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The Relationship between Firm Characteristics and the Disclosure of Sustainability Reporting

Mao-Chang Wang

Department of Accounting, Chinese Culture University, 55, Hwa-Kang Road, Taipei 11114, Taiwan; wmc3@faculty.pccu.edu.tw or wmaochang@yahoo.com.tw; Tel.: +886-2-2861-0511 (ext. 35534)

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Abstract: Stakeholder theory is a major approach to research on sustainability management. Firm characteristics, including corporate governance and business characteristics, can be represented in terms of their effects on stakeholders. In this study, a multi-regression model is used to examine the relationship between firm characteristics and the disclosure of sustainability reporting for the Taiwan 50 Index-listed companies. Least-squares regression, panel data regression, and logistic regression analyses are applied. The results show that seven corporate governance and business characteristics, namely the size of the board of directors, ratio of independent directors, audit committee, ratio of export income, percentage of foreign shareholders' holdings, fixed asset staleness, and firm growth are positively related to the disclosure of sustainability reporting, whereas the percentage of director holdings and stock price per share are negatively related to the disclosure of sustainability reporting. This study supports the notion that stakeholder involvement is related to the disclosure of sustainability reporting.

Keywords: firm characteristics; sustainability reporting; corporate governance; stakeholder theory; stakeholders

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1. Introduction

Since the formation of the United Nations Global Compact, sustainable development has been internationally recognized as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. Institutions, organizations, and enterprises, both public and private, have sought to report their sustainable development efforts to their stakeholders. A firm's stakeholders can be defined as "the individuals and groups who depend on the firm to achieve their personal goals and on whom the firm depends for its existence". Corporations can strive to deliver sustainable development by embracing the triple bottom line of corporate social responsibility that includes environmental, social, and economic parts. All stakeholders play important roles in the firm's achievement of sustainable development. Achieving this goal, however, can be difficult in the current era of unprecedented economic growth. Although the quality of life has improved worldwide, the environment is threatened, and millions of people continue to suffer from poverty and hunger. This imbalance has led to a severe predicament in the twenty-first century. Knowledge and technological development can promote sustainable economic growth and may defuse the crisis that threatens the society, environment, and world economy. Attempts to implement sustainable development without transparency face severe risks; however, organizations that are transparent in their economic, environmental, and social activities can empower stakeholders, promote effective relations with other markets, and make improved investment decisions. Firms can promote clear, open, and transparent communication about sustainable development by using a recognizable framework that includes standard metrics and a unified terminology. The mission of the Global

Reporting Initiative (GRI) is to produce a credible, reliable, and sustainable reporting framework for all types of organizations. Business, labor, accounting, investment, and nongovernmental sectors, and other stakeholders are expected to improve the transparency of organizational activities. The GRI relies on stakeholders to establish a wide network of experts who collaborate to achieve consensus in consultative meetings. The GRI framework was established in 1997, and it has constantly been improved through consultations. The GRI reporting framework has achieved wide spread credibility because of stakeholder views [1–3].

Corporate governance has emerged as a topic connected to the establishment of agreements and the implementation of improvements in three dimensions: environmental, social, and economic, and conclude that collaboration is necessary to broaden theoretical development to enable the implementation of best practices of corporate governance and to ensure sustainability. The dialogue between corporate governance and stakeholders has been already tackled by some international organizations, guidelines, or principles, following a debate on corporate governance that has progressively combined a stakeholder perspective with a more classic shareholder-maximizing model of governance [4,5]. An enterprise that focuses on sustainable development can enhance the competitive ability of a country, industry, and the enterprise itself. Stakeholder theory stresses that managers must keep stakeholders' interests in mind when implementing business strategies. For this reason, the researchers extensively used stakeholder theory to explain firms' drivers for undertaking sustainability strategies and behaviors, so stakeholder theory is one of the major approaches in social, environmental, and sustainability management research. Many researchers investigated descriptive and empirical aspects of stakeholder theory, which helps describe how companies are actually managed, or more specifically to identify relevant stakeholders and their expectations related to sustainability reporting. Sustainable development is a concept, and sustainability reporting has the same importance and value as financial reports [6,7].

This study focused on how firm characteristics influence the disclosure of sustainability reporting for Taiwan 50 Index-listed companies. Firm characteristics, including corporate governance and business characteristics, that are relevant to the firm's stakeholders were considered; therefore, this study addressed the gaps in the literature on firm characteristics and the disclosure of sustainability reporting. This study applied a least-squares regression, a panel data regression, and a logistic regression analyses and analyzed the differences between firms in Taiwan's emerging economy and those in the United States. The potential contributions of this study include (a) examination of the relationship between firm characteristics and the disclosure of sustainability reporting; and (b) using Taiwan 50 Index-listed companies as a non-US sample framework. This study can help government authorities, practitioners, and academics to elucidate the relationships between firm characteristics and the disclosure of sustainability reporting. The results can compensate for the lack of studies on this topic, and provide a reference point for firms in emerging economies that seek to implement sustainability reporting.

2. Literature Review and Hypothesis Development

This section comprises two subsections that review the literature and describe the hypothesis development, including disclosure of sustainability reporting, firm characteristics and disclosure of sustainability reporting.

2.1. Disclosure of Sustainability Reporting

Improving the transparency of disclosures exerts a positive effect on the firm in the capital market [8,9]. According to Beaver [10], information asymmetry implies that the firm's management has more private information than existing shareholders or potential investors, and complete and adequate information helps mitigate the adverse selection of poor risk investments and related moral hazards. The World Business Council for Sustainable Development defined corporate social responsibility as corporate commitment to ongoing compliance with ethics, contributing to economic development, and improving the life quality of employees and their families and the local community. Enterprises should engage in social ethical behavior and act responsibly toward stakeholders. The GRI formulated a globally recognized reporting framework, which gave sustainability reporting the same importance and value as financial reporting. Montiel and Delgado-Ceballos [7] reviewed the literature and concluded that management scholars used different approaches to define, theorize, and measure the evolving field of corporate sustainability.

Sustainability reporting includes environmental aspects (such as raw materials, energy, water, biodiversity, air, suppliers, products and services, and transportation) as well as social aspects (such as labor practices, human rights, customer health and safety, respect for privacy, bribery and corruption, public policy competition, pricing, and corporate citizenship). The OECD Guidelines for Multinational Enterprises comprise 10 elements: concepts and principles, general policies, disclosures, employment and labor relations, environment, combating bribery, consumer interests, science and technology, competition, and taxation [2]. Standard and Poor listed 500 companies in an Investor Responsibility Research Center Institute database; A1-Tuwaijri, Christensen, and Hughes [11] used that database as a statistical sample and found statistically significant positive relationships among environmental performance, economic performance, and environmental information disclosure. Dhaliwal, Oliver, Albert, and Yong [12] reported that firms with a high equity capital cost in the previous year had a high tendency to disclose a corporate social responsibility report; therefore, disclosing a corporate social responsibility report was related to lowered equity capital costs for that firm in the future. Rüdiger and Kühnen [13] described legitimacy, stakeholders, signaling, and institutional theory as determinants of sustainability reporting. Alcaraz-Quiles, Navarro-Galera, and Ortiz-Rodríguez [14] reported that socioeconomic and e-government factors are relevant to the disclosure of sustainability information by regional governments. Barkemeyer, Comyns, Figge, and Napolitano [15] reported that the rhetoric in the chief executive officer statements of sustainability reports is indicative of impression management rather than accountability, despite the increasing standardization of sustainability reporting.

2.2. Firm Characteristics and Disclosure of Sustainability Reporting

Stakeholder theory is one of the major approaches to social, environmental, and sustainability management research, and scholars describe stakeholders as "those groups and individuals who can affect or be affected by the actions connected to value creation and trade", or as "the individuals and groups who depend on the firm to achieve their personal goals and on whom the firm depends for its existence". Stakeholder theory contributes to understanding stakeholders' influences on organizations' actions and how organizations respond to these influences. Stakeholders often seek to influence their organization's philosophy and practice of sustainability reporting. Stakeholder engagement can be defined as a "trust-based collaboration between individuals and social institutions with different objectives that can only be achieved collaboratively". Sustainable development can only be advanced by trust-based collaborative effort from both organizations and their stakeholders. Organizations are moving toward stakeholder engagement mainly to increase trust, transparency, and accountability, and provide more effective communication regarding sustainability reporting [6,16–19]. Corporate governance is conceptualized as the creation and implementation of processes seeking to optimize returns to shareholders while satisfying the legitimate demands of stakeholders [20]. This study used the firm's characteristics, including corporate governance and business characteristics, to understand stakeholders' interests. Corporate governance characteristics of a firm can contribute to stakeholders' beliefs about who and what really is important at that firm; business characteristics, including the financial and operational activities of a firm, can influence stakeholders' decisions [20,21].

This study focused on how firm characteristics influence the disclosure of sustainability reporting. Stakeholder interests can be inferred from firm characteristics such as corporate governance and business characteristics. The corporate governance characteristics comprise seven measurable variables: size of the board of directors, ratio of independent directors, audit committee, general manager acting as the concurrent chairman of board, percentage of director holdings, deviation in control and cash-flow rights, and pledged percentage of director shareholding. The business characteristics comprise six measurable variables: ratio of export income, percentage of foreign shareholders' holdings, stock price per share, fixed asset staleness, firm growth, and firm debt ratio. Cheng [22] examined the corporate governance and corporate social responsibility reports of Standard and Poor's 500 companies and found that firms with enhanced corporate governance tend to disclose corporate social responsibility reports. Jo and Harjoto [23] examined Standard and Poor's 500 companies by multi-regression analysis, the sample consisted of 12,527 firm-year (2952 firms) observations from 1993 to 2004, and reported that corporate governance has a positive relationship with corporate social responsibility, which is related to sustainability reporting.

Klein [24] observed that the size of the board of directors and the presence of an audit committee have positive relationships with management supervision; a firm with a large board of directors and an audit committee shows enhanced corporate governance and corporate social responsibility. Chen and Hsu [25] found that a high proportion of independent directors indicated highly transparent information disclosure. Karamanou and Vafeas [26] reported that an effective audit committee motivates the management to disclose financial information voluntarily; the effectiveness of corporate governance is related to the quality of information disclosure. Some accounting firms provide assurance services for corporate sustainability reports, which are related to the audit committee of the enterprise. Therefore, this study was based on the assumption that a firm will disclose sustainability information if it has a large board of directors, a high ratio of independent directors, and an audit committee. Core, Holthausen, and Larcker [27], and Liao, Lee, and Wu [28] reported that a general manager acting as the concurrent board chairman weakens the supervisory function of the board of directors, thus weakening corporate governance. Eng and Mak [29] considered companies in Singapore and found that the percentage of director holdings is negatively correlated with information transparency. La Porta, Lopez-Silanes, Schleifer, and Vishny [30], and Leuz, Nanda, and Wysocki [31] reported that a considerable deviation in control and cash-flow rights causes controlling shareholders to engage in harmful behavior toward other shareholders, which implies that poor corporate governance has a negative effect on information disclosure. Chen and Hsu [25] found that a considerable deviation in control and cash-flow rights leads to a negative effect on information disclosure. Increasing the pledged percentage of director shareholding results in substantially decreased director ownership; the deviation in control and cash-flow rights causes severe agency problems of poor corporate governance that lead to a negative effect on information disclosure [32,33]. Therefore, this study was based on the assumption that sustainability reporting might be impaired by any of the following problems: a general manager acting as the concurrent chairman of board, high proportion of director holdings, considerable deviation in control and cash-flow rights, and high pledged percentage of director shareholding.

Global enterprises with a high ratio of export income or a high percentage of foreign shareholders are under pressure to conduct corporate social responsibility activities that deter international competition and find new overseas development opportunities; therefore, such firms disclose considerable information regarding corporate social responsibility. Few studies have discussed the relevance of corporate social responsibility disclosures to firm value. Because of the differences in sample selection, variable measurement, research methods, and research periods, scholars have argued about the shift in focus and social impact hypotheses; therefore, evidence for the relevance of corporate social responsibility disclosure to firm value is inconclusive. A party interested in a firm with substantial growth opportunities or long-term fixed asset staleness requires the firm to provide more activities and a disclosure of social responsibility to secure its interests and manage its risks. Creditors play a supervisory role in firms that borrow and thus require extensive information disclosure to protect their claims [12,23,34–36]. Therefore, this study was based on the assumption that a high ratio of export income, high percentage of foreign shareholders' holdings, long-term fixed asset staleness, considerable firm growth, and high firm debt ratio cause a firm to disclose extensive information about sustainability. The stock price per share of a firm has a relationship with the disclosure of sustainability reporting.

Therefore, the following two hypotheses were proposed:

Hypothesis 1. *The corporate governance characteristics have positive or negative relationships with the disclosure of sustainability reporting.*

Hypothesis 2. *The business characteristics have positive or negative relationships with the disclosure of sustainability reporting.*

3. Research Methods

This section consists of three sub-sections that describe the research methods, including research period and sample selection, variable definitions, and research model.

3.1. Research Period and Sample Selection

The research issue and research design were produced in 2014, and the sample includes firms listed on the Taiwanese 50-index listed companies from 2010 to 2013 years end. The sample consists of 200 observations, and data were collected from the Market Observation Post System, the Taiwan Economic Journal (TEJ) database, websites of The Business Council for Sustainable Development of Taiwan (BCSD-Taiwan), and firm websites.

3.2. Variable Definitions

Table 1 summarizes the meaning of the variables. The dependent variable of this study is disclosure of sustainability reporting (DISC) that refers to the research design of Dhaliwal, Oliver, Albert, and Yong [12], and Jo and Harjoto [23]. The research variables of this study are the firm's characteristics, including corporate governance and business characteristics. Corporate governance characteristics of a firm can contribute to stakeholders' beliefs about who and what really is important at that firm; business characteristics, including the financial and operational activities of a firm, can influence stakeholders' decisions [20,21]. The corporate governance characteristics comprise seven measurable variables: size of the board of directors, ratio of independent directors, audit committee, general manager acting as the concurrent chairman of board, percentage of director holdings, deviation in control and cash-flow rights, and pledged percentage of director shareholding. The business characteristics comprise six measurable variables: ratio of export income, percentage of foreign shareholders' holdings, stock price per share, fixed asset staleness, firm growth, and firm debt ratio. To enhance specification of the regression model, the research model adds firm size as a controlling variable to represent missing variables that must be controlled, so disclosure of sustainability reports (DISC) uncertainty is expected [11].

Table 1. Variable definitions.

Variable	Code	Definitions	Expected Direction
Disclosure of sustainability reporting	DISC	Firms that disclosed sustainability reporting (or entitled environmental or corporate social responsibility) were assigned one for the year of the disclosure; firms that did not disclose information during a specific year were assigned zero for that year.	Not applicable
Size of the board of directors	DSIZE	The total number of board seats.	+
Ratio of independent directors	ID	The number of independent directors divided by the total number of directors.	+
Audit committee	AC	Firms with an audit committee were assigned one; firms without an audit committee were assigned zero.	+

Table 1. *Cont.*

Variable	Code	Definitions	Expected Direction
General manager acting as the concurrent chairman of board	MD	Firms with the general manager serving concurrently as the chairman of board were assigned one; firms without such an officer were assigned zero.	−
Percentage of director holdings	DHOLD	The number of shares held by directors divided by the number of shares outstanding at the end of the year.	−
Deviation in control and cash-flow rights	DEV	Stock domination minus earnings distribution.	−
Pledged percentage of director shareholding	PLE	The number of pledged shares held by directors divided by the number of shares held by directors.	−
Ratio of export income	SALE	The export income divided by the operating income.	+
Percentage of foreign shareholders' holdings	OUT	The number of shares held by foreign shareholders divided by the number of shares outstanding at the end of the year.	+
Stock price per share	VALUE	The average monthly stock price per share at the end of the year.	+ or −
Fixed asset staleness	AGE	Accumulated depreciation divided by depreciation expense.	+
Firm growth	GROW	(Equity market value + liabilities book value)/book value of total assets.	+
Firm debt ratio	LEV	Total liabilities divided by total assets.	+
Firm size	SIZE	Logarithmic value of total assets.	+ or −

3.3. Research Model

The research model is as follows:

$$\begin{aligned}\mathrm{DISC}_{i,t} = {} & \alpha_0 + \alpha_1\mathrm{DSIZE}_{i,t} + \alpha_2\mathrm{ID}_{i,t} + \alpha_3\mathrm{AC}_{i,t} + \alpha_4\mathrm{MD}_{i,t} + \alpha_5\mathrm{DHOLD}_{i,t} + \alpha_6\mathrm{DEV}_{i,t} + \alpha_7\mathrm{PLE}_{i,t} \\ & + \alpha_8\mathrm{SALE}_{i,t} + \alpha_9\mathrm{OUT}_{i,t} + \alpha_{10}\mathrm{VALUE}_{i,t} + \alpha_{11}\mathrm{AGE}_{i,t} + \alpha_{12}\mathrm{GROW}_{i,t} + \alpha_{13}\mathrm{LEV}_{i,t} + \alpha_{14}\mathrm{SIZE}_{i,t} + \varepsilon_{i,t}\end{aligned} \tag{1}$$

The variables have been explained in Table 1. The research model proposed in this study uses $\mathrm{DSIZE}_{i,t}$, $\mathrm{ID}_{i,t}$, $\mathrm{AC}_{i,t}$, $\mathrm{MD}_{i,t}$, $\mathrm{DHOLD}_{i,t}$, $\mathrm{DEV}_{i,t}$, $\mathrm{PLE}_{i,t}$, $\mathrm{SALE}_{i,t}$, $\mathrm{OUT}_{i,t}$, $\mathrm{VALUE}_{i,t}$, $\mathrm{AGE}_{i,t}$, $\mathrm{GROW}_{i,t}$, $\mathrm{LEV}_{i,t}$ which are used to examine Hypothesises 1 and 2 to determine whether corporate governance characteristics and business characteristics, representing stakeholders, affect the disclosure of sustainability reporting. The research methods of this paper will apply least-squares regression, panel data regression, and logistic regression analyses [37].

4. Empirical Results and Analysis

The empirical results comprise the results of descriptive statistical analysis, correlation analysis, least-squares regression analysis, panel data regression analysis, and logistic regression analysis.

4.1. Descriptive Statistical Analysis

Table 2 presents the sample descriptive statistics. The disclosure of sustainability reporting (DISC) had a mean of 0.53, which showed that more than half the sampled firms disclosed sustainability reporting. The size of the board of directors (DSIZE) ranged from 4 to 21, with a mean of 10.37; the ratio of independent directors (ID) ranged from 0 to 0.6, with a mean of 0.19. The audit committee (AC) had a mean of 0.24, which showed that less than a quarter of the sampled firms had audit committees. The general manager acting as the concurrent chairman of board (MD) had a mean of 0.86; the percentage of director holdings (DHOLD) ranged from 0.61 to 83.03, with a mean of 19.10; and the deviation in control and cash-flow rights (DEV) ranged from 0.16 to 61.15, with a mean of 16.69. Furthermore, the pledged percentage of director shareholding (PLE) ranged from 0 to 90.3, with a mean of 14.19; the ratio of export income (SALE) ranged from 0 to 82, with a mean of 44.37; and the percentage of foreign shareholders' holdings (OUT) ranged from 6.21 to 76.93, with a mean of 33.86. Moreover, the stock price per share (VALUE) ranged from 7.44 to 888.91, with a mean of 81.11; the fixed asset staleness (AGE) ranged from 1.29 to 44, with a mean of 8.18; and the firm growth (GROW) ranged from 0.5 to 4.41, with a mean of 1.51. In addition, the firm debt ratio (LEV) ranged from 15.59 to 96.14, with a mean of 57.17, and the firm size (SIZE) ranged from 0.93 to 9.74, with a mean of 8.51. These descriptive statistics displayed the variation in firm characteristics caused by different industries, management styles, or business needs.

Table 2. Descriptive statistics.

Variable	Average	Smallest	Largest	Median	Standard Deviation
DISC	0.53	0.00	1.00	1.00	0.50
DSIZE	10.37	4.00	21.00	9.00	3.60
ID	0.19	0.00	0.60	0.21	0.15
AC	0.24	0.00	1.00	0.00	0.43
MD	0.86	0.00	1.00	1.00	0.35
DHOLD	19.10	0.61	83.03	15.06	15.77
DEV	16.69	0.16	61.15	12.85	13.17
PLE	14.19	0.00	90.30	1.24	23.48
SALE	44.37	0.00	82.00	47.57	39.70
OUT	33.86	6.21	76.93	33.36	16.09
VALUE	81.11	7.44	888.91	42.65	119.52
AGE	8.18	1.29	44.00	6.40	8.39
GROW	1.51	0.50	4.41	1.28	0.68
LEV	57.17	15.59	96.14	55.23	24.03
SIZE	8.51	0.93	9.74	8.46	0.75

Note: The variables have been explained in Table 1.

4.2. Correlation Analysis

Table 3 provides the Pearson correlation coefficient matrix of the variables. The disclosure of sustainability reporting (DISC) is positively correlated with the ratio of independent directors (ID), audit committee (AC), and percentage of foreign shareholders' holdings (OUT), and the correlation has a statistical significance of 1%. Moreover, the disclosure of sustainability reporting (DISC) is positively correlated with the pledged percentage of director shareholding (PLE), and the correlation has a statistical significance of 5%. The disclosure of sustainability reporting (DISC) is negatively correlated with the percentage of director holdings (DHOLD) and stock price per share (VALUE), and these correlations have statistical significance levels of 1% and 5%, respectively.

Table 3. Pearson correlation coefficient matrix.

	DISC	DSIZE	ID	AC	MD	DHOLD	DEV	PLE	SALE	OUT	VALUE	AGE	GROW	LEV	SIZE
DISC	1														
DSIZE	−0.01	1													
ID	0.30 ***	−0.05	1												
AC	0.34 ***	0.01	0.57 ***	1											
MD	0.02	0.15 **	−0.06	−0.01	1										
DHOLD	−0.30 ***	0.31 ***	−0.16 **	−0.32 ***	0.10	1									
DEV	−0.03	0.05	−0.07	−0.06	−0.05	0.19 ***	1								
PLE	0.17 **	−0.01	0.14 *	0.25 ***	−0.05	−0.15 **	−0.19 ***	1							
SALE	0.08	−0.51 ***	0.07	−0.07	−0.04	−0.26 ***	−0.28 ***	−0.14 **	1						
OUT	0.33 ***	−0.33 ***	0.15 **	0.20 ***	−0.07	−0.47 ***	−0.27 ***	0.07	0.40 ***	1					
VALUE	−0.18 **	−0.33 ***	−0.08	−0.09	−0.24 ***	−0.01	−0.01	−0.24 ***	0.38 ***	0.20 ***	1				
AGE	0.05	0.26 ***	−0.07	−0.08	0.02	0.17 **	0.13*	−0.03	−0.23 ***	−0.21 ***	−0.14 **	1			
GROW	−0.03	−0.29 ***	−0.08	−0.08	−0.13 *	0.15 **	0.08	−0.23 ***	0.18 **	0.23 ***	0.68 ***	−0.12	1		
LEV	−0.01	0.33 ***	0.10	0.15 **	0.06	−0.04	0.03	0.06	−0.39 ***	−0.24 ***	−0.28 ***	0.09	−0.46 ***	1	
SIZE	0.03	0.35 ***	0.21 ***	0.18 **	0.23 ***	−0.01	−0.07	−0.01	−0.29 ***	−0.10	−0.23 ***	0.18 ***	−0.28 ***	0.47 ***	1

Notes: 1. The variables have been explained in Table 1; 2. * Significant level at 10%, ** significant level at 5%, *** significant level at 1%.

4.3. Least-Squares Regression Analysis

The empirical results of the least-squares regression analysis showed that the adjusted R^2 value of the research model was approximately 0.26, and the F-test was statistically significant ($p < 0.01$); therefore, the research model can describe the relationship between firm characteristics and the disclosure of sustainability reporting. The variance inflation factors of each independent variable estimated in the research model ranged from 1.142 to 2.673 and were smaller than 10; the collinearity problems among independent variables were not significant [37]. Table 4 presents a summary of the least-squares regression analysis.

Table 4. Least squares regression analysis.

Variable	Regression Coefficient	*t*-Statistics
INTERCEPT	−0.128	−0.28
DSIZE	0.021	1.86 *
ID	0.507	2.00 **
AC	0.163	1.71 *
MD	0.034	0.36
DHOLD	−0.006	−2.33 **
DEV	0.004	1.54
PLE	0.002	1.40
SALE	0.002	1.90 *
OUT	0.007	3.03 ***
VALUE	−0.001	−3.63 ***
AGE	0.006	1.92 *
GROW	0.187	2.56 ***
LEV	0.001	0.69
SIZE	−0.039	−0.77
VIF	1.142~2.673	
Adjusted R^2	0.260	
F test of model	5.992 ***	

Notes: 1. The variables have been explained in Table 1; 2. * Significant level at 10%, ** significant level at 5%, *** significant level at 1%.

The size of the board of directors (DSIZE) was positively related to the disclosure of sustainability reporting (DISC), with a regression coefficient of 0.021, and was statistically significant at 10%. The ratio of independent directors (ID) was positively related to the disclosure of sustainability reporting (DISC), with a regression coefficient of 0.507, and was statistically significant at 5%. The audit committee (AC) was positively related to the disclosure of sustainability reporting (DISC), with a regression coefficient of 0.163, and was statistically significant at 10%. The percentage of director holdings (DHOLD) was negatively related to the disclosure of sustainability reporting (DISC), with a regression coefficient of −0.006, and was statistically significant at 5%. The empirical results supported Hypothesis 1.

The ratio of export income (SALE) was positively related to the disclosure of sustainability reporting (DISC), with a regression coefficient of 0.002, and was statistically significant at 10%. The percentage of foreign shareholders' holdings (OUT) was positively related to the disclosure of sustainability reporting (DISC), with a regression coefficient of 0.007, and was statistically significant at 1%. The stock price per share (VALUE) was negatively related to the disclosure of sustainability reporting (DISC), with a regression coefficient of −0.001, and was statistically significant at 1%. The fixed asset staleness (AGE) was positively related to the disclosure of sustainability reporting (DISC), with a regression coefficient of 0.006, and was statistically significant at 10%. The firm growth (GROW) was positively related to the disclosure of sustainability reporting (DISC), with a regression coefficient of 0.187, and was statistically significant at 1%. The empirical results also supported Hypothesis 2. However, variables for a general manager acting as the concurrent chairman of board (MD), deviation in control and cash-flow rights (DEV), pledged percentage of director shareholding (PLE), and firm debt ratio (LEV) did not have significant relationships with the disclosure of sustainability reporting (DISC).

The empirical results showed that firm characteristics, including the size of the board of directors (DSIZE), ratio of independent directors (ID), audit committee (AC), ratio of export income (SALE), percentage of foreign shareholders' holdings (OUT), fixed asset staleness (AGE), and firm growth (GROW) were positively related to the disclosure of sustainability reporting (DISC); however, the percentage of director holdings (DHOLD) and stock price per share (VALUE) were negatively related to the disclosure of sustainability reporting (DISC). The results of this study supported the idea that the stakeholders (for example, directors, independent directors, audit committees, foreign customers, foreign shareholders, security authorities, and potential investors) can influence the firm's decision of disclosing sustainability reporting. The results show the firm characteristics, including corporate governance and business characteristics, which can influence the adoption of sustainability reporting practices. The results of this study conformed to the conclusions of Jo and Harjoto [23] and supported the notion that the stakeholders' interests are related to the disclosure of sustainability reporting.

4.4. Robustness Analysis

4.4.1. Panel Data Regression Analysis

The empirical results showed that the chi-square of Hausman test is 24.25 and is statistically significant ($p < 0.05$), so this study applied the panel data regression analysis with fixed effects. The adjusted R^2 value of the research model was approximately 0.653, and the F-test was statistically significant ($p < 0.01$). Table 5 summarizes the panel data regression analysis with fixed effects. The empirical results of panel data regression with fixed effects showed that firm characteristics, including the size of the board of directors (DSIZE), audit committee (AC), deviation in control and cash-flow rights (DEV), ratio of export income (SALE), percentage of foreign shareholders' holdings (OUT), fixed asset staleness (AGE), and firm growth (GROW) were positively related to the disclosure of sustainability reporting (DISC); however, the percentage of director holdings (DHOLD) and stock price per share (VALUE) were negatively related to the disclosure of sustainability reporting (DISC). The results of panel data regression analysis with fixed effects conformed to the conclusions of least-squares regression analysis, implying that the empirical results of least-squares regression analysis are robust.

Table 5. Panel data regression analysis with fixed effects.

Variable	Regression Coefficient	*t*-Statistics
INTERCEPT	0.733	1.55
DSIZE	0.014	2.30 **
ID	−0.111	−0.28
AC	0.215	1.76 *
MD	−0.052	−0.54
DHOLD	−0.013	−3.27 ***
DEV	0.008	1.81 *
PLE	−0.003	−0.24
SALE	0.001	1.72 *
OUT	0.008	1.70 *
VALUE	−0.001	−2.10 **
AGE	0.002	1.85 *
GROW	0.127	3.06 ***
LEV	0.011	0.30
SIZE	−0.039	−0.80
Adjusted R^2	0.653	
F test of model	6.937 ***	

Notes: 1. The variables have been explained in Table 1; 2. * Significant level at 10%, ** significant level at 5%, *** significant level at 1%.

4.4.2. Logistic Regression Analysis

Table 6 summarizes the logistic regression analysis. The empirical results of logistic regression showed that the chi-square of the Hosmer and Lemeshow test is 19.284 and is statistically significant ($p < 0.01$). Regarding the strength of association coefficients, the Cox and Snell R^2 and Nagelkerke R^2 values of the research model were approximately 0.338 and 0.452, respectively. The forecast accuracy of the research model was approximately 77%; therefore, it is suitable for asserting the relationships between firm characteristics and the disclosure of sustainability reporting. The empirical results of logistic regression showed that firm characteristics, including the size of the board of directors (DSIZE), ratio of independent directors (ID), audit committee (AC), ratio of export income (SALE), percentage of foreign shareholders' holdings (OUT), and firm growth (GROW) are positively related to the disclosure of sustainability reporting (DISC); however, the percentage of director holdings (DHOLD) and stock price per share (VALUE) are negatively related to the disclosure of sustainability reporting (DISC). The results of logistic regression analysis conformed to the conclusions of the least-squares regression analysis, implying that the empirical results of least-squares regression analysis are robust.

Table 6. Logistic regression analysis.

Variable	Regression Coefficient	Wald Test	EXP
DSIZE	0.127	3.528 *	1.135
ID	4.112	6.754 ***	61.080
AC	1.187	4.098 **	3.276
MD	0.502	0.715	1.652
DHOLD	−0.039	5.911 **	0.962
DEV	0.023	2.352	1.024
PLE	0.011	1.580	1.012
SALE	0.014	4.371 **	1.014
OUT	0.050	10.052 ***	1.052
VALUE	−0.013	13.923 ***	0.988
AGE	0.047	1.277	1.048
GROW	1.966	10.634 ***	7.141
LEV	0.006	0.339	1.006
SIZE	−0.229	0.401	0.795
INTERCEPT	−5.397	2.948 *	0.005
Cox & Snell R^2	0.338		
Nagelkerke R^2	0.452		
Forecast accuracy	77%		
Chi-squarestatistics	19.284 ***		

Notes: 1. The variables have been explained in Table 1. 2. * significant level at 10%, ** significant level at 5%, *** significant level at 1%.

5. Conclusions

The GRI formulated a globally recognized reporting framework that gave sustainability reporting the same importance and value as financial reporting. An enterprise that focuses on sustainable development can enhance its competitive ability, as well as that of its country and industry. Stakeholder theory is a major approach to research on sustainability management. Many researchers have investigated descriptive and empirical aspects of the stakeholder theory; they have described the actual management of companies or the identification of relevant stakeholders and their expectations related to sustainability. Firm characteristics, including corporate governance and business characteristics, can represent stakeholders' interests. Therefore, the impact of firm characteristics on the disclosure of sustainability reporting is a crucial topic in enterprise operations, government administration, and academic research.

This study applied the stakeholder theory, least-squares regression analysis, panel data regression analysis, and logistic regression analysis to examine the relationship between firm characteristics and the disclosure of sustainability reporting for the Taiwan 50 Index-listed companies. The empirical results showed that corporate governance and business characteristics, including the size of the board of directors, ratio of independent directors, audit committee, ratio of export income, percentage of foreign shareholders' holdings, fixed asset staleness, and firm growth are positively related to the disclosure of sustainability reporting, whereas the percentage of director holdings and stock price per share are negatively related to the disclosure of sustainability reporting. This study concludes that some firm characteristics have positive or negative relationships with the disclosure of sustainability reporting, and support the notion that the stakeholders' interests are related to the disclosure of sustainability reporting.

The results of this study contribute to the literature on the relationship between firm characteristics and the disclosure of sustainability reporting. This contribution directly concerns researchers and practitioners; it can help managers to develop sustainability strategies. The results suggest that stakeholders are an essential component in the development of sustainability reporting. A firm may be challenged when stakeholders pressure the firm to disclose information about sustainable practices and corporate social responsibility. This can prompt management to focus on problems related to certain sustainable development actions, add value, and eventually achieve more sustainable development. A firm's adoption of more sustainable development strategies is indicative of managerial attention to the perceptions of the stakeholders, for example, directors, independent directors, audit committees, foreign customers, foreign shareholders, security authorities, and potential investors. The implications of this study are valuable for firms that strive to adopt sustainability reporting practices. The results show the firm characteristics that can influence the adoption of sustainability reporting practices. The results provide a reference for government authorities for specifying the establishment of firm characteristics and disclosure of sustainability reporting, examining the policy effectiveness, and amending relevant laws and regulations, thereby improving the national, industrial, and company competitiveness of Taiwan. The empirical results of Taiwanese firms can provide a reference point for firms in other emerging economies, so that those firms can promote sustainability reporting. The limitations of this study are the absence of content quality analysis for the sustainability report (i.e., scale from 1 to 5, depending on the intensity of reporting), and contingency analysis and lag effect for the research variables of firm characteristics. This study does not take into account the possible impact of different industries. Future research could address these limitations.

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