15%	
	Neutral	25%	

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