Article

The Impact of Environmental Accounting Information Disclosure on Financial Risk: The Case of Listed Companies in the Vietnam Stock Market

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Abstract: This research study aims to assess the impact of environmental accounting information disclosure on financial risk within the context of Vietnam's stock market. The data collection process involved 60 non-financial companies, carefully selected from both the pool of 100 Sustainable Companies listed in the "Programme on Benchmarking and Announcing Sustainable Companies in Vietnam (CSI)", as organized by VBCSD, and companies outside this list. The data span a timeframe from 2018 to 2022. Afterward, we utilize regression models to assess relationships and employ the *t*-test to evaluate differences. The results indicate that environmental accounting information disclosure has an inverse effect on the financial risk of the current year and the following year. This implies that companies that are more transparent and proactive in reporting their environmental performance are likely to experience decreased financial risk. Furthermore, the results also show differences in financial risk between the group of companies within the "100 Sustainable Companies" list and the group of companies outside this list. This disparity underscores the potential financial benefits of being recognized as a sustainable company. Based on the findings, the research team has provided several recommendations to enhance environmental accounting information disclosure and awareness.

Keywords: environmental accounting; environmental accounting information disclosure; financial risk; sustainable companies; CSI

1. Introduction

In recent years, issues related to sustainable development, economic development in parallel with social progress, and ensuring environmental sustainability have become significant global concerns. In this context, environmental accounting has emerged to support businesses in fulfilling their environmental responsibilities during their production and operations. Essentially, environmental accounting seeks and provides essential information on environmental-related issues, aiming to enhance the accountability of businesses in their use of resources. In addition, environmental accounting is also a part of accounting aimed at recording, analyzing, and reporting information about a company's impacts on the environment.

Information disclosure has become an indispensable part of public companies, as stakeholders use it to assess the business's performance. Although there is no unified definition of environmental accounting, according to the International Federation of Accountants (IFAC), environmental accounting is a broad term with many implications, such as assessing and disclosing environmental information combined with financial information in accounting and financial reporting. From this, it can be seen that environmental accounting disclosure includes, first, general environmental information: presenting environmental

policies, describing environmental issues the company may face, improvements the company has implemented, and the level of compliance with legally mandated protective measures; second, environmental accounting information: displaying business activities related to the environment such as assets, costs, liabilities, and environmental income in accounting reports such as financial statements and annual reports for information users, providing a basis for making relevant decisions. This will allow companies to allocate economic resources more reasonably in line with the environment to provide motivation to help the business achieve sustainable development goals. Vietnam is in a period of international economic integration, the disclosure of environmental accounting information and non-financial information is also a trend that Vietnam needs to embrace quickly. However, in practice, not many companies can provide a comprehensive set of environmental information to stakeholders (Linh 2013). When information for stakeholders is not adequately provided, it can pose risks for the company, such as reducing opportunities for collaboration and issues related to environmental legal compliance. Financial risks are risks arising from external environmental fluctuations and risks stemming from the choices and implementation of financial decisions within a business. These risks impact the profit-making capability and solvency of the business, with the worst-case scenario leading to the possibility of business bankruptcy. Pham and Duong (2022) conducted a study on the impact of disclosing information about environmental impacts on the financial performance of listed companies in Vietnam during the period 2016–2020. The research results showed that the extent of disclosing information about environmental impacts has a positive effect on the financial performance of companies. This is because the disclosure of environmental accounting information helps the business strengthen the trust of various stakeholders. Therefore, the lack of this information can have a negative impact on financial risk management within the company. So, it can be observed that there is a linkage between the disclosure of environmental accounting information and financial risks within a company. Therefore, the authors have chosen the topic "The Impact of Environmental Accounting Information Disclosure on Financial Risk: The Case of Listed Companies in the Vietnam Stock Market" for research. We particularly focus on companies participating in the "Programme on Benchmarking and Announcing Sustainable Companies in Vietnam (CSI)". The research questions encompass how the disclosure of environmental accounting information affects the financial risk of businesses; and whether there is a difference in financial risk between the group of companies listed in the Top 100 Sustainable Companies and the group outside this list. After the research process, the main findings indicate that disclosing environmental accounting information helps mitigate the financial risks of businesses in the current year and the following year. Additionally, companies listed in the Top 100 Sustainable Companies have, on average, lower financial risks compared to those outside the list. From these findings, the authors propose several recommendations aimed at assisting businesses in enhancing the quality of environmental accounting information disclosure and minimizing financial risks.

This research aspires to make contributions to the theoretical understanding of social responsibility information disclosure and the financial performance of businesses. This study could serve as a foundation for future in-depth research on environmental accounting and social responsibility, as well as related issues. Moreover, this research holds practical significance in exploring the relationship between environmental issues and the financial performance of businesses, providing valuable insights for managers in developing enterprises in an era focused on green and sustainable development.

This study aims to achieve the following specific objectives: firstly, examine the factors influencing financial risks; secondly, investigate how environmental accounting information disclosure affects financial risks, positively or negatively, in the current year for non-financial companies listed on the Vietnam Stock Market; thirdly, explore the relationship between environmental accounting information disclosure and the financial risks of companies in the following year; fourthly, study the differences in financial risks among companies implementing environmental accounting information disclosure within differ-

ent target groups as categorized by the research team; fifthly, provide recommendations to improve financial risks, financial risk management, and the quality of environmental accounting information disclosure for companies.

To address these objectives, the research team has designed research questions to find answers to: Question 1: What factors influence financial risk? Question 2: How does environmental accounting information disclosure impact financial risk in the current year? Question 3: How does environmental accounting information disclosure affect financial risk in the following year? Question 4: Are there differences in financial risk between the group of companies recognized as "Sustainable Enterprises in Vietnam" and the remaining group of companies? Question 5: What recommendations should be made to help companies improve financial risks, financial risk management, and the quality of environmental accounting information disclosure?

2. Literature Review and Theoretical Framework

2.1. Literature Review

Environmental accounting has garnered significant attention from both academia and business practitioners in developed nations. Official guidelines on environmental accounting were established by the United Nations Sustainable Development Commission (UNDSD) in 2001 and the International Federation of Accountants (IFAC) in 2005. Despite this, research in environmental accounting dates back to the 1970s, with a surge in studies and literature emerging in the 1990s. The period from 1997 to the present is particularly notable for a boom in environmental accounting research, covering theoretical aspects, accounting practices, and the impact of environmental accounting and social responsibility on financial risks. This field has become a focal point for scientific inquiry, attracting increasing interest from researchers.

Regarding the examination of the impact of environmental accounting disclosure in general and social responsibility on corporate risk, previous studies have predominantly identified an inverse relationship between the disclosure of environmental and social information and corporate risk (Liu and Lu 2021; Eriandani and Wijaya 2021; Cai et al. 2016; Jo and Na 2012; Minor and Morgan 2011; Luo and Bhattacharya 2009; Godfrey et al. 2009; Orlitzky and Benjamin 2001).

The study by Liu and Lu (2021) focused on all publicly traded companies in Standard and Poor's Compustat from 2004 to 2012, scoring social responsibility disclosure in aspects such as the environment, community, and corporate governance. The research results showed that companies with higher disclosure scores had significantly lower corporate risk. Additionally, the results implied that social responsibility disclosure partly reduces risk through the company's reputation.

The study by Eriandani and Wijaya (2021) sampled listed companies on the Indonesia Stock Exchange that disclosed social responsibility information from 2016 to 2019. It demonstrated that disclosure activities had an inverse relationship with corporate risk, as such activities could build reputation and enable effective resource management. Companies could minimize risk by disclosing social responsibility information as a way to demonstrate a balance between economic, social, and environmental aspects.

The study by Cai et al. (2016) examined the relationship between environmental responsibility and a company's risk. To test hypotheses related to risk reduction, resource constraints, and industry variations, the authors collected a sample comprising 1947 large U.S. companies from the period between 2003 and 2015 by combining various datasets. The research results indicated that companies with environmental responsibility may face lower risks.

The discussion on studies examining the impact of environmental accounting disclosure in general and social responsibility on the risk of bankruptcy or financial distress is significant. Do (2022) conducted a study to explore the relationship between corporate social responsibility and bankruptcy risk, with a focus on conditional effects over different time periods. The results revealed an inverse relationship between social responsibility and

bankruptcy risk. Furthermore, the long-term impact of social responsibility was stronger than the short-term effect.

Boubaker et al. (2020) investigated how corporate social responsibility affects the level of financial distress risk. The study sample consisted of 1201 publicly listed companies in the United States from 1991 to 2012. The research results indicated that companies with high-quality social responsibility have lower levels of financial distress risk and a better ability to access financial resources, aligned with the conclusion, the diversity of community, employee relationships, and environmental aspects of corporate social responsibility helps reduce financial distress risk for businesses (Attig et al. 2013).

The study by Cooper and Uzun (2019) utilized a sample comprising 78 companies that filed for bankruptcy during the period from 2007 to 2014 and a corresponding group of companies that did not. Overall, the results indicated that companies with higher levels of social responsibility disclosure are less likely to face bankruptcy compared to companies with lower disclosure levels.

The research conducted by Lin and Dong (2018) aimed to address the question of whether the financial distress of companies could be mitigated through a commitment to social responsibility. The study's findings demonstrated that companies with a positive history of engaging in social responsibility were less likely to file for bankruptcy when facing financial difficulties and were more likely to recover quickly after a crisis.

Additionally, some studies have highlighted an inverse relationship between social responsibility and systemic risk by increasing the disclosure of social responsibility, which helps enhance financial efficiency and reduce capital costs (El Ghoul et al. 2011; Oikonomou et al. 2012).

Ding et al. (2022) investigated the role of environmental information disclosure in relation to borrowing costs. This study focused on manufacturing companies that had been penalized by the Chinese government for violating environmental rules and regulations. Based on the results, the authors found that regulatory penalties significantly increased a company's borrowing costs in the following year through the adverse impact of environmental information disclosure.

The study by Albuquerque et al. (2019) presented an industry equilibrium model in which companies have the choice to engage in social responsibility activities as an investment to enhance product differentiation, allowing them to benefit from higher profit margins. The research aims to capture the social, environmental, and corporate governance factors related to a company's operations, financial performance, and risk management. The research results indicate that social responsibility activities affect a company's systemic risk. Companies that disclose information on social responsibility will have lower capital costs, and investors including these companies' stocks in their investment portfolios will help reduce the overall portfolio risk.

Dutta and Nezlobin (2017) used data from companies in the S&P 500 to confirm that social responsibility has an inverse impact on systemic risk, which includes market risk. The study also indicated that companies with higher social responsibility tend to have lower capital costs. The research results further revealed that, all else being equal, current shareholders prefer maximum information disclosure, and the future benefits to shareholders will increase (decrease) depending on the accuracy of the disclosed information if the company's growth rate is above (below) a certain threshold.

Research on the impact of environmental accounting and environmental information disclosure has gained popularity in developed countries where the relationship between business activities and the environment has been recognized for an extended period. Environmental accounting is relatively new in Vietnam and primarily follows the general provisions of Circular 96/2020/TT-BTC or the Global Reporting Initiative (GRI) framework for implementation. In Vietnam, studies on corporate social responsibility and environmental accounting have only been conducted in recent years and have not been significantly practical. A few recent studies in this context include (Nguyen 2020, 2022; Nguyen et al. 2022, 2023; Anh-Tuan et al. 2022). In general, research in this field in Vietnam is not yet

diverse across various aspects and has not delved deeply into specific relationships. Additionally, the results of these studies may differ due to different national contexts and various time periods. Therefore, our research team embarks on this study with the intention of investigating and collecting information to fill the gaps in this field in Vietnam.

2.2. Theoretical Background

To assess the level of environmental accounting information disclosure and its relationship with financial risk, we utilize the following theories:

The theory of legitimacy posits that organizations must align their activities with societal values and standards. Failure to adhere to these social values and standards can lead to difficulties in gaining community support for their continued operation. The theory of legitimacy originates from the research on legitimacy in politics by the German economist and sociologist Weber (1922) in his work "Concepts in Sociology". Given the increasing societal concern about the environment, the public expects that organizations will exhibit responsible and environmentally-friendly behavior. Failing to meet these societal expectations and demands could result in sanctions, such as the revocation of licenses, which can have long-term implications for the survival of the business (Deegan 2002). This theory explains the motivation behind using environmental accounting as a tool to fulfill social responsibility and ensure legal compliance. Therefore, the clearer the disclosure of environmental accounting information, the more it minimizes legal and ethical issues, reducing financial risks.

Since its introduction, Resource Dependency Theory has become one of the most influential theories in organizational and strategic management. This theory emerged from the idea of organizations' vulnerability to their external environment (Pfeffer and Salancik 1978). This theory asserts that organizations must recognize and identify the societal groups upon which they depend. They must then manage and align their actions and behaviors with the needs of these external societal groups to reduce the risks and potential reactions from them. Bhattacharyya (2016) applied this theory to examine the extent of environmental information disclosure. According to this framework, businesses need to secure support and consensus from society, especially from the entities that provide the primary resources to the organization. Therefore, disclosing environmental accounting information becomes a necessary and appropriate action aligned with societal demands, reducing the risks associated with external societal reactions and minimizing financial risks for the company.

The stakeholder theory originated from Freeman's (1984) research on organizational management and business ethics. This theory asserts that organizations have an obligation to treat their stakeholders fairly. The concept of accountability (information disclosure) requires businesses to be responsible for their activities. The responsibility to account for actions to stakeholders extends beyond that of accountability to shareholders. As the success of businesses depends on how they balance the diverse needs of stakeholders, enterprises need to respond and account for stakeholders. Freeman and Liedtka (1997) identified three reasons for accountability to stakeholders: (i) interest-based accountability; (ii) rights-based accountability; (iii) obligation-based accountability. Ullmann (1985) developed a conceptual model of corporate social responsibility. Ullmann concluded that the stakeholder theory provides a suitable framework for integrating strategic decisions into the examination of corporate social responsibility activities. Manini et al. (2016) used this theory to analyze the correlation between financial structure, company profitability, audit firm type, liquidity, the number of years in business, and environmental information disclosure. A company's operations have an impact on both internal and external stakeholders. This theory is employed to explain why companies voluntarily adopt environmental accounting information disclosure to meet the increasing demand for environmental data from various stakeholders, including government agencies, credit organizations, investors, consumers, and the community. Conversely, the lack of transparent disclosure of environmental accounting information can lead to specific financial risks for the company.

2.3. Research Hypotheses

2.3.1. The Relationship between the Level of Environmental Accounting Information Disclosure and Financial Risk

Elias (2004) argues that businesses are facing increasing pressure from stakeholders to establish ethics and transparent information systems. Today's market economy demands that companies not only sell products and services but also create value and fulfill corporate social responsibility (CSR) towards the public. Regarding the relationship between CSR and business risks, various studies have found evidence supporting the beneficial impact of engaging in CSR on business risks from different perspectives (Cheung 2016; Albuquerque et al. 2019). Companies with higher CSR effectiveness tend to be perceived as less risky by investors. According to the stakeholder theory, for a business to sustain and thrive, it needs to balance the interests of various stakeholders, such as shareholders, employees, and customers (Freeman 1984; Mishra and Modi 2013). CSR activities can help companies mitigate the risk of losing support from one or more stakeholders, enhancing the reputation of these companies. Strong relationships with stakeholders can improve the ability to reduce risk by reducing market uncertainty, thus eliminating or mitigating any disruptions, losses, or damages to a company's profits and minimizing the impact of unforeseen events (Kytle and Ruggie 2005).

With efforts to improve the financial market in Vietnam, the disclosure of information related to social responsibility is gradually becoming a near-obligatory element in annual reports, as emphasized in Circular 96/2020/TT-BTC, affirming the concern of stakeholders on this matter. Therefore, it can be seen that the disclosure of environmental accounting information has an impact on the financial risks of companies, hence the research hypothesis (H1) is formulated as follows:

H1a. *The level of environmental accounting information disclosure has an inverse effect on the financial risk of the company in the current year.*

H1b. *The level of environmental accounting information disclosure has an inverse effect on the financial risk of the company in the following year.*

2.3.2. Assessing the Differences in Financial Risk between Listed Companies Included in the List of the Top 100 Sustainable Companies in Vietnam and Those Not on This List

According to the stakeholder theory, businesses should address the interests of all stakeholders rather than just their own. Freeman (1984) noted that when there is consensus among stakeholders, interests are enhanced, and cooperation is promoted. Therefore, many businesses have adopted various strategies to encourage consensus among stakeholders. In Vietnam, to enhance the trust and satisfaction of stakeholders, many companies have chosen to participate in the "Programme on Benchmarking and Announcing Sustainable Companies in Vietnam (CSI)". The CSI program helps raise awareness among businesses and society about the importance and benefits of sustainable development in the new context, as well as encourages businesses to engage in sustainable business practices and sustainable corporate management. Simultaneously, this recognition also provides businesses with the opportunity to enhance their reputation, brand, and attract human resources. It opens doors to new business opportunities by increasing the trust of partners, investors, and shareholders. It contributes to the development of sustainable business, thereby improving the competitive capabilities of businesses in the current international economic integration context.

With these positive impacts, when recognized among the top 100 companies in the CSI program, the financial risks of these companies are likely to be significantly reduced. Therefore, the research group formulates hypothesis (H2) as follows:

H2. *There is a difference in financial risk between companies listed in the top 100 Sustainable Companies in Vietnam and companies not included in this list.*

3. Research Methodology

3.1. Data Collection

Group 1: Listed companies meeting two criteria: (i) Have published financial reports and annual reports (or sustainability reports) from 2018 to 2022, and (ii) are included in the list of the top 100 Sustainable Companies in the "Programme on Benchmarking and Announcing Sustainable Companies in Vietnam (CSI)" for at least 3 out of 5 years from 2018 to 2022.

Group 2: Listed companies not included in the list of the top 100 Sustainable Companies from 2018 to 2022 but meeting two criteria: (i) Have published financial reports and annual reports (or sustainability reports) from 2018 to 2022, and (ii) have business size and sector corresponding to Group 1.

After screening the list of 100 Sustainable Companies over the course of 5 years, only a total of 30 companies meet the criteria for Group 1. Next, 30 suitable companies for Group 2 companies are selected (both in terms of quantity and quality, matching those of Group 1). The sample comprises 300 observations, in line with the conditions for analysis (Tauchen 1986; Hair et al. 2011). The final research sample is presented in Table 1.

Table 1. Sample allocation by industry.

Industry	Number of Companies	Observations
Manufacturing	42	210
Utilities	8	40
Construction and Real Estate	6	30
Transportation and Warehousing	2	10
Wholesale	2	10
Total	60	300

3.2. Variable Measurements

3.2.1. Dependent Variable: Financial Risk (FR)

In this study, the financial risk measurement model developed by Alexander Bathory (Bathory 1984) is utilized. The formula is as follows:

$$FR_{it} = SZL_{it} + SY_{it} + GL_{it} + YF_{it} + YZ_{it} \tag{1}$$

where

SZL_{it} = (profit before tax + depreciation + deferred tax)/current liabilities.
SY_{it} = pre-tax profit/operating capital.
GL_{it} = shareholders' interests/current liabilities.
YF_{it} = net tangible assets/total liabilities.
YZ_{it} = working capital/total assets.

Bathory's model suggests that a higher value of FRit indicates lower financial risk, and vice versa.

3.2.2. Independent Variable: The Level of Environmental Accounting Disclosure (ENVI)

We calculate the variable ENVI based on the 2016 GRI (Global Reporting Initiative (GRI) 2016) Sustainability Reporting Standards, specifically with the environmental criteria (GRI 300) as presented in Table 2.

Table 2. Environmental items.

No.	Field	Number of Items	Referencing to GRI
1	Materials	4	301
2	Energy	6	302
3	Water	4	303
4	Biodiversity	5	304
5	Emissions	8	305
6	Effluents and Waste	6	306
7	Environmental Compliance	2	307
8	Supplier Environmental Assessment	3	308

Each item is scored depending on the level of environmental accounting disclosure in the annual report (or sustainability report) of the company. The scoring scale is presented in Table 3.

Table 3. The method for assessing the level of environmental information disclosure.

The Level of Information Disclosure	Score
Full disclosure of required information through quantitative data or qualitative information	2
Partial disclosure of required information but not complete	1
Non-disclosure of required content or disclosure of irrelevant information	0

After scoring the items, the score represents the level of environmental accounting information disclosure of the company, calculated according to the formula:

$$ENVI_{it} = \sum X_{nt} \tag{2}$$

where

X_{nt} is the score of item n disclosed by company i in year t.

To illustrate the calculation method of the variable ENVI, we provide an assessment and computation example in Table 4. The company in this example is Vietnam Dairy Products Joint Stock Company (VNM), one of the selected companies in the study sample. The table below presents the evaluation and computation of the level of environmental information disclosure for VNM in the year 2022.

Table 4. Table assessing the level of environmental information disclosure of VNM in 2022.

Item	Content	Score	Item	Content	Score
301-0	Management approach	1	305-0	Management approach	1
301-1	Materials used by weight or volume	0	305-1	Direct (Scope 1) GHG emissions	1
301-2	Recycled input materials used	2	305-2	Energy indirect (Scope 2) GHG emissions	1
301-3	Reclaimed products and their packaging materials	0	305-3	Other indirect (Scope 3) GHG emissions	0
302-0	Management approach	1	305-4	GHG emissions intensity	1
302-1	Energy consumption within the organization	1	305-5	Reduction in GHG emissions	1
302-2	Energy consumption outside of the organization	0	305-6	Emissions of ozone-depleting substances (ODS)	0

Table 4. *Cont.*

Item	Content	Score	Item	Content	Score
302-3	Energy intensity	1	305-7	Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions	0
302-4	Reduction in energy consumption	2	306-0	Management approach	1
302-5	Reduction in energy requirements of products and services	2	306-1	Water discharge by quality and destination	1
303-0	Management approach	1	306-2	Waste by type and disposal method	2
303-1	Water withdrawal by source	2	306-3	Significant spills	1
303-2	Water sources significantly affected by withdrawal of water	1	306-4	Transport of hazardous waste	1
303-3	Water recycled and reused	1	306-5	Water bodies affected by water discharges and/or runoff	1
304-0	Management approach	1	307-0	Management approach	0
304-1	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	0	307-1	Non-compliance with environmental laws and regulations	0
304-2	Significant impacts of activities, products, and services on biodiversity	1	308-0	Management approach	1
304-3	Habitats protected or restored	1	308-1	New suppliers that were screened using environmental criteria	2
304-4	IUCN Red List species and national conservation list species with habitats in areas affected by operations	0	308-2	Negative environmental impacts in the supply chain and actions taken	1
			Total score (X) = 34		

3.2.3. Control Variables

The control variables include business size (SIZE), financial leverage (LEV), return on assets (ROA), and current ratio (CR) as shown in Table 5.

Table 5. Measurement of control variables.

Code	Control Variable	Measurement	References
SIZE	Business size	Log(Total Assets)	Ohlson (1980); De Jonghe et al. (2015); Al-Hadi et al. (2019)
LEV	Financial leverage	Liabilities/Total Assets	Ayadi et al. (2015); Benlemlih et al. (2018); Al-Hadi et al. (2019)
ROA	Return on assets	(Net Income/Average Total Assets)*100	Altman (1968); Bhunia and Mukhuti (2012); Ahmed Sheikh and Wang (2013); Al-Hadi et al. (2019)
CR	Current ratio	Current Assets/Current Liabilities	Beaver (1966); Edmister (1972); Ohlson (1980); Bhunia and Mukhuti (2012)

Based on theoretical background and previous studies, from constructing hypotheses H1a and H1b, we propose the research model as follows:

$$FR_{it} = \beta_0 + \beta_1 ENVI_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 ROA_{it} + \beta_5 CR_{it} + \varepsilon_{it} \tag{3}$$

$$FR_{it} = \alpha_0 + \alpha_1 ENVI_{it-1} + \alpha_2 SIZE_{it} + \alpha_3 LEV_{it} + \alpha_4 ROA_{it} + \alpha_5 CR_{it} + e_{it} \tag{4}$$

4. Results and Discussion

4.1. Descriptive Statistics

Figure 1 provides an overview of the level of environmental accounting information disclosure by listed companies in Vietnam from 2018 to 2022. The average ENVI index increased over the years, rising from 9.47 in 2018 to 14 in 2022, an increase of 47.89%. This is a positive sign, indicating that Vietnamese companies are becoming more concerned about environmental information disclosure. Especially in the 2021–2022 period, the average index increased more rapidly compared to the previous period. The average index in 2020 increased by 17.25% compared to 2018, from 9.47 to 11.1. Meanwhile, the rate of increase in 2022 compared to 2020 was even higher, at 26.13%, going from 11.1 to 14. This may be due to the issuance and enforcement of Circular 96/2020/TT-BTC, which has increased legal pressure on listed companies and raised awareness of environmental accounting practices and disclosure.
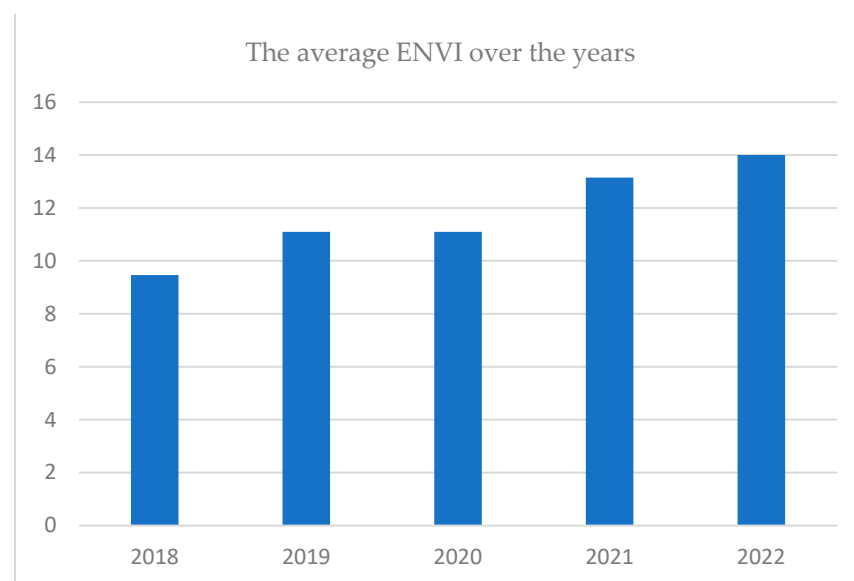

Figure 1. Environmental Information Disclosure Index for the Period 2018–2022.

Table 6 presents descriptive statistics of the variables in the model. Accordingly, FR has an average value of 5.293, ranging from −1.029 to 108.349, with a standard deviation of 7.301, indicating significant variation in financial risk among the companies. ENVI has an average value of 11.763, ranging from 0 to 39, with a standard deviation of 8.843, suggesting that Vietnamese companies, in general, have awareness of environmental accounting, but there is substantial variation among them. SIZE has an average value of 3.485, ranging from 2.297 to 5.411. LEV has an average value of 0.441, ranging from 0.079 to 0.931. ROA has an average value of 8.816, ranging from −1.1 to 47.51. CR has an average value of 2.304, ranging from 0.252 to 10.842.

Table 6. Descriptive statistics of the variables.

Variable	Obs	Mean	Std. Dev.	Min	Max
FR	300	5.293275	7.30096	−1.028936	108.3492
$ENVI_t$	300	11.76333	8.842773	0	39
$ENVI_{t-1}$	240	11.20417	8.701223	0	38
SIZE	300	3.485007	0.5990884	2.296665	5.411173
LEV	300	0.4409413	0.198406	0.079096	0.9310873
ROA	300	8.815633	7.520865	−1.1	47.51
CR	300	2.30426	1.520973	0.252497	10.84211

4.2. Assessing the Correlation between Variables

The correlation matrix and the calculated Variance Inflation Factor (VIF) results are presented in Table 7. It can be observed that the independent variables $ENVI_t$ and $ENVI_{t-1}$ have a positive correlation with the dependent variable FR, with correlation coefficients of 0.057 and 0.0020, respectively. This suggests that a higher level of environmental accounting information disclosure in the previous year and the current year leads to a reduction in financial risk in the present and the future. A higher value of FR indicates lower financial risk (Bathory 1984). However, to confirm the accuracy of these results, a regression analysis should be conducted.

Table 7. Correlation matrix and VIF coefficients.

	FR	$ENVI_t$	$ENVI_{t-1}$	SIZE	LEV	ROA	CR	VIF_t	VIF_{t-1}
FR	1.0000							-	-
$ENVI_t$	0.0565	1.0000						1.25	-
$ENVI_{t-1}$	0.0020	0.8970	1.0000					-	1.24
SIZE	−0.1669	0.3190	0.3188	1.0000				1.28	1.29
LEV	−0.3235	−0.1502	−0.1354	0.2612	1.0000			2.07	2.04
ROA	0.2450	0.2190	0.2094	−0.1863	−0.4675	1.0000		1.35	1.35
CR	0.3298	0.0875	0.0680	−0.1577	−0.6402	0.2960	1.0000	1.70	1.65

Table 7 also shows that the absolute values of the correlation coefficients between independent variables are all less than 0.8, and the VIF coefficients of the variables are also less than 5. Therefore, there is no issue of multicollinearity.

4.3. Research Finding and Discussions

4.3.1. The Relationship between the Level of Environmental Accounting Information Disclosure and the Financial Risk of the Current Year

First, perform regressions using the following models: Ordinary Least Squares (OLS), Fixed-Effects Model (FEM), and Random-Effects Model (REM). Subsequently, we utilize two tests to select the appropriate model. The F-test is used to choose between OLS and FEM, with a *p*-value of 0.0088 < 0.05 (significant), indicating that the FEM is more appropriate. The Hausman test is employed to select between FEM and REM, and the *p*-value is 0.5778 > 0.05, suggesting that the REM is a better fit. Therefore, the REM is chosen among the three models. Using Pesaran's test of cross sectional independence yields a *p*-value of 0.5016, indicating that the model does not encounter the issue of cross-sectional correlation. Next, conduct tests for heteroskedasticity and tests for autocorrelation, with *p*-values of 0.0119 and 0.0000, both less than 0.05, indicating that the REM suffers from both of these phenomena. To address these issues, perform Feasible Generalized Least Squares (FGLS) estimation. The regression results for the different models are presented in Table 8.

Table 8. Regression results—case without considering lag.

	FR			
	OLS	FEM	REM	FGLS
$ENVI_t$	0.0230811 (0.642)	−0.01655 (0.884)	0.014334 (0.801)	0.0037033 (0.041)
SIZE	−1.144191 (0.124)	−7.334444 (0.108)	−1.189315 (0.181)	−0.5217391 (0.000)
LEV	−4.034508 (0.158)	0.9085111 (0.901)	−3.549392 (0.280)	−4.410638 (0.000)
ROA	0.1046479 (0.086)	0.1090136 (0.450)	0.1083972 (0.121)	0.0785901 (0.000)

Table 8. *Cont.*

	FR			
	OLS	**FEM**	**REM**	**FGLS**
CR	1.010112 (0.003)	1.716255 (0.008)	1.094589 (0.004)	0.9329858 (0.000)
Constant	7.538163 (0.013)	25.73223 (0.094)	7.356697 (0.038)	5.527951 (0.000)
Observations	300	300	300	300
R^2	0.1340	0.0927	0.1482	-

It can be observed that the variable $ENVI_t$ has a *p*-value of 0.041, which is less than 0.05, indicating statistical significance. Additionally, the coefficient $\beta1 = 0.004$ demonstrates that the variables $ENVI_t$ and FR have a positive relationship. According to Bathory, a higher value of FR indicates lower financial risk. Thus, we conclude that the hypothesis H1a is accepted: The level of environmental accounting information disclosure has an inverse effect on the financial risk of the company in the current year. This result is consistent with previous studies (Cai et al. 2016; Boubaker et al. 2020; Do 2022).

4.3.2. The Relationship between the Level of Environmental Accounting Information Disclosure and the Financial Risk of the Following Year

Conduct regressions using various models: OLS, FEM, and REM. Subsequently, employ two tests to choose the appropriate model. With the F-test, the *p*-value is 0.0000, which is less than 0.05, indicating that the FEM is more suitable. Using the Hausman test, the *p*-value is 0.3364, which is greater than 0.05, suggesting that the REM is more appropriate. Thus, the REM is selected from among the three models. Using the Pesaran test yields a *p*-value of 0.0182, indicating that the model encounters cross-correlation. Next, conduct tests for heteroskedasticity and tests for autocorrelation, with *p*-values of 0.0000 and 0.0004, respectively, both less than 0.05, concluding that the REM is affected by both phenomena. To address these issues, perform FGLS estimation. The regression results for the various models are presented in Table 9.

Table 9. Regression results—case considering lag.

	FR			
	OLS	**FEM**	**REM**	**FGLS**
$ENVI_{t-1}$	−0.0414766 (0.088)	0.0322612 (0.399)	−0.0013598 (0.962)	0.0215336 (0.000)
SIZE	−0.511191 (0.152)	−1.212972 (0.436)	−0.7889314 (0.161)	−1.140958 (0.000)
LEV	−6.725794 (0.000)	−2.706355 (0.300)	−4.719109 (0.007)	−2.385443 (0.000)
ROA	0.1181029 (0.000)	0.0799709 (0.089)	0.0934042 (0.008)	0.0808845 (0.000)
CR	1.005345 (0.000)	1.511309 (0.000)	1.32014 (0.000)	1.435245 (0.000)
Constant	6.814886 (0.000)	5.846111 (0.274)	5.943473 (0.004)	5.394794 (0.000)
Observations	240	240	240	240
R^2	0.5315	0.5020	0.5283	-

With a significance level of 5%, the results indicate that the variable $ENVI_{t-1}$ has a positive relationship with FR, with a coefficient of 0.022. This suggests that as the level of environmental accounting information disclosure increases, the financial risk for the following year decreases. Therefore, we can conclude that hypothesis H1b is accepted: The level of environmental accounting information disclosure has an inverse effect on the financial risk of the company in the following year.

From Table 10, it can be concluded that an increase in the level of disclosure of environmental accounting information helps mitigate the financial risk of the companies in the current year and the following year. For the control variables, both models yield consistent results. As the scale of the companies increases, financial risk may also increase. Companies with high financial leverage may face higher financial risks. A high return on assets can minimize financial risk. Companies with strong current liquidity have lower financial risk.

Table 10. Regression results summary.

	FR		The Relationship with the Variable FR	The Relationship with Financial Risk
	Non-Lag	**Lag**		
$ENVI_t$	0.0037033	-	+	−
$ENVI_{t-1}$	-	0.0215336	+	−
SIZE	−0.5217391	−1.140958	−	+
LEV	−4.410638	−2.385443	−	+
ROA	0.0785901	0.0808845	+	−
CR	0.9329858	1.435245	+	−

4.3.3. Evaluate the Difference in Financial Risk between Companies Listed in the "Top 100 Sustainable Companies in Vietnam" and Those outside This List

To determine the difference in financial risk between the two groups of companies, the research team used the independent-samples *t*-test. The results are presented in Table 11.

Table 11. Results of the independent-samples *t*-test.

	Group	**Obs**	**Mean**	**Std. Err.**	**Std. Dev.**	**Pr(|T| > |t|)**
FR	Non-TOP	178	4.501455	0.3002183	4.005411	0.0230
	TOP	122	6.448553	0.9320428	10.29475	
$ENVI_t$	Non-TOP	178	9.11236	0.483452	6.450048	0.0000
	TOP	122	15.63115	0.93627	10.34144	

The results in the table show that the mean value of FR for the group of companies within the list is 6.449, while for the group outside the list, it is 4.501. Additionally, the *p*-value is 0.0230, which is less than 0.05. Thus, the hypothesis H0 is rejected and accepts the alternative hypothesis. This means that there is a significant difference in financial risk between the companies within the "100 Sustainable Companies in Vietnam" list and those outside the list. This research's hypothesis H2 is accepted.

At the same time, the average value of ENVI for the group of companies within the list is 15.631, while for the group outside the list, it is 9.112. The *p*-value is 0.0000, which is less than 0.05. Therefore, it can be concluded that there is a difference in the level of environmental accounting information disclosure between the two groups.

So, companies within the list tend to disclose more environmental accounting information and have lower average financial risks compared to companies outside the list. This conclusion further supports hypotheses H1a and H1b. It is evident that environmental accounting information disclosure can help companies enhance their image and reputation, especially in the context of increasing community interest in green growth and sustainable

development. Good information disclosure can attract investors, retain employees, establish a bond with consumers, and improve relationships with sponsors, local communities, and governments, thereby minimizing financial risks.

5. Conclusions and Policy Implications

This research was conducted with the aim of understanding the relationship between the disclosure of environmental accounting information and the financial risk of businesses, as well as determining the differences in this risk between two groups of companies. The results show that the disclosure of environmental accounting information has an inverse impact on financial risks. This is consistent with previous studies (Cai et al. 2016; Boubaker et al. 2020; Do 2022). Moreover, this research contributes some new points: (1) This study also examines and indicates that the disclosure of environmental accounting information not only affects the current-year financial risk but also helps prevent financial risk in the following year. (2) Companies listed in the top 100 Sustainable Companies tend to disclose more environmental accounting information and have lower financial risks compared to companies outside the list.

Currently, globalization is a powerful phenomenon. Companies engage in activities related to the environment, exploiting resources to achieve the goal of maximizing profit. Therefore, in addition to activities impacting the environment, businesses also need to be concerned about avoiding environmental damage and depleting natural resources. Environmental concerns are not only those of the businesses but also of all stakeholders such as managers, shareholders, and external information users. The disclosure of environmental accounting information is considered a tool to build trust among stakeholders, enhance the credibility and brand of the business in its operational activities, create opportunities for businesses to access global investment sources, and notably, help mitigate financial risks. Based on the research results, discussions, and conclusions presented in the thesis, the research group provides some recommendations to improve and enhance the practical level of environmental accounting and the disclosure of environmental accounting information as follows:

Firstly, establishing a precise and appropriate legal framework for environmental accounting disclosure is crucial in Vietnam. Currently, disclosure in this area is mainly voluntary, lacking standardized templates. Larger and financially robust companies, as well as certain non-financial enterprises, are more inclined to engage in environmental accounting disclosure, offering more comprehensive information. However, the overall number of reporting enterprises remains low, with some providing only basic and superficial information. Many Vietnamese companies still do not fully grasp the significance of environmental accounting disclosure, prioritizing short-term profits over long-term benefits or company value. Some are unaware or indifferent to the concept, and others exploit legal loopholes, leading to consequences for consumers, the environment, and the economy. The role of state agencies in refining specific legal documents for regulation and management is now more crucial than ever.

Secondly, carry out awareness campaigns through mass media to enhance understanding of environmental accounting information disclosure. Despite gaining attention in Vietnam over the past decade and being adopted by large enterprises, environmental accounting information disclosure is still relatively unfamiliar to small and medium-sized enterprises. Additionally, there is a misconception that focusing on environmental protection activities and transparency in environmental accounting information will incur significant costs and may reduce profitability. Therefore, the government should use continuous communication channels to address concerns, amplify the significance and role of environmental accounting information disclosure. This approach can encourage businesses to improve their practices in environmental accounting information disclosure, making government oversight more straightforward and cohesive.

Thirdly, there is a need to encourage the issuance of evaluation standards, a Code of Conduct for Enterprises. The government should enhance the role of professional as-

sociations such as the Chamber of Commerce, the Vietnam Chamber of Commerce and Industry (VCCI), and relevant ministries and sectors in establishing a Code of Conduct and evaluation criteria, providing guidance to enterprises during implementation. Similar to the research, the author's team has selected some enterprises from the list of the "Top 100 Sustainable Companies in Vietnam". These enterprises play an active role and receive enthusiastic support from the business community in implementing the Sustainable Development Strategy in Vietnam. This facilitates the sharing of experiences and best practices, strengthening close coordination and dialogue between the business community, the government, and social partners to promote sustainable development. Annual programs to honor outstanding enterprises in sustainable development serve as both a motivation for businesses and a benchmark for consumers and investors to assess. These programs should be organized more frequently to intensify awareness campaigns, act as a bridge between government agencies and the business sector, and showcase excellent models of sustainable business development.

Fourthly, each enterprise should equip itself with information and gain a deep understanding of environmental accounting disclosure. The research results serve as a basis to encourage organizations to shift their perspectives when preparing annual reports. The content of their annual reports should not only focus on financial indicators and achievements in the current year but should also encompass information on environmental activities. Given the global and Vietnamese trend toward sustainable development, investors increasingly value information related to environmental accounting practices and the corporate social responsibility of enterprises. Therefore, by fulfilling environmental responsibilities, the disclosure of this information to investors and information users, in general, becomes a way to attract their attention and, furthermore, can help reduce the financial risks of the enterprise.

Fifthly, businesses should comply with the regulations and policies of the government, as well as consider adopting global rule sets. In addition to the laws stipulated and strictly enforced by the government, such as environmental protection laws and business laws, there are also globally recognized sets of standards. Notable standards include ISO 26000, ISO 45001, ISO 14000, SA 8000, and many others that cover various aspects including environmental issues. These standards have been widely disseminated globally and are utilized by numerous businesses worldwide. The benefits for businesses using these standards are diverse, ranging from strengthening and enhancing the quality of their environmental accounting information disclosure to keeping pace with global trends, increasing the globalization and competitiveness of domestic enterprises in the world.

Moreover, the results also indicate that, in addition to the level of environmental accounting disclosure, factors such as the scale of the company, financial leverage, return on assets, and current liquidity also impact the financial risk of the company. Therefore, to mitigate financial risks, companies need to coordinate and pay attention to these factors to achieve the optimal economic growth rate. This will also ensure sustainable development and enhance the company's reputation in the market.

The team has made efforts to accomplish the set objectives; however, limitations still exist. Firstly, this study only confines the measurement of financial risk and four control variables, while there are other factors that could be utilized to examine this relationship. Secondly, the research sample may not be sufficiently representative of all listed companies on the Hanoi Stock Exchange (HNX) and the Ho Chi Minh Stock Exchange (HOSE), and companies in Vietnam as a whole. Additionally, the level of environmental information disclosure in this study also carries a subjective aspect from the authors. Therefore, several topics are proposed for future research, such as expanding the investigation into the impact of environmental accounting information disclosure using different financial risk models; incorporating additional factors beyond the control variables used in this paper, possibly including perception factors. Extending the scope of the survey to ensure representativeness or delving into a specific industry to ensure specialization is also suggested.

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