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Determinants of Climate Change Disclosure: Evidence from Listed Companies in Vietnam

Thi Phuong Thao Le

Faculty of Finance and Banking, University of Economics and Business, Vietnam National University, Hanoi

Abstract: Environmental pollution and climate change in Vietnam are now becoming a major concern. This situation is increasing the pressure on companies to improve climate change disclosure to meet the requirements of stakeholders. The aim of this study examines some common determinants of climate change disclosure of 120 listed companies on Ho Chi Minh City Stock Exchange. The attributes of the company and its board of directors such as firm size, operating time, profitability, board size, independence and gender of the board of directors were selected as independent variables and their effects on climate change disclosure levels were empirically examined. The study uses content analysis to build disclosure indicators for the companies using climate change disclosures made on the companies' sustainability and annual reports. Research results show that only firm size and the independence of the board have positive relationship with climate change disclosure. Operating time, profitability, board size, gender of board members have failed to exhibit any significant influence on climate change disclosure of listed firms.

Keywords: Greenhouse gas emissions, climate change, climate change disclosure; legitimacy theory, agency theory.

INTRODUCTION

Rapidly increasing greenhouse gas emissions by human activities have severely affected ecosystems, changing climate conditions around the world. Global climate change leads to many adverse consequences for the atmosphere, ocean, cryosphere and biosphere, and human beings. According to World Meteorological Organization (WMO, 2023), "extreme weather and climate events can have widespread and lasting impacts, often affecting the most vulnerable communities." The number of droughts, heatwaves, floods, tropical cyclones and wildfires have been increasing over the past few decades. These extreme weather and climate events can damage infrastructure, destroy agricultural yields, reduce freshwater supplies, cause mass displacements, cause adverse health consequences, and casualties. Tropical cyclones are among the most dangerous natural hazards, causing high casualties and economic losses. Drought depletes water for domestic use and irrigation, seriously affecting the agriculture of many countries. The consequences of heat waves are the risk of wildfires, diseases caused by high temperatures. Extreme rainfalls and floods are also significant natural hazard, resulting in economic damage of billions of dollars, thousands of deaths and the displacement of millions of persons (WMO, 2023). Extratropical windstorms and severe thunderstorms also cause remarkable economic losses.

These extreme events have devasting impacts on human system. All four pillars of food security, namely access, availability, utilization, and stability are threatened. Extreme heat and air pollution increase health risks of people, especially those living in urban areas. The events can also severely damage infrastructure.

It is becoming increasingly clear that climate extremes are affecting the ability of populations to develop sustainably. According to IPCC (2023), there is a narrowing window of opportunity for climate-resilient development that includes achievement of the SDGs, thereby necessitating better understanding of how progress is hindered by extreme events. Nearly 94% of all disaster displacements during the 2011-2020 period were caused by weather events such as floods, drought, coastal erosion, rising sea levels, desertification etc. Hazardous weather-events disproportionately affect vulnerable communities who have contributed the least to current climate change. Furthermore, adverse influence from human-caused climate change is predicted to intensify in the future.

Vietnam is among the countries most heavily affected by climate change. Extreme weather events cause high fatalities and limit economic growth. Vietnam was ranked 6th among countries worst affected by extreme weather events during 1999-2018 period (Eckstein, *et al.*, 2020). During the period, there were 226 extreme weather and climate events, causing 286 fatalities and 2 billion dollars of economic losses each year. In the future, the intensity of the events such as the rise in extreme heat, river flood, vulnerability of low-lying coastal and river delta regions due to sea-level etc. is likely to amplify the impacts on human health, livelihoods, and ecosystems.

***Corresponding Author:** Thi Phuong Thao Le

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According to the World Bank (2022), Vietnam's rapid economic growth, urbanization, and industrialization over the last 30 years have been generated significant and increasing GHG emissions, making the country "one of the most GHG-intensive economies in East Asia". To reduce GHG emissions and climate change, Vietnam's government has strongly committed to reach net-zero GHG emissions by 2050. There are, however, many actions needed to be done by the government and private sector in order to achieve the commitment. Among these actions, GHG emissions reporting and climate change disclosure are essential for businesses to start their journey toward net-zero emissions. Recently, less than 10% of 1,700 companies listed in Ho Chi Minh City Stock Exchange and Hanoi Stock Exchange disclose carbon emissions in their annual reports and sustainability report (Pham Nguyen Vinh, 2023).

THEORETICAL BACKGROUND OF

Climate Change Disclosure

Several theories have been developed to explain the environmental disclosures by companies. Three of these theories, namely agency theory, legitimacy theory, and stakeholder theory, provide theoretical basis for environmental and climate change disclosure. Agency theory refers to the contractual relationship between a business owner on the one hand and a manager on the other. Both parties want to maximize their own interests, owners want to maximize their interests by adding business value, and managers' interests are often tied to the income. Therefore, while owners expect companies to perform social responsibility and increase the value of the business by attracting the attention of investors, managers are less willing to do activities related to social responsibility because it is costly and affects profits of the company, thereby affecting the earnings of managers. To avoid this, the company owner will tie the manager's interests to the achievement of the company's goals, including social responsibility and environmental goals.

According to the legitimacy theory, an organization's activities must conform to the values or norms of the society in which it operates (Freeman and Jaggi, 2005). Organizations' failure to adhere to social values or norms can make it difficult for an organization to gain public support to continue operating. Due to the increasingly serious impacts of business activities on the environment, society and the community expect businesses to behave in accordance with environmental responsibility and evaluate the impacts of their activities on the environment. A social contract is established that stipulates the rights and obligations of the parties in relation to the environment. Failure to meet societal expectations can lead to closure due to license revocation and that affects the viability of the business in the long run (Deegan, 2002). Therefore, the legitimacy creates pressure for businesses to practice environmental management and change the accounting system to align with community standards and values. This theory explains the motivation that environmental management accounting is used as a tool for organizations to carry out social responsibility to achieve legal performance.

Stakeholder theory of Watts and Zimmerman, (1986) *as cited by Ahmad, *et al*., 2003; Freedman and Jaggi, 2005) holds that an organization has an obligation to treat its stakeholders fairly, and where stakeholders have a conflict of interest, the business has an obligation to strike an optimal balance between them. Since the needs of stakeholders are different and ever-changing, the organization will focus on meeting the needs of stakeholders with a large and direct interest and assume that the interests of the other parties are also covered satisfactorily through the organization's pursuit of business strategy and reporting information consistent with societal norms and values. This theory is used to explain the motivation of organizations to choose and voluntarily apply environmental management accounting to meet the increasing demand for environmental information from government agencies, credit institutions, investors and consumers, and the community.

Based on the findings of studies on legitimacy theory and agency theory, this study is trying to examine what are the determinants of climate change disclosure by a sample of listed companies in Vietnam. The findings provide insights into what kind of company, in terms of the attributes and governance structure, is serious in addressing the climate change issues.

HYPOTHESES

Company size

Firm size is one of the most influential attributes in disclosing environmental issues. Previous studies have shown a positive association between company size with environmental disclosure (Ahmad, *et al*., 2003; Freedman and Jaggi, 2005,

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2009; da Silva Monteiro and Aibar-Guzmán, 2009; Stanny and Ely, 2008). According to the political hypothesis, larger companies attract the attention of the media, planners and the media policy makers and regulators. As a result, larger companies have greater pressure to act in a way that is consistent with requirements. However, there are studies that show a negative relationship between environmental disclosure and firm size (Patten, 2000). Zhang and Wang, 2008; and Patten, 2002 shows that larger companies have to disclose more environmental information. Because of abundant financial resources, management and technical staff are more qualified, it is easy to carry out environmental disclosure to meet the requirements of the government and society. Freedman and Jaggi, (2005) found that greenhouse gas pollution disclosure is positively related to firm size. Therefore, the following hypothesis is proposed:

H1: There is a positive relationship is predicted between firm size and environmental disclosure level.

Operating time

The results of previous studies show that enterprises with a long operating time disclose more voluntary information than newly established enterprises. Based on the legitimacy theory, the interaction between the company and the community is imperative for the company's existence. The longer the existence, the wider the interaction for the company to build an effective public image (Samarah,, *et al*., 2021). Age is considered an important specific that affects environmental disclosure since stability, financial strength, strategic posture usually increases with age (Liu and Anbumozhi, 2009). "as a company matures, its reputation and its reputation and involvement in discretionary activities, such as environmental protection activities and disclosure of environmental information, can become entrenched and more valuable to the company" (Akhter, *et al*., 2022). Based on the discussion, this study proposes that:

H2: There is a positive relationship between firms' operating time and environmental disclosure.

Profitability

According to legitimacy theory, the more profitable businesses are, the more accountable to society because they have to protect the environment to sustain profit in the long run. They also have to satisfy the information needs of their stakeholders, especially those who hold control over the company's key resources. Disclosing environmental information helps to build good impression among investors, thus providing opportunities for businesses to increase the value of their shares in the market as well as to raise capital (Joshi, *et al*., 2011). Profitable firms can afford to spend more on environmental disclosure and abatement (Freeman and Jaggi, 2005). The higher the financial performance, the more willing they are to devote financial resources to the development of a sustainable environment in which they operate. Therefore, the following hypothesis is developed:

H3: There is a positive relationship between return on equity and environmental disclosures.

Board size

Previous studies have showed mixed results about the relationship between board size and environmental disclosure. Initially, a large board of directors will have advantages for the company in improving the functions of the board of directors, such as providing advisory support, autocratic supervision of managers, take advantage of various skills and backgrounds of the members of the board of directors. Some studies indicate a positive relationship between the board size and the level of environmental disclosure (Mahmood, *et al*., 2018; Trieksani & Djajadikerta, 2016). However, when board size increases to a certain extent, large board size may lead to less effective coordination, communication and decision-making and are more likely to be controlled by the CEO. The company with a large board size will have more responsibilities that are positively related to the level of information disclosure. Barako, *et al* (2006) shows that board size has a negative effect on the level of voluntary disclosure of general information of enterprises. This study proposes that:

H4: Board size has a positive effect on disclosure level.

Gender of board members

Many studies in recent years have identified the reasons why the presence of women on the board of directors can affect performance as well as environmental disclosure of the enterprise. When women join the board of directors, they will provide a more multi-dimensional view of the opportunities of the enterprise, help strengthen the supervision of the leadership, and improve corporate governance. The female gender is usually more sensitive towards social and environmental issues. Gender diversity on the board leads to decisions that are aligned with the global warming issues faced by each organization.

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Bear, *et al*. (2010) suggested that the presence of women on board can enhance ratings for corporate social responsibility and corporate reputation sending vital signals to investors indicating thus, the potential for improved financial performance. Amran, *et al*. (2011), however, have found evidence that "firms that demonstrate a lack of gender diversity on the board would increase the climate change reporting system practices". The hypothesis adopted in this study supports that:
H5: The proportion of female members in the board of directors is positively related to the degree of climate change disclosure.

The degree of independence of the board of directors

In corporate governance, the number of non-executive board members is often considered as one of the most important factors for representing and protecting shareholders' interests. Independent board members will act as a supervisor with the task of reducing the risk of power abuse of managers and executives and protect the legitimate interests of small shareholders and other stakeholders. According to Armstrong, *et al*. (2010), non-executive board members often have experience that can provide the company with expertise in areas such as business strategy, finance, marketing, operations and organizational structure. Webb (2004) examined the differences in the board structure between socially responsible firms and non-socially responsible firms and found that socially responsible firms have more outsider/independent directors compared with non-socially responsible firms. Independent directors have incentives to guard shareholders' interest. In Vietnam, research results of Vu (2012), Lan, *et al* (2013), Hieu & Lan (2015) also show that there is a positive influence between the degree of independence of the board of directors and the degree of self-disclosure of voluntary information. Therefore, the following hypothesis is proposed:
H6: The degree of board independence has a positive impact on disclosure level.

RESEARCH DESIGN

Data collecting methods

The research sample includes 120 companies listed on the Ho Chi Minh City Stock Exchange (HOSE). Data and information were collected for the year 2020 from secondary sources, including annual reports, financial statements, social responsibility reports etc. Climate change disclosure information was obtained from the 2020 annual reports and social responsibility reports (if available) published on the websites of 120 companies in the sample. Information on factors affecting environmental disclosure - namely firm size, operating time, profitability, board size, gender of board members, the degree of independence of the board - were collected from financial statements, annual reports and others documents published on the websites of the companies. Annual reports and sustainability reports are among the most important documents of an enterprise. They play an important role in disclosing information to shareholders and other stakeholders. These reports provide comprehensive information about the company's financial performance and activities occurring throughout the financial year.

Dependent variable

In this study, content analysis is applied in the same way as Freedman and Jaggi, (2005) used in research assessing the level of commitment to the Kyoto protocol and disclosure of public companies. The annual reports, social responsibility reports or sustainability reports are evaluated against five key criteria that are expected to capture climate change disclosure and are shown in Table 1.

Table 1: Content analysis of climate change disclosure

1.	Mention of global warming or of the Kyoto Protocol
2.	Firm's plan to deal with global warming and the objective to control global warming
3.	Potential costs to achieve the global warming objectives
4.	Current costs to reduce greenhouse-gas emissions
5.	Information on the extent of greenhouse-gas emission

Source: Freeman and Jaggi, 2005

The maximum score of five is achieved if all items are detected.

Independent Variables

- X1: Enterprise size (measured by the variable SIZE = log(total assets of the enterprise)
- X2: Operating time in years.
- X3: Profitability (measured by return on equity ROE)
- X4: Board size (number of members)
- X5: Gender of board members (% of female board members).

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- X6: The degree of independence of the board (% of independent board members)

RESEARCH RESULTS

Descriptive Analysis

Table 2: The level of climate change disclosure

y	Freq.	Percent	Cum.
1	19	15.83	15.83
2	26	21.67	37.50
3	40	33.33	70.83
4	19	15.83	86.67
5	16	13.33	100.00
Total	120	100.00	

Source: Compilation of the author

The average level of climate change disclosure of 120 companies in the sample is 3.125. The most common score of disclosure is 3, with 40 firms getting this score, accounting for 33.3% of the total sample. This is followed by the score of 2 with 26 companies or 21.7%. The same number of 19 companies get the scores of 1 and 4, accounting for 15.8% of the total 120 companies. Only 16 firms or 13.3% get the maximum score of 5, meaning that they comprehensively disclose information on the impact of their activities on climate change.

For individual criterion, there are higher percentage of companies that meet the descriptive criteria. 61.7% and 65% of the companies meet the criteria of "Mention of global warming or of the Kyoto Protocol" and "Firm's plan to deal with global warming and the objective to control global warming", respectively. For quantitative criteria, 50% of the companies disclose information on "the extent of greenhouse-gas emission". The proportion of companies that disclose "potential cost to achieve global-warming objectives" and "current costs to reduce greenhouse-gas emission" are similar, at 35.8% and 33.3%, respectively.

While descriptive criteria are easier to achieve by higher proportion of the companies, 1/3 to ½ of the companies publish more difficult quantitative criteria on climate change in their reports.

Regression Analysis

Regression results using stata software:

Table 3: Regression results

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. reg y x1 x2 x3 x4 x5 x6
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Source	SS	df	MS
Model	149.615976	6	24.9359961
Residual	33.9756903	113	.300669825
Total	183.591667	119	1.54278711

Number of obs	= 120
F(6, 113)	= 82.93
Prob > F	= 0.0000
R-squared	= 0.8149
Adj R-squared	= 0.8051
Root MSE	= .54833

y	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x1	1.617994	.0739267	21.89	0.000	1.471532	1.764456
x2	.0014505	.0030223	0.48	0.632	-.0045372	.0074382
x3	.0013891	.0039324	0.35	0.725	-.0064017	.0091799
x4	-.030392	.0398725	-0.76	0.448	-.1093866	.0486025
x5	-.0034906	.002463	-1.42	0.159	-.0083703	.0013891
x6	-.1083881	.0578331	-1.87	0.063	-.2229659	.0061898
_cons	-16.65802	.9321361	-17.87	0.000	-18.50475	-14.8113

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The regression results show that the regression model is significant at 0%. R^2 of 0.8149 means that 81.49% of climate change disclosure of listed companies in Vietnam are explained by the independent variables.

Among the independent variables, only firm size and the dependence of the board are statistically significant. Firm size has a positive relationship with climate change disclosure at 0% significant level. Therefore, we accept the first hypothesis. The independence of the board of directors has directly increased the climate change disclosure and this positive relationship is significant at 6.3%. This finding supports H6 that the more independent the board of directors, the higher the level of climate change disclosure. Operating time, profitability, board size, gender of board members have failed to exhibit any significant influence on climate change disclosure of listed firms, that is, H2, H3, H4, and H5 are not supported.

CONCLUSION

The regression analysis shows that firm size is the most influential determinant of climate change disclosure of the listed companies. The bigger the firm, the greater the attention it attracts from various stakeholders. Bigger firms have greater pressure to conform with regulations on information disclosure. Furthermore, big firms are more financially capable to shoulder the costs of climate change disclosure. This result is also consistent with empirical evidence provided by many previous studies such as Freedman and Jaggi, 2005; da Silva Monteiro and Aibar-Guzmán, 2009; Stanny and Ely, 2008. In addition to firm size, the independence of the board of directors has directly increased the climate change disclosure. Independent directors have incentives to protect shareholders' benefits and thus, put pressure on the management to properly manage the companies and reduce the management's chance of withholding information.

The regression results, however, show that operating time, profitability, board size, gender of board members does not have significant influence on climate change disclosure of listed firms. While the assumption is that companies with longer operating time disclose more voluntary information than newly established enterprises, firms with better financial performance can afford to spend more on environment abatement and disclosure, the research results indicate otherwise. Similarly, board size failed to have significant influence on climate change disclosure. This implies that more members in the board do not necessarily have more input regarding the climate change issues. Rather, large board size may lead to less effective coordination, communication and decision-making. While it is argued in the literature that the female gender is usually more sensitive towards social and environmental issues, in the context of listed companies in Vietnam, female directors failed to do so.

This study still has several limitations and is open for further studies. Due to time constraint, the research sample includes only 120 companies. Bigger sample size will help improve research results. The study is for the year 2020 only and a study of climate change over several years should be analysed to examine the trend and changes of disclosure over time. Future studies using primary data from survey questionnaires answers by companies' directors and managers may better captured the reasons behind decision-making of climate change disclosure.

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