

FACTORS AFFECTING ENVIRONMENTAL ACCOUNTING DISCLOSURE OF LISTED FOOD MANUFACTURING ENTERPRISES IN VIETNAM

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Abstract: The purpose of this study is to evaluate the factors affecting the disclosure of environmental accounting information of the food manufacturing companies listed on the Vietnamese stock market. Theoretical framework including stakeholder and agency theories is used to explain the disclosure of corporate environmental accounting. Using the data collected from 100 listed food manufacturing firms in Vietnam during the period from 2019 to 2021, the six factors selected to study their influence on the environmental accounting disclosure are firm size, profitability, liquidity, financial leverage, time of listing, and reputation of the audit firm. The regression results show that the three factors including firm size, listing time, and reputation of the audit companies have positive impacts on the environmental accounting disclosure of listed firms, in which the audit firm's reputation has the strongest influence. Based on content analysis of annual and sustainability reports, practices of environmental accounting disclosure of the chosen firms are assessed at a relatively low level, and there is a big gap between the highest and lowest disclosure levels. From the research results, several recommendations have been proposed for listed food manufacturing companies and other stakeholders to improve the level of corporate environmental accounting disclosure in Vietnam.

Keywords: Impacting factors, environmental accounting disclosure, food manufacturing industry, sustainability.

Introduction

One of the hot issues attracting top attention today is the environmental problem due to the development of social life and the process of industrialisation that has increasingly caused impacts on the environment. According to the announcement of the Organisation for Economic Cooperation and Development in 2021, the world generated 353 million tons of plastic waste, of which only 9% was recycled, whereas the remainder was either dumped in landfills or not managed after use. Due to the COVID-19 pandemic and the implementation of social distancing, although there was substantially less plastic waste, there was more single-use garbage. In Vietnam during the period 2016-2020, the amount of domestic solid waste generated in urban areas nationwide was 35,624 tons per day, equivalent to about 13,002,592 tons per year. In addition, the manufacturing industry in general

and the food production industry in particular cause environmental pollution related to wastewater, greenhouse gas emissions, and solid waste. Therefore, companies must account for environmental costs and disclose environmental accounting information so that they can reduce environmental impacts and improve their financial performance (Ngo, 2018).

According to Rounaghi (2019), businesses in a variety of industries, as well as in the production or service sectors can use environmental accounting. According to Schaltegger, Burritt and Christ (2022), pressures from stakeholders such as investors, policymakers, customers, suppliers, community, and creditors lead to the development of environmental accounting. Studies around the world have proven that environmental accounting brings great benefits to businesses such as helping companies comply

with environmental laws and policies, ensuring a long-term strategic position (IFAC, 2005), reducing environmental impacts, saving costs, alleviating government environmental concerns (Liu & Anbumozhi, 2009), establishing better relationships with stakeholders and improving corporate decision making (Kokubu & Kitada, 2015), enhancing corporate image, reputation and trade name (Zeng *et al.*, 2010), and improving financial performance (Amacha & Dastane, 2017).

Businesses need to be socially responsible, which is demonstrated by paying attention to the environmental impact of the company's activities in that area. Businesses need to balance economic, social, and environmental aspects (Nguyen, 2020). Burritt *et al.* (2019) pointed out that environmental accounting research in developing countries is still limited, especially in Southeast Asia, so, studying this issue in Vietnam is necessary.

In Vietnam, there are several studies on environmental accounting information disclosures. However, these studies focus on specific types of enterprises in the construction, agricultural production, or mining industries (Nguyen *et al.*, 2017; Nguyen *et al.*, 2019; Nguyen, 2020). Meanwhile, one of the hugely profitable industries such as food production is still rarely mentioned in the research. According to a report by Research and Markets (2019), it is estimated that from 2019 to 2024, the total value of the food production and processing market is about \$4.1 trillion, with a compound annual growth rate of 4.3%. According to statistical data from the General Statistics Office of Vietnam, during the past years, Vietnam's food processing and manufacturing industry has contributed greatly to the growth of the industry with the average growth rate of the industrial production index in five years from 2016 to 2020 of 7% per year. The number of enterprises operating in the food production and processing industry is not much (accounting for nearly 1% of the total number of enterprises in the country) but this is one of the spearhead industries with great potential for development in Vietnam,

which accounts for more than 20% of the annual net sales of manufacturing and trading in the processing and manufacturing industries.

However, along with the strong development of the food production industry, environmental issues are also of great concern because the characteristics of the food production industry require many resources, especially energy, water resources, and the production and packaging process using a lot of nylon as well as plastic products. In addition, the production process also emits environmental pollutants such as CO, CO₂, NO₂, dust, high temperature, domestic waste, animal husbandry waste, and wastewater. Therefore, when these wastes are discharged into the environment without being treated, they will cause extremely serious impacts on the surrounding living environment.

At the same time, businesses in the food production industry also face the risk of being fined a large amount of money if they do not fully comply with waste treatment regulations and thereby lose their reputation in the market. Therefore, food production enterprises need to honestly disclose their environmental accounting information to provide to the government, financial institutions, customers, investors, local communities, and those interested in corporate environmental responsibility, which also helps to enhance their image, reputation, and commercial value.

A study by Rashid *et al.* (2015) showed that there should be pressure and orders to force businesses to comply with environmental activities. Corporate social responsibility is demonstrated through corporate concerns about environmental degradation, depletion of natural resources, global warming, climate change, and human rights violations (Sheldon & Park, 2011). Vietnam is facing challenges and trade-offs between economic development and environmental and social issues. The National Action Plan for the implementation of the 2030 Agenda for Sustainable Development of Vietnam in 2017 has set out specific goals to encourage the business community to maintain sustainable

economic growth while protecting the ecological environment, effective management and use of resources, and proactively responding to climate change. It is of the utmost importance for businesses to disclose economic-environmental information. This practice facilitates state agencies in comprehending the manner in which environmental resources are being utilized and exploited to create economic efficiency and sustainability. Such disclosure also enables policy adjustments to be made in order to ensure that the exploitation of resources is carried out in an environmentally friendly manner that aligns with government regulations. Therefore, it is necessary to conduct further studies on the environmental accounting disclosure of Vietnamese enterprises. The main objective of this study is to determine the factors affecting the disclosure of environmental accounting information of listed food manufacturing companies in Vietnam. Besides, we evaluate the level of environmental accounting disclosure of listed enterprises in the study sample on the five main aspects: Emissions, materials, energy consumption, water consumption, and legal compliance. We focus on food manufacturing firms because this is a spearhead industry with great potential for development in Vietnam, accounting for more than 20% of the annual net sales of the manufacturing industries. Moreover, the food manufacturing industry uses many resources and the production process emits lots of environmental pollutants, which affects the surrounding habitat and biodiversity. Based on the research results, we would like to give recommendations for food production firms and other stakeholders to improve the disclosure level of environmental accounting information in the food manufacturing industry in Vietnam.

Literature Review

Disclosure is a process of conveying corporate information to relevant parties, including state regulators, suppliers, financial institutions, investors, employees, and the community (Nguyen, 2017). Disclosure can be financial and non-financial information,

in which environmental information reflects environmental impact, waste, pollution level, environmental degradation, and other environmental issues (Nguyen *et al.*, 2019).

Environmental accounting is a vital tool for sustainability development (Shakkour *et al.*, 2018) which is the combination of traditional accounting with ecological reporting (Lu & Li, 2020) and is often referred to as “green accounting” (Matsler, 2019). Companies can disclose environmental accounting information on their balance sheet, income statement, and notes to financial statements (Senn, 2018). Disclosures may include environmental costs, environmental assets, and environmental liabilities. Pham and Nguyen (2012) argued that one form of environmental accounting disclosure is the environmental report showing environmental strategy and policy, environmental risks, environmental assets, costs, income, and liabilities. According to Akdoğan and Hicyorulmaz (2015), environmental accounting is growing rapidly on a global scale. Burritt *et al.* (2019) argued that research on environmental accounting is needed in developing countries, especially in Southeast Asia.

Nguyen *et al.* (2017) conducted a study to evaluate the factors affecting the level of environmental accounting information disclosure of construction companies in Vietnam based on the data collected from 74 construction enterprises listed on the Vietnamese stock market in the period from 2013 to 2016. The research results showed that the level of environmental accounting disclosure of chosen construction enterprises tends to increase, especially in 2016. Furthermore, the results of this study also showed that enterprise size, profitability, financial leverage, number of years of listing, and independent audit factors have impacts on the level of environmental accounting information disclosure. Finally, Nguyen *et al.* (2017) proposed recommendations to improve the level of environmental accounting information disclosure to meet the information needs of stakeholders. At the same time, the study also pointed out the importance of environmental

accounting information disclosure of listed companies in their long-term strategy. Disclosure of environmental accounting information is a way for businesses to improve their image and reputation with stakeholders, especially in the integration trend when developed countries are very interested in green growth and sustainable development.

Yang and Liang (2017) also concluded on the factors affecting the disclosure of environmental accounting information of printing enterprises listed on the Shenzhen and Shanghai Stock Exchange in China, including solvency, profitability, and business size. Specifically, the research result shows that ISO 14001 certification has a positive relationship with the environmental accounting disclosure index and the larger companies are, the more likely they are to disclose environmental accounting information to strengthen investors' confidence and get more funding opportunities. In addition, profitability has a positive relationship with the level of environmental accounting information disclosure. When industry profit declines, businesses solely focus on enhancing their operating performance and pay little attention to environmental issues, resulting in a low degree of environmental accounting information disclosure.

Nguyen *et al.* (2018) assessed the factors affecting the level of environmental accounting information disclosure by collecting 85 Vietnamese enterprises operating under the model of parent company — subsidiary listed on the Vietnam Stock Exchange during the period 2013-2017. Based on the quantitative research method, the study result shows that the level of environmental accounting information disclosure is influenced by factors such as firm size, profitability, financial leverage, number of years of listing and independent audit, number of members of the Board of Directors, and concurrent position between Chairman of the Board of Directors and General Director.

Based on 280 survey questionnaires and annual reports, Nguyen and Pham (2020) used EFA exploratory factor analysis and found

five factors affecting the implementation of environmental accounting, including the legal system, economics, competitiveness, accounting training system, and managers. From another perspective, Nguyen (2020) conducted a survey of accountants, chief accountants, deputy financial directors, or directors at mining enterprises in Binh Dinh province. Based on 149 valid responses, the study used Cronbach's alpha analysis, exploratory factor, and multivariable regression analysis. The research results show that there are five different factors affecting the implementation of environmental accounting at mining enterprises in Binh Dinh province, including pressure from stakeholders, firm characteristics, coercive pressure of government agencies, environmental awareness of senior managers, and environmental accounting qualification of accountants.

Similarly, Nguyen *et al.* (2019) studied the determinants impacting the disclosure of environmental accounting information in mining companies listed on the Vietnamese stock market during the period 2013-2017. The research results show that the factors affecting the disclosure of environmental accounting information at listed mining companies in Vietnam are profitability, financial leverage, firm size, number of years of listing, and independent audit. Recent studies on environmental accounting are mainly related to the practice of applying environmental accounting in specific type of enterprises such as construction companies (Nguyen *et al.*, 2017), printing enterprises (Yang & Liang, 2017), and mining firms (Nguyen *et al.*, 2019; Nguyen, 2020). Each industry has its characteristics and the disclosure of environmental accounting of these industries is affected by many different factors. In particular, there are few in-depth studies on the factors affecting environmental accounting disclosure in the food manufacturing industry which is considered to have a large impact on the environment.

Based on an overview of domestic and international studies, most of the studies identify the factors affecting the level of environmental

accounting information disclosure including firm size, the time of listing, profitability, solvency, financial leverage, and independent audit (Nguyen *et al.*, 2017; Yang & Liang, 2017; Nguyen *et al.*, 2018; Nguyen *et al.*, 2019; Nguyen, 2020; Nguyen *et al.*, 2020). In addition, several study results also show that other factors such as pressure from the government and other stakeholders related to environmental protection issues, enterprises' perception of environmental responsibility, and accounting qualifications also influence the disclosure of environmental accounting information (Deegan *et al.*, 2002; Qian *et al.*, 2011; Spencer *et al.*, 2013; Jamil *et al.*, 2015). The food manufacturing industry is the industry that provides essential food for our daily lives. In the production process, in addition to liquid waste generated in the process of soaking fresh foods or cleaning production equipment, this industry also generates solid waste, mainly impurities from food, causing harm to biological life as well as the ecosystem. Therefore, this study was conducted to measure the influence of factors on the disclosure of environmental accounting information of food manufacturing enterprises listed on the Vietnamese stock market, contributing empirical evidence in the field of research on environmental accounting and sustainable development in Vietnam.

Hypothesis Development

Based on the literature review on factors affecting the level of environmental accounting information disclosure, the research hypotheses are determined as follows.

First, the larger the firm size, the more the tendency to disclose environmental accounting information. Big firms are always confident about their prospects, so, they are willing to pay the cost to make more voluntary disclosure of information to differentiate themselves from competitors and increase their business value (Jamil *et al.*, 2015). Jensen and Meckling (1976) initiated agency theory which analyses the conflicting relationship between business owners, principals and managers, or agents in the business. This theory assumes that

conflict will arise when there is incomplete and asymmetric information between the subject and the representative in the company. Both parties have different interests and this problem is minimized by establishing appropriate compensation mechanisms for managers and building effective monitoring mechanisms to limit abnormal behaviour or the self-interest of managers. Agency theory suggests that firms may use voluntary disclosures to lessen conflicts of interest between managers and shareholders (Bala *et al.*, 2021). Besides, managers have incentives to voluntarily release environmental information to draw in new investors and improve their company's reputation (Sun *et al.*, 2010). According to this theory, information asymmetries between managers and shareholders give rise to agency costs. Therefore, in large companies with various shareholders, agency costs increase because companies tend to monitor managers more closely. To reduce these costs, companies tend to disclose more information. According to Nandi and Ghosh (2012), Nguyen *et al.* (2017), Yang and Liang (2017), Nguyen *et al.* (2018), and Nguyen *et al.* (2019), larger firms will disclose more information to reduce political costs and increase trust in the market. Therefore, we propose the following hypothesis:

Hypothesis H1: Firm size (SIZE) has a positive effect on the level of environmental accounting information disclosure.

Second, according to stakeholder theory, the more profitable businesses are, the more ambitious they are to satisfy the information needs of their stakeholders, especially those who hold control over the company's key resources (Roberts, 1992). Stakeholder theory holds that there is always an interactive relationship between the business and its stakeholders, so, the interests of the stakeholders need to be satisfied for the success of the business in the long run (Freeman, 1984). Accordingly, stakeholders affected by business behaviour include shareholders, suppliers, customers, employees, competitors, social activists, mass media, legislators, academics, indigenous

people, labour organisations, local authorities, and the government. If a stakeholder controls a business's critical resources, then, the business will find ways to satisfy their needs. Disclosure of environmental accounting information is considered an effective management strategy to satisfy the needs of stakeholders (Deegan & Blomquist, 2006; Darnall *et al.*, 2009). Therefore, it is an opportunity for businesses to increase the value of their shares in the market. The higher the financial performance, the more willing they are to devote financial resources to the sustainable development of the company. According to agency theory, when firms operate effectively, managers will proactively disclose more information to negotiate their rewards (Singhvi & Desai, 1971), as well as enhance their value in the labour market (Barako *et al.*, 2006). At the same time, high profitability also has a positive effect on stock prices in the capital market (Inchausti, 1997). Omnamasivaya and Prasad (2017) and Nguyen *et al.* (2019) showed that companies with high profits often disclose more environmental accounting information than others. Therefore, we propose the following hypothesis:

Hypothesis H2: Profitability (PRO) has a positive influence on the level of environmental accounting information disclosure.

Third, liquidity is the ability of a business to meet its debt obligation in the short term. Liquidity is an important characteristic of the company which may influence the level of environmental accounting information disclosure. The current ratio can measure liquidity. The agency theory states that shareholders are the principals and managers are the agents (Jensen & Meckling, 1976). It is challenging for the principal to keep track of the agents' behaviour because information asymmetry claims that the principal and agent possess differing amounts of information. To solve the problem of information asymmetry, companies tend to provide complete and relevant information to investors, showing that they are doing better than others. Therefore, they can attract more investments and enhance

their reputation (Verrecchia, 1983). In practice, many companies voluntarily disclose more information including environmental accounting information, than is required by law and regulations (Cambell *et al.*, 2001; Kartika & Utami, 2019). In addition, Nandi and Ghosh (2013) also found a correlation between liquidity and the degree of disclosure. Therefore, we propose the following hypothesis:

Hypothesis H3: Liquidity measured by the current ratio (CUR) has a positive effect on the level of environmental accounting information disclosure.

According to the stakeholder theory, the higher the financial leverage or debt-to-equity ratio, the greater the conflict of interest among stakeholders such as creditors, shareholders, and managers (Roberts, 1992). However, businesses with large debt ratios often face solvency difficulties. Empirical research by Arif and Tuhin (2013) showed that the debt-to-equity ratio has a negative effect on the level of environmental accounting disclosure. In contrast, Ahmed and Nicholls (1994) argued that firms with high financial leverage have a higher level of disclosure required by creditors. Similarly, Naser (1998) also found a positive relationship between financial leverage and the level of information disclosure. On the other hand, high financial leverage shows that the business may not be able to pay its due debts or may even be insolvent. Chiu and Wang (2015) and Nguyen *et al.* (2019) found that there is a negative relationship between financial leverage and the level of environmental accounting disclosure. Although there are conflicting results on the relationship between financial leverage and the level of disclosure mentioned above, we propose the following research hypothesis:

Hypothesis H4: Financial leverage (LEV) has a positive effect on the level of environmental accounting information disclosure.

Jamil *et al.* (2015) indicated that the age of the firm has a significant influence on the level of mandatory disclosure. In contrast, Martínez-Ferrero *et al.* (2015) showed that the

age of the company does not affect the level of environmental accounting disclosure. Deegan *et al.* (2002) posited that the longer an enterprise has been listed on the stock market, the easier it is to comply with information disclosure requirements. Camfferman and Cooke (2002) suggested that there exists a positive relationship between the operating time of enterprises and the level of information disclosure. Companies with a longer operating history have more achievements to report to increase their reputation and competitive position in the market (Nguyen *et al.*, 2017; Nguyen *et al.*, 2018; Nguyen *et al.*, 2019). Therefore, we propose the following hypothesis:

Hypothesis H5: Time of listing (AGE) has a positive effect on the level of environmental accounting information disclosure.

Auditing is a mandatory requirement for the financial statements of listed companies. In order to minimize conflicts of interest between managers and shareholders, agency theory affirms the important role of independent audit. Big audit firms work to reduce agency costs and promote their supervisory role by limiting the opportunistic behaviour of managers (Jensen & Meckling, 1976). Bhayani (2012) supposed that choosing big audit firms is also a way for businesses to signal to investors that the information they provide ensures transparency, objectivity, and honesty. The more reputable independent audit firms are, the more likely they are to require the level of disclosure of their clients. Therefore, the fact that listed companies actively choose reputable audit firms is considered a good signal to ensure the transparency of disclosed information. Although the preparation and presentation of the financial statements is the responsibility of management, the reputation of the audit firm can significantly affect the disclosure of information. DeAngelo (1981), Nguyen *et al.* (2018) and Nguyen *et al.* (2019) showed the relationship between the reputation of audit firms and the level of information disclosure. Therefore, we propose the following hypothesis:

Hypothesis H6: The reputation of audit firms (BIG4) has a positive influence on the level of environmental accounting information disclosure.

Research Methodology

Research Sample

Currently, there are approximately 111 food manufacturing firms listed on the Vietnamese stock market. However, during the period 2019-2021, due to missing data on some enterprises, the sample size of the research was 100 companies. Tabachnick and Fidell (2013) provide a formula to calculate sample size requirements, taking into account the number of independent variables “n” to be greater than $(50 + 8m)$, where m is the number of independent variables. This study measures six independent variables, including firm size, profitability, liquidity, financial leverage, time of listing, and reputation of the audit firm, so, the minimum research sample that needs to be collected for regression analysis is 98 observations $(50 + 8m)$. However, when performing quantitative research, the minimum sample size should be 100 observations (Nguyen, 2011). Therefore, the sample size of 100 listed food manufacturing companies in this study is appropriate and representative of the population.

The 100 food manufacturing firms chosen in the sample account for more than 90% of the total number of enterprises in the same industry. Financial information of listed companies is extracted from <http://finance.vietstock.vn>. Environmental accounting information is collected from annual reports and sustainability reports, which are published on the websites of 100 sampled companies.

Research Model

The research hypotheses are tested using the regression model below:

$$EAD_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 PRO_{it} + \beta_3 CUR_{it} + \beta_4 LEV_{it} + \beta_5 AGE_{it} + \beta_6 BIG4_{it} + \varepsilon_{it}$$

Table 1: Measurement of independent variables

No.	Code	Variables	Measurement	Expectations
1	SIZE	Size of firms	Log (total assets)	+
2	PRO	Profitability	Profit after tax/owner’s equity	+
3	CUR	Current ratio	Current assets/current liabilities	+
4	LEV	Financial leverage	Non-current liabilities/total assets	+
5	AGE	Years of listing	Starting year of listing to the end of 2021	+
6	BIG4	Reputation of audit firm	= 1, if being audited by BIG4 (PwC, EY, KPMG, Deloitte) = 0, if not being audited by BIG4	+

Table 2: Measurement of the dependent variable

Level of Environmental Accounting Disclosure (EAD)	Scores
Disclosure is both quantitative and qualitative	4
Disclosure is only qualitative, not quantitative	3
Disclosure is fully quantitative, not qualitative	2
Disclosure is partially quantitative, not qualitative	1
No disclosure	0

EAD_{it} is the dependent variable measuring the level of environmental accounting disclosure of listed company i in year t . The independent and dependent variables are explained in Table 1 and Table 2 as follows.

Dependent variable – The level of environmental accounting disclosure of listed companies is measured based on both the quantity and quality of the disclosure provided, as shown in Table 2. The Environmental Accounting Disclosure (EAD) index for each company is determined as follows: $I_j = \frac{\sum_{i=1}^n d_{ij}}{n_j}$, of which I_j is the EAD index for company j , d_{ij} is the score of the i^{th} information disclosed by company j , and n_j is the number of information disclosed by company j . In this study, quantitative environmental accounting disclosure means companies can quantify the impacts of their business activities on the environment and disclose such information to related stakeholders. For example, companies can disclose information on how much greenhouse gas emissions are reduced during

the food production process. On the contrary, qualitative disclosures mean not showing an actual number but rather providing information on how companies operate and affect the environment (Ohonba & Obaretin, 2020).

According to the consolidated GRI sustainability reporting standards in 2016 and Circular No. 96/2020/TT-BTC guiding the information disclosure on the Vietnamese stock market (Ministry of Finance, 2020), environmental accounting disclosures in annual reports or sustainability reports include five main indices: Emissions, materials, energy consumption, water consumption, and legal compliance as shown in Table 3.

Results and Discussion

Descriptive Statistics for Variables

As shown in Table 4, the mean of listed food manufacturing enterprises (SIZE) is 11.629, measured by the logarithm of total assets. The

Table 3: Environmental accounting disclosure criteria

No.	Criteria	Content of Information Disclosure
1	Emissions	Total direct and indirect greenhouse gas (GHG) emissions
		Initiatives and measures to reduce greenhouse gas emissions and reductions achieved
2	Materials	The total amount of materials used to manufacture and package the company's main products and services during the year
		The percentage of recycled materials used in the production of the company's main products and services
3	Energy consumption	Direct and indirect energy consumption
		Energy saved through energy efficiency initiatives
		Energy saving initiatives (providing energy-saving products and services or using renewable energy), results of initiatives implementation
		Energy reduction achieved
4	Water consumption	Water supply and usage
		Percentage and total water reuse
5	Legal compliance	The number of times of been fined for not complying with environmental laws and regulations
		Total amount fined for non-compliance with environmental laws and regulations

Source: Consolidated GRI Sustainability Reporting Standards in 2016, Circular 96/2020/TT-BTC.

largest size enterprise is 13.689 (equivalent to VND 48,865 billion) while the smallest one is 11.053 (equivalent to VND 112.98 billion) and therefore, the sample size is quite diverse. Besides, the profitability of listed companies in the sample reached an average of 5.6%, showing a relatively large difference between food production firms with the highest profitability of 19.6% and the lowest profitability of -26.11%. This gap can be explained by the fact that

during the period 2019-2021, several listed food manufacturing companies in Vietnam were negatively affected by the COVID-19 pandemic. Processed products could not be exported to other countries resulting in declining sales and profit.

Table 4 also shows that the standard deviation of the Current Ratio (CUR) is relatively high at 2.859, indicating that this

Table 4: Descriptive statistics for variables

	SIZE	PRO	CUR	LEV	AGE	BIG4	EAD
Observations	300	300	300	300	300	300	300
Minimum	11.053	-0.2611	0.014	0.000	0	0.00	1.028
Maximum	13.689	0.1960	22.346	0.763	21	1.00	3.758
Mean	11.629	0.056	2.120	0.0742	6.41	0.343	1.989
Std. Dev.	0.939	0.398	2.859	0.1397	5.170	0.458	0.875

index of listed food manufacturing companies has a big difference. Similarly, the financial leverage of these firms also ranges from 0% to 76.3%, with an average level of 7.42%. In addition, the average listing time (AGE) of the chosen firms in the sample is 6.41 years and the longest listed time is 21 years. The mean of the independent variable “BIG4” is only 0.343, implying few listed companies are choosing BIG4 audit firms.

Based on the dependent variable measurement in Table 2, the level of Environmental Accounting Disclosure (EAD) of 100 listed food manufacturing enterprises ranges from 1.028 to 3.758 points on a 4.0 scale, showing that there is a relatively high disparity of disclosure levels between enterprises. This indicates that during the period 2019-2021, these firms did not fully disclose environmental accounting information in all five aspects of emissions, materials, energy consumption, water consumption, and legal compliance. These analysis results are in line with the previous studies (Le, 2015; Nguyen *et al.*, 2017; Nguyen *et al.*, 2018; Nguyen *et al.*, 2019; Lai, 2019).

Based on annual and sustainability reports on the websites of 100 sampled companies, most of the small and medium-sized firms with total capital of not more than VND 100 billion provide only qualitative environmental accounting information related to emissions, materials, energy consumption, water consumption, and legal compliance. Only a few large corporations on the Vietnamese stock market such as Masan Group, Vietnam Dairy Products Joint Stock Company (Vinamilk), and KIDO Group provide both qualitative and quantitative environmental accounting information.

The practices of environmental accounting in Vietnamese firms reveal that there are many important environmental costs hidden in overhead accounts. For example, the costs of environmental monitoring are recorded in the manufacturing overhead account (Lai, 2019). Nguyen *et al.* (2017) argue that only the end-of-pipe treatment costs are recorded. Other environmental costs are hidden in the

direct costs and overheads of the production process. In addition, enterprises have not been able to track and separately account for significant environmental costs such as repair and compensation costs and costs of handling damage to the ecological environment (Do, 2021).

Correlation Analysis of Variables

Table 5 presents the correlation analysis results and the multicollinearity test. The correlation coefficients between the variables ranged from -0.063 to 0.569. Independent variables such as firm size (SIZE), listing time (AGE), and reputation of audit firm (BIG4) all have Sig. of 0.000, showing that these variables are correlated with the dependent variable (EAD) and the correlation between the dependent variable and these independent variables is 0.375, 0.492, and 0.569, respectively. The ** symbol shows that these variables have a linear correlation at the 99% confidence level.

In addition, Table 5 also shows the linear correlation relationship between the independent variables. According to Dormann *et al.* (2013), if Sig. < 0.05 and the Pearson correlation value is greater than 0.7, multicollinearity is likely to occur. As shown in Table 5, the “SIZE” and “BIG4” variables have Sig. = 0.003 < 0.05 but have Pearson coefficient = 0.291 < 0.4. Therefore, there is no multicollinearity and the Pearson coefficient of these two variables is significant at the 0.01 level.

Linear Regression Analysis Results

According to Table 6, firm size (SIZE), listing time (AGE), and reputation of audit firm (BIG4) variables are all statistically significant with Sig. values of 0.013, 0.001, and 0.000, respectively. The other variables including profitability, current ratio, and financial leverage have no statistical significance in the regression model. The independent variable BIG4 has the largest Beta value of 0.392 among all variables, so, it has the biggest impact on the change of the dependent variable of the level of environmental accounting disclosure. Besides,

Table 5: Pearson correlation analysis results

		EAD	SIZE	PRO	CUR	LEV	AGE	BIG4
EAD	Pearson correlation	1	.375**	.173	-.063	-.017	.492**	.569**
	Sig. (2-tailed)		.000	.085	.536	.865	.000	.000
	N	300	300	300	300	300	300	300
SIZE	Pearson correlation	.375**	1	.118	-.111	.005	.177	.291**
	Sig. (2-tailed)	.000		.244	.271	.957	.078	.003
	N	300	300	300	300	300	300	300
PRO	Pearson correlation	.173	.118	1	.017	-.107	.300**	.141
	Sig. (2-tailed)	.085	.244		.863	.287	.002	.163
	N	300	300	300	300	300	300	300
CUR	Pearson correlation	-.063	-.111	.017	1	-.178	-.009	-.055
	Sig. (2-tailed)	.536	.271	.863		.076	.930	.590
	N	300	300	300	300	300	300	300
LEV	Pearson correlation	-.017	.005	-.107	-.178	1	-.053	.050
	Sig. (2-tailed)	.865	.957	.287	.076		.599	.618
	N	300	300	300	300	300	300	300
AGE	Pearson correlation	.492**	.177	.300**	-.009	-.053	1	.392**
	Sig. (2-tailed)	.000	.078	.002	.930	.599		.000
	N	300	300	300	300	300	300	300
BIG4	Pearson correlation	.569**	.291**	.141	-.055	.050	.392**	1
	Sig. (2-tailed)	.000	.003	.163	.590	.618	.000	
	N	300	300	300	300	300	300	300

** . Correlation is significant at the 0.01 level (2-tailed).

Table 6: Regression results

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics		
	B	Std. Error	Beta			Tolerance	VIF	
(Constant)	-.799	.877		-.911	.364			
1	SIZE	.192	.076	.206	2.534	.013	.897	1.114
	PRO	.003	.179	.001	.017	.986	.897	1.115
	CUR	-.006	.024	-.020	-.257	.798	.956	1.046
	LEV	-.161	.494	-.026	-.326	.745	.952	1.051
	AGE	.051	.015	.300	3.441	.001	.781	1.280
	BIG4	.749	.165	.392	4.535	.000	.791	1.265

Dependent Variable: EAD.

all the factors have a positive impact on the level of environmental accounting information disclosure. Therefore, hypotheses H1, H5, and H6 are accepted.

The above study results show that the level of environmental accounting disclosure in food manufacturing companies listed on the Vietnamese stock market is affected by three factors including firm size, listing time, and reputation of audit firm. The other three factors including profitability, liquidity, and financial leverage do not affect the environmental accounting disclosure of food manufacturing firms in Vietnam, which is not in line with the previous studies (Singhvi & Desai, 1971; Nandi & Ghosh, 2013; Chin & Wang, 2015; Omnamasivaya & Prasad, 2017; Nguyen *et al.*, 2019).

First, according to agency theory (Jensen & Meckling, 1976), agency costs related to the separation of management and ownership are often incurred in big firms. Huang and Zhang (2012) argued that enhanced disclosure helps to lower agency costs. Therefore, big companies often disclose more information to reduce agency costs. In addition, it is easier for enterprises with a long listing period to comply with regulations on information disclosure. Large-scale companies on the Vietnamese stock market such as Vietnam Dairy Products Joint Stock Company (VNM), Vinacafe Bien Hoa Joint Stock Company (VCF), and KIDO Group (KDC) have been listed for many years on the stock market, often chosen BIG4 audit firms. These are large companies that have built a long-standing brand name in the market. Their products are voted by consumers as high-quality Vietnamese goods and exported to foreign countries. As shown in the research results, the larger the enterprise scale, the longer the listing period, the higher the level of environmental accounting disclosure. This result is consistent with the previous studies (Nandi & Ghosh, 2012; Nguyen *et al.*, 2017; Yang & Liang, 2017; Nguyen *et al.*, 2018; Nguyen *et al.*, 2019). This indicates that stakeholders have higher expectations and requirements of information

disclosure for companies with large scale and long listing periods.

Second, the reputation of the audit firm also affects the level of disclosure of environmental accounting information of listed food manufacturing companies. Enterprises audited by BIG4 often have a higher level of environmental accounting disclosure than others (DeAngelo, 1981; Nguyen *et al.*, 2018; Nguyen *et al.*, 2019). These are also usually large-scale enterprises with a long listing time on the market. Selecting the BIG4, as well as other established audit firms, not only guarantees the dependability of financial reporting data but also amplifies the openness of environmental accounting information disclosure (Bhayani, 2012).

Third, based on the theory of asymmetric information in the stock market, listed companies with a healthy financial position and responsible for the environment and society are often proactive in disclosing information (Jensen & Meckling, 1976). This is how listed companies react to the market to reduce information asymmetry. On the other hand, to avoid the bankruptcy of enterprises, creditors often require businesses to disclose more information. When the company has high liquidity, it tends to disclose further information about the economy, environment, and society (Pham & Le, 2017; Dang & Tran, 2018). For the three independent variables such as profitability, financial leverage, and liquidity, previous studies show that these factors may have positive or negative impacts (Arif & Tuhin, 2013; Chin & Wang, 2015; Yang & Liang, 2017; Nguyen *et al.*, 2019) on the level of information disclosure, whereas no relationship between these factors can be found in our study. This can be explained by the fact that the profitability and liquidity of listed food manufacturing companies fluctuated during the period from 2019 to 2021 due to the impact of the COVID-19 epidemic and other factors, so, the influence of these two factors on the level of environmental accounting disclosure cannot be found. In practice, several food manufacturing firms suffered from loss due to a significant

drop in sales during the period 2019-2021. The COVID-19 epidemic negatively affects the financial performance and cash flows of listed firms in Vietnam (Vo & Tran, 2021).

Conclusion and Recommendations

After analysing the annual and sustainability reports of 100 listed food manufacturing companies in Vietnam during the period 2019-2021, practices of environmental accounting disclosure of the chosen firms are assessed at a relatively low level. In addition, there is a significant variation in the level of disclosure among these food manufacturing firms. Several listed firms in the sample only release qualitative environmental accounting information. These companies need to be fully aware of the benefits of disclosing environmental accounting information that may help them attract more investors and improve their reputation based on agency theory (Jensen & Meckling, 1976). In general, Vietnamese firms should not only pay attention to short-term benefits but also need to have a long-term strategy in business activities to achieve sustainable development (Do, 2021).

The above research results show that the low level of environmental accounting disclosure of listed manufacturing enterprises in Vietnam does not satisfy stakeholders. Therefore, the Ministry of Finance of Vietnam needs to issue standards on the disclosure of both financial and non-financial information related to the environment, society, and corporate governance to promote businesses to provide useful information to stakeholders. At the same time, Vietnamese management agencies need to impose strict sanctions to ensure compliance with regulations on information disclosure of listed firms on the Vietnamese stock market.

This study has collected data from a sample of 100 listed firms to assess the impact of three factors: Firm size, listing time, and reputation of audit firms — on the disclosure of environmental accounting information among food manufacturing enterprises. The outcomes of this study have established significant insights into the field of environmental

accounting practices in Vietnamese food manufacturing firms and contribute to the existing literature.

Firstly, the size of the firm and the time of listing on the stock market have positive effects on the level of environmental accounting disclosure of the chosen firms. Therefore, to attract and maintain the position of enterprises, managers of big companies need to focus on investing necessary resources for accounting work and information disclosure related to environmental accounting. In addition, the State Securities Commission of Vietnam and other state management agencies should have policies to promote the application of environmental accounting in small and medium-sized firms that have been listed for a long time on the Vietnamese stock market.

Secondly, the choice of audit firm also affects the level of environmental accounting disclosure. The above study results show that companies audited by the world's leading audit firms like BIG4 tend to disclose more environmental accounting information than others. Therefore, the selection of an appropriate audit company is very important for the Board of Directors and management to ensure the audit service quality and its obligations to disclose information about environmental accounting. During the process of collecting data for the study, there were still some companies that did not choose BIG4 audit firms but had a relatively high level of environmental accounting disclosure. This can be justified by the audit quality of several large domestic auditing firms equivalent to the BIG4's service quality. Therefore, in addition to the BIG4, enterprises can choose the leading domestic audit companies such as AASC Auditing Firm Company Limited, A&C Auditing and Consulting Company Limited, CPA Hanoi, or other audit companies that are members of big overseas audit firms such as Grant Thornton Vietnam, Mazars Vietnam Co., Ltd., and RSM Vietnam Auditing & Consulting Limited. The quality of audit services by reputable firms helps the listed food manufacturing companies to provide reliable information to stakeholders.

Lastly, the study still has some limitations. As shown in the regression results, the independent variables in the research model only explain 45% of the environmental accounting information disclosure level of the sampled enterprises. Therefore, future studies need to explore more determinants influencing environmental accounting information disclosure such as external pressure and corporate performance (Ji *et al.*, 2022), environmental awareness of senior managers (Nguyen, 2020), ownership structure, and environmental supervision (Liu & Bai, 2022).

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Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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