DETERMINANT OF CARBON EMISSION DISCLOSURE IN INDONESIA MANUFACTURING COMPANY

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ABSTRACT

Abstract: Increasing carbon emission is the cause of climate change and this become a global concern. Indonesia, as a major carbon producer, is expected to cut carbon emission. This research explores the factors forcing companies to disclose carbon emission for 2016-2018 period, with a selection of Indonesian manufacturing companies. The number of samples gathered is as much as 108 firm years. Results showed that profitability, type of industry, and company size were determining carbon emissions disclosure. This means that the higher the company's profitability and size, the wider the disclosure of carbon emissions. The industry type is classified into high profile and low profile, concerning emission's contributor. This condition also supports the legitimacy theory, stated that the company wants to be recognized by stakeholders. Moreover, the leverage factor was not included to make a disclosure, which means that the company with high leverage tended to conduct cost saving. Besides, carbon emissions disclosure reports are still voluntary, so the company makes only the required report.

1. INTRODUCTION

Climate change is an issue that is attracting international attention. The United Nations Framework Convention on Climate Change (UNFCCC) explains that climate change from year to year occurs due to human activities, either directly or indirectly which can change the world's atmosphere (Intergovernmental Panel on Climate Change at www.ipcc.ch). Greenhouse gases increased significantly, especially in the 90s. The increase in emission gases led the United Nations to form the Intergovernmental Panel on Climate Change (IPCC) and issue the Kyoto Protocol at an international conference as an instrument to stabilize GHG concentrations that have been ratified by at least 55 members. The Kyoto Protocol applies three mechanisms, namely Emission Trading (ET), Clean Development Mechanism (CDM), and Joint Implementation (JI). The renewal of the 1997 Kyoto Protocol agreed at the 21st Conference of Parties (COP) with the 2015 Paris Agreement, which

shows the world's countries' commitment to maintaining the limit of the increase in earth's temperature below 2°C. Therefore, company world today focuses on green practices to be attentive to the conservation of the environment and to environmentally sustainable facilities and goods (Ahmed et al.,2019).

Indonesia is the fifth emitter of carbon globally, mainly from forest fires and carbon-rich peatlands, but carbon emissions are still classified as a voluntary disclosure. The importance of disclosing carbon emissions is expected to push companies to be more transparent about environmental information so that stakeholders can monitor the extent to which companies care about climate change. Company management will be pressured to evaluate climate change concerns, including company policies. The carbon report is a company strategy that can retain its legitimacy (Pellegrino & Lodhia, 2012).

Therefore, carbon reports are still voluntary in several countries, so they do not have a standard and cause differences in disclosure. Several factors influence the carbon report itself. Firm size has a major influence on disclosure of carbon emissions (Lorenzo,et al., 2009; Gonzalez, 2016; Majid & Gozali, 2015; Choi, Lee, & Psaros, 2013; Ghomi & Leung, 2013; Freedman & Jaggi, 2005). Tang and Luo (2016) added that out of 243 companies in the world, around 74% carried out transparency in carbon emission disclosures influenced by firm size, leverage, and industry type. In contrast, Chu et. al (2013), for companies in China, profitability cannot increase carbon emissions disclosure. Other studies have found that leverage (Hapsoro & Ambarwati, 2018) and company size (Hanifah, 2017) do not affect carbon emissions' disclosures.

This study aims to determine the factors that can improve companies' reporting of carbon emissions by distinguishing high profile and low profile companies connected with research results that are inconsistent and have been described above. The contribution of this research is to provide knowledge related to greenhouse gas emissions and to encourage companies to reduce carbon emissions, as well as their implications for legitimacy theory. For policy makers it is consideration for requiring regulation related to carbon reporting as well as sustainability reporting.

2. LITERATURE REVIEW

2.1 Legitimacy theory

Legitimacy theory is a theory that is often used to explain the motivation of company management to implement CSR. Legitimacy is defined by Lindblom (1994) as a condition or status in which the entity's value system is in line with the social value system in which the company operates. The organization tries to align its goals and operations with the values and norms that apply in society (Harsanti, 2011), with the hope that the company can continue to operate. Therefore, a "social contract" is created between the business and the community (Muttakin et al., 2018).

Based on the legitimacy theory, CSR is seen as a tool to achieve legitimacy, so that the continuity of the company's operations is maintained (Cho et al., 2010). This theory may explain why CSR projects are carried out by business according to community demand. The CSR activities carried out by companies are often only symbolic or only aimed at influencing people's perceptions without any real contribution (Deegan, 2002; Michelon et al.,2014). CSR activities will be disclosed in an annual report or sustainability report, while carbon emission reports are part of it.

2.2 Carbon Emission

Emissions are substances, energy and/or components resulting from activities that either have and/or do not have the potential as elements of air pollutants. According to the big Indonesian dictionary, carbon emissions are charcoal in the form of a gas without color and heavier than air. So, carbon emissions are carbon gas compounds that are produced from activity and have the potential to pollute the air. Based on data from Our World in Data, the largest contributors to carbon emissions are the United States, China, and Europe, while the sectors that have the largest contribution to carbon emissions come from energy, industry, waste, transportation, land use sources, and agriculture.

The high carbon emission due to the company's activities has made stakeholders hope for handling action from the company. Therefore, the company carries out carbon emission disclosures as an accountability effort. In Indonesia itself, addressing climate change due to increased carbon emissions has been regulated in Law Number 16 of 2016 concerning Ratification of the Paris Agreement to The United Nations Framework Convention on Climate Change, Presidential Regulation Number 71 of 2011 concerning Implementation of National Greenhouse Gas Inventories, and Presidential Regulation Number 61 of 2011 concerning the National Action Plan for Reducing Greenhouse Gas Emissions.

This is the basis for the emergence of carbon accounting with Green Business's thought to Green Accounting. Carbon accounting is used to monitor, measure, and report on industrial activities regarding GHG emissions in a certain period (Carbon Accounting, at www.carbonaccounting.net.au). The implementation of carbon accounting is contained in the carbon disclosure project (CDP) as an effort to take responsibility for the company to the environment and / or climate. CDP has two main objectives, namely to inform investors (shareholders) of climate change and to inform the company's climate change risks (Stanny & Ely, 2008 in Depoers, Jerome, & Jeanjean, 2014). There are five broad categories relevant to climate change and carbon emissions, namely the risks and opportunities of Climate Change / CC, GHG emissions (Greenhouse Gas / GH), Energy Consumption / EC, GHG reduction and costs / RC, as well as Accountability of Emission Carbon / AEC (Choi et. al, 2013).

2.3 Conceptual Framework

Carbon emission disclosure (CED) is a disclosure of the intensity of greenhouse gas emissions, energy use, emission trading schemes, strategies related to climate change, and efforts to reduce emissions (Cotter and Najah, 2012). Disclosure of carbon emissions is a voluntary disclosure in nature, while the increase in carbon emissions in the world is very worrying.
Several factors, namely profitability, company size and type of industry cause companies to make efforts to disclose carbon emissions more widely (Choi et al., 2013; Chu et al., 2013; and Faisal et al., 2018). Conversely, there are some researchers who find leverage has an effect (Faisal et al., 2018) and other findings cannot increase carbon emission exposure (Ghomi and Leung, 2013). Therefore, the conceptual framework can be described as follows:
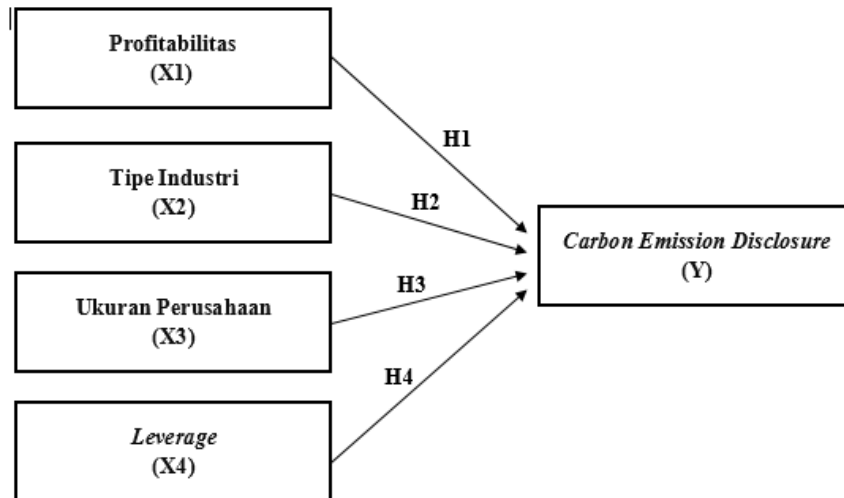
Figure 1. Conceptual Framework

2.3.1. Relationship of Profitability and Disclosure of Carbon Emissions

Profitability is the company's ability to make a profit. Companies with high profitability have good prospects ahead because it shows efficient management (Faisal, 2018). Previous research has hinted that profitability has a significant link to the disclosure of carbon emissions (Faisal, 2018; Hermawan, Aisha, Gunardi, & Putri, 2018; Ismail, Rahman, & Hezabr, 2018; Kolsi, 2017). This is in line with the theory of legitimacy that companies with high profits will disclose more voluntary disclosure, especially Carbon Emission Disclosure as a form of its responsibility in reducing its emissions.

H1: the higher the profitability the wider the disclosure of carbon emissions.

2.3.2. Relationship between Industry Type and Carbon Emission Disclosure

Ilene (2016) divides the type of industry into 2 parts, namely high-profile and low-profile. Companies classified as high-profile or high-emitting are electricity, chemical, oil and mining, nuclear, iron production, automotive, paper, tobacco and cigarettes, health, food and beverage, transportation, and agribusiness industries. The low-profile classification includes household products, finance and banking, personal products and so on. The results of previous studies reveal that the type of industry has a significant relationship to carbon emissions' disclosures (Choi, Lee, & Psaros, 2013; Faisal, Adiningtyas, Achmad, & Haryanto, 2018; Chu, Chatterjee, & Brown, 2013; Ichsani & Suhardi, 2015; Hackston & Milne, 1996). This is because companies with environmental sensitivity and high-risk levels tend to be in the spotlight of the wider community. The government and the state will more closely monitor industries that produce high emissions. In maintaining their reputation and legitimacy, companies classified as high-profile will disclose their carbon emissions.

H2: Industry type classified as the high profile has a positive effect on carbon emissions' disclosures.

2.3.3. Relationship between Company Size and Carbon Emission Disclosure

The relationship between firm size and carbon emission disclosure has positive results (Faisal, et al., 2018; Ghomi & Leung, 2013; Choi, Lee, & Psaros, 2013; Hermawan, et al.,

2018; Chu, Chatterjee, & Brown, 2013; Lorenzo, et al., 2009). This is because stakeholders, especially the community, will pressure them because they think that the bigger the company, the increased natural resources used. This is in line with Jannah's (2014) explanation that larger companies will disclose more voluntary disclosure information than smaller companies. The companies that are more likely to have the resources to pay the cost of disclosing information (collecting and producing) for users of financial statements. Therefore, the company will disclose carbon emissions as the demands of the stakeholders.

> H3: Companies classified as big firms will disclose more comprehensive carbon emissions than small companies

2.3.4. Leverage Relationship and Carbon Emission Disclosure

Leverage is the company's ability to use debt in managing the company to maximize revenue. Several studies have revealed that the relationship between leverage and carbon emissions' disclosures is negative (Al Russi, Selamat, & Hanefah, 2009; Kolsi, 2017). This is because companies with high leverage are at a danger point, so managers will reduce expenses that are not in accordance with business activities such as carbon emissions disclosures (Faisal, et al., 2018). Therefore, environmental disclosure is dependent on equity financing and low leverage.

> H4: High leverage will reveal lower carbon emissions' disclosures

3. RESEARCH METHOD

The object of this research is manufacturing companies listed on the Indonesia Stock Exchange from 2016 to 2018. In selecting the sample, the author uses the purposive sampling method that has been discussed in the previous chapter.

3.1 Variable Measurement

Independent Variable
In this study, researchers used 4 independent variables, namely: profitability, industry type, company size, and leverage and the dependent variable was carbon emission disclosure. Disclosure of carbon emissions can be seen in Table 2-3, and the measurement of independent variables in Table 1.

Table 1. Independent Variable Measurement

No	Variable	Measurement
1	Profitability: the profit the company generates. In this case using ROE (Kijewska, 2016)	$\dfrac{Net\ Income}{Shareholder\ Equity}$
2	Industry type: based on the company with the level of carbon emissions produced (Choi et. Al., 2013)	- *high-emitted* value 1 - *low-emitted* value 0.
3	Company size is measured by the amount of total assets (Jannah, 2014)	Company Size = Total assets
4	Leverage: as proxied by DER (Arifin, 2007)	$DER = \dfrac{Total\ Debt}{Total\ Equity}$

Dependent Variable

Choi, Lee, & Psaros (2013) categorized voluntary levels of disclosure related to climate change and carbon emissions into 18 categories based on demand factors from the Carbon Disclosure Project (CDP).

Table 2. Carbon Emission

1	Climate change, risk and opportunities	CC1 – description of the risks (regulatory, physical or general) relating to climate change and actions and taken or to be taken to manage the risks
		CC2 – description of current (and future) financial implication, business implications and 6pportunities of climate change
2	GHG emission accounting	GHG1 – description of the methodology used to calculate GHG emission (e.g. GHG protocol or ISO)
		GHG2 – existence external verification of quantity of GHG emission-if so by whom and on what basis
		GHG3 – total GHG emissions – metric tonnes CO_2 emitted
		GHG4 – disclosure of Scopes 1 and 2, or Scope 3 direct GHG emissions
		GHG5 – disclosure of GHG emissions by sources (e.g. coal, electricity, etc.)
3	Energy Consumption accounting	GHG6 – disclosure of GHG emissions by facility or segment level
		GHG7 – comparison og GHG emissions with previous years
4	GHG reduction and cost	EC1 – total energy consumed (e.g. tera-joules or peta joules)
		EC2 – quantification of energy used from renewable sources
		EC3 – disclosure by type, facility or segment
		RC1 – detail of plans or strategies to reduce GHG emissions
5	Carbon Emission Accountability	RC2 – specification of GHG emissions reduction target level and target year
		RC3 – emissions reductions and associated costs or savings achieved to date as a result of the reduction plan
		RC4 – cost of future emissions factored into capital expenditure planning
		ACC1 – indication of which board committee (or other executive body) has overall responsibility for actions related to climate change
		ACC2 – descritption of the mechanism by which the board (or other executive body) reviews the company's progress regarding climate change

Carbon Disclosure checklist (Choe et al., 2013)

4. RESULTS AND DISCUSSION

The results of sample selection can be seen in Table 3 below:

Table 3. Sample Selection

No.	Criteria	Amount
1	Manufacturing companies listed on the IDX for the 2016-2018 period	142
2	Manufacturing companies that did not report consecutive financial statements in 2016-2018	(18)
3	Companies that did not publish consecutive annual reports in 2016-2018	(11)
4	Does not disclose policies or items regarding greenhouse gases	(77)
The number of research samples per year		**36**
Number of observations from 2016-2018		**108 firm-years**

The division of high profile industrial sectors (companies with high carbon emission risk) and low profile (companies with low carbon emission risk), due to 63% of carbon pollution in the air is produced by the coal, petroleum and other mining industries.

Internationally, industry categorization is regulated by the Global Industry Classification Standard (GICS), Russell Global Sectors (RGS), and Industry Classification Benchmark (ICB). The industrial sector's GICS version is divided into energy, materials, industrials, consumer discretionary, consumer staples, health, finance, information technology, telecommunications networks, utilities, and real estate. Industrial sectors that are classified as carbon-intensive sectors, namely energy, land use, and agriculture, industry, transportation, residential, commercial, & institutional. Therefore, based on classification GICS as follows (See table 4).

Table 4. Classification of Companies According to High-low Emission

Emisiion Classification	Industry Sector
Low	Consumer durables and apparel
	Health Care
High	Construction Materials
	Building Products
	Metals and Mining
	Chemicals
	Paper and Forest Products
	Automobiles and Components

	Electrical Equipment
	Food, Beverages, and Tobacco

Source: processed secondary data, 2020

4.1 Descriptive Statistics

Descriptive statistics for each research variable are presented in table 5. Based on the statistical results, only the leverage variable has a standard deviation of more than 2. The data for other research variables are relatively stable.

Table 5. Descriptive Statistics

	N	Min	Max	Mean	Std Dev
X1	108	0.000	9.640	4.341	2.247
X2	108	0.000	1.000	0.778	0.417
X3	108	5.180	5.820	5.489	0.167
X4	108	0.000	12.440	5.275	4.130
Y	108	0.690	5.550	2.975	1.100

Source: Secondary data processed by SPSS
Notes: X1 is the company's profitability variable; X2 is a type of industry; X3 is the company's size and X4 is the leverage, while Y is the disclosure of carbon emissions.

Based on the descriptive statistic the sample shows large companies, this means that companies disclosing carbon reporting are mostly big companies. Leverage data tends to fluctuate for the sample firms.

4.2 Discussion

The results of statistical testing are shown in Table 6. Based on the test results show that the variable profitability, industry type and company size play a role in disclosing carbon emissions. On the other hand, leverage is not a consideration for disclosing carbon emissions.

Table 6. Results of Hypothesis Testing

Model	β	P value (Significance)
(Constant)	-8.695	**)-2.903 (.005)
Profitabilitas (X1)	.088	**)2. 073 (.041)
Tipe Industri (X2)	.939	***)4.194 (.000)
Ukuran Perusahaan (X3)	1.955	***)3.575 (.001)
Leverage (X4)	-.034	-1.515 (.133)
Notes: **Model: Y**= $\alpha + \beta1 X_1 + \beta2X_2 + \beta3 X_3 + \beta14X_4 + e$ ***; ** and * indicates significant at 1%, 5% and 10% level of significance based on t-statistics. **F test: 12.643 (0.000)**		

Companies with good financial performance (high profitability) tend to get more attention from several stakeholders, such as investors, the public, the government and the media. This results in the company having greater pressure, not only having a good financial performance in investors' eyes, but from an operational and environmental perspective, the company needs attention. This finding is consistent with the findings of many researchers (Faisal et al., 2018; and Hermawan et al., 2018)

In line with the legitimacy theory that companies need social existence in society, companies with high profitability have the opportunity to reveal more about the company's carbon emissions. This study's results are inconsistent with the findings of Chu et al (2013), who researched in China. Moreover, there is no standard in disclosing company carbon emissions.

Companies with a high level of environmental sensitivity (high emission) have tighter supervision by the government and society. The results of this study support these arguments and are consistent with the findings of Chu et al. (2012) and Choi et al. (2013). Based on the legitimacy theory, companies will try to fulfil their corporate responsibilities to believe that the company has good quality. This is the basis for companies attempting to carry out environmental responsibility, especially regarding carbon emissions. Climate change has resulted in the community being more sensitive to environmental issues so that the company shows its existence in protecting the environment. Apart from these reasons, disclosure of carbon emissions is also part of Indonesia's achievement target in participating in reducing global warming, particularly for high emission companies.

This research supports that size will reveal a wider range of carbon emissions. Large companies will disclose more concerning carbon emissions than small companies (Freedman & Jaggi, 2005). Based on the theory of legitimacy, the company is expected to fulfil the surrounding community's wishes to maintain its existence both in the short and long term. This makes the larger the company, the more carbon emissions will be revealed (Ghomi & Leung, 2013; Ismail et al., 2018; Choi et al .; 2013, Gonzalez & Ramirez, 2016 and Lorenzo et al., 2009).

This study does not support the latter hypothesis, related to leverage, meaning that disclosure of carbon emissions is not caused by high or low leverage. Based on the signal theory, companies with leverage will show better financial performance, because they are responsible for creditors by reducing costs outside of production. Disclosure of carbon emissions is more influenced by investors than creditors.

Tang & Luo (2011) explained that companies have a high level of leverage that disclose broadly. Still, some do not disclose widely, so the level of leverage does not significantly affect Carbon Emission Disclosure. This is because leveraged companies tend to prioritize financial performance. Simultaneously, the extent of disclosure of carbon emissions is considered an optional addition, except for Annex I countries that require disclosure.

5. CONCLUSION

This study aims to determine the factors that cause manufacturing companies to disclose carbon emissions voluntarily. Testing uses linear regression with a sample of 108 firm-years for the 2016-2018 period. The results showed that the size of the profitability, the company's size, and the type of industry could increase the extent of disclosure of carbon emissions. This is in accordance with the theory of legitimacy, that the companies with more profits, the size of companies and companies with higher carbon emission emitters, will get more pressure from stakeholders (society, consumers and government).

On the other hand, this study cannot support the leverage factor, and this is because companies with a high degree of leverage tend to improve their profit performance more and avoid unnecessary costs, for example making reports on carbon emissions.

This study has limitations in terms of the carbon emission checklist. There may be a researcher's subjectivity factor. Future studies can use more than one research staff to reduce subjectivity.

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