Determinants of Environmental Reporting in the Top 50 New Zealand Listed Companies

Corresponding Author:

Gayani Hewagama (PhD)
ghewagama@unitec.ac.nz
+64 02115333387
Wajira Dassanayake
wdassanayake@
unitec.ac.nz
+64 211673910

Keywords:
Firm size, Industry, Profitability, Global Reporting Initiative (GRI)

https://doi.org/10.34074/jabr.18102

GAYANI HEWAGAMA
WAJIRA DASSANAYAKE
UNITEC, NEW ZEALAND

Abstract: The purpose of the study reported here was to examine the relationship between firm-specific variables (firm size, industry, and profitability) and Global Reporting Initiative (GRI)-based environmental reporting practices among the top 50 market-capitalised firms on the New Zealand Stock Exchange (NZSX). Data were gathered from the companies' annual and sustainability reports for 2018 and 2019 and analysed using the panel regression method. The findings suggest that firm size and industry environmental sensitivity are positively associated with GRI-based environmental reporting. Firms operating in environmentally sensitive industries are more likely to report GRI-based disclosures. However, profitability was not found to strongly influence GRI-based disclosure practices in listed firms. Our findings also indicate that environmental reporting disclosures increased slightly in 2019 compared to 2018, and New Zealand will need this trend to continue in order to meet the 2030 emission goals pledged under the 2016 Paris Agreement.

1. INTRODUCTION

Environmental sustainability reporting is a mechanism for informing stakeholders about an organisation's policies regarding the natural environment and about being transparent and accountable for the environmental impacts of its actions (Dobbs & Staden, 2016). Environmental sustainability reporting can enable an organisation to increase its internal and external legitimacy through adherence to environmental standards, such as the Global Reporting Initiative (GRI, 2020), Task Force on Climate-related Financial Disclosures (TCFD, 2022). Research indicates firms that publish environmental sustainability reports can achieve better economic performance by gaining a competitive business advantage and improving their reputation (de Villiers et al., 2011). As a result, there has been a growing awareness among listed companies of the benefits associated with publishing standalone environmental sustainability reports (Kusey & Uyar, 2017). These reports have become increasingly important to investors and capital providers wishing to make socially responsible investment decisions.

Global Reporting Initiative (GRI) is a non-governmental organisation that supports firms in understanding and communicating their sustainability issues, such as greenhouse gas (GHG) emissions, waste disposal, water consumption, and protection of habitats. GRI provides common guidelines and standards for sustainability reporting, meaning that a company's sustainability performance can be evaluated over time, and inter-industry corporate comparisons can be made. GRI is comprised of three sustainability indicators, which relate to a firm's economic, environmental, and social impact, respectively. However, adherence to the GRI Standards is still predominantly voluntary internationally. Despite the increased awareness of the need for environmental sustainability reporting, most businesses have not yet committed to such reporting. One reason for this could be that publication of a standalone sustainability report is a voluntary investment by a corporate, which requires significant financial and human resource commitments (Kusey & Uyar, 2017).

The study reported in this article aimed to examine the adoption of the voluntary GRI environmental disclosure requirements of the top 50 market-capitalised companies listed on the New Zealand Stock Exchange (NZSX). The purpose of this research was twofold: (1) to formulate a composite Environmental Reporting Score (ERS) to examine the level of adherence to environmental reporting among the top 50 NZSX companies; and (2) to investigate and measure impacts of firm-specific variables of firm size, industry sensitiveness, and profitability on environmental reporting. Data on environmental reporting practices were manually collected from the companies' annual and sustainability reports.

After this Introduction, Section 2 describes the theoretical background and hypothesis development for the study. Section 3 then outlines the sample selection and the empirical tests conducted, including how the variables were measured. Section 4 presents the results of the study, and Section 5 discusses the findings. Finally, Section 6 outlines the study's limitations.

2. THEORETICAL BACKGROUND

Environmental reporting is predominantly a voluntary reporting requirement. What then motivates companies to publish such reports? Research shows pressure from the stakeholder groups can influence environmental reporting, as does the willingness of management to show stakeholder groups that the company operates legitimately and in a socially responsible manner (Braam et al., 2016; Deegan, 2019; Hahn & Kühnen, 2013). If organisations are viewed as part of a broader social system, they should function within society's legal boundaries and comply with community expectations for their survival (Braam et al., 2016). Failure to adhere to these societal expectations could leads to society imposing sanctions on a company, leading to reduced demand for an organisation's goods and services or negative publicity.

Environmental accounting researchers adopt different theoretical perspectives to understand the underlying reasons for companies to engage in sustainability reporting (Blackburn et al., 2018; Dobbs & Staden, 2016; Hackston & Milne, 1996;). Primary theories utilised to explain the phenomenon of environmental sustainability reporting are legitimacy theory and signalling theory (Blackburn et al., 2018; Dobbs & Staden, 2016; Kuzey & Uyar, 2017; Mahmood & Orazalin, 2017; Reverte, 2009). Legitimacy theory holds that organisations should function legitimately within society's boundaries and expectations without jeopardising the survival of society or the environment (Deegan, 2019). Thus, sustainability reporting demonstrates publicly that a company is performing its activities responsibly through legitimate economic and social actions. Based on legitimacy theory, this study argues that the firm-specific variables such as firm size and the industry

sensitiveness in which the firm operates could affect the publication (or non-publication) of environmental sustainability reports.

From the signalling theory perspective, company profitability is a 'signal' sent by the management to investors and stakeholders about company performance (Kuzey & Uyar, 2017). Prior studies have found that profitability is a significant driver of sustainability reporting (de Villiers et al., 2011; Branco et al., 2014). Companies can create a positive impression among the public by presenting sustainability information to their stakeholders that show they have achieved their profits through legitimate activities (Legendre & Coderre, 2013). Conversely, if a firm ignores the growing public interest in environmental or other sustainability issues, it might not survive in the long term. Sustainability issues arise when companies pursue short-term profits and ignore the long-term negative consequences of their actions in relation to the environment. Hence, this study examines the association between profitability and environmental reporting.

A small number of research studies have explored stakeholder engagement and voluntary social and environmental reporting in the New Zealand context (Blackburn et al., 2018; Dobbs & Staden, 2016; Hackston & Milne, 1996; de Villers & Staden, 2012). Hackston and Milne (1996) investigated the extent of social and environmental disclosures in annual reports of New Zealand firms and potential factors of why companies engage in environmental reporting. Their findings indicate that company size and industry are positively associated with social and environmental disclosures; however, a firm's profitability did not appear to have an impact. Hackston and Milne (1996) did not use the GRI Standards to measure the extent of environmental reporting, instead using a 'sustainability checklist' to evaluate the relative measure of disclosure.

Meanwhile, Blackburn et al. (2018) looked at stakeholder engagement and perceptions on reporting social and environmental disclosures. Their study sample consisted of 24 individuals involved in developing the sustainability reports from 15 organisations in New Zealand. The findings show stakeholder involvement is minimal in the decision-making pertaining to environmental issues in these organisations. One reason for this could be that the environmental reporting disclosures are voluntary for the companies in New Zealand, meaning that adherence to environmental reporting practices and research on the impacts of adopting such practices is still in its infancy.

A study conducted by de Villers and Staden (2012) on shareholder attitudes towards environmental disclosures found that most of the 360 New Zealand shareholders they sampled wanted environmental disclosures to be compulsory by law and not at the discretion of companies. Their findings suggest that both shareholders and institutional investors rely on publicly available environmental reporting disclosure information when making investment decisions. Similarly, Dobbs and Staden's (2016) research on corporate motivations for social and environmental reporting found that the most influential factors were community concerns and shareholder rights. Further, the role of the senior management of a firm is critical in promoting the sustainability reporting practices of the firm. The authors also noted that New Zealand companies were not fully committed to environmental reporting.

In light of the above findings, this research aims to contribute to this growing area of research by improving our understanding of how firm-specific variables influence environmental reporting practices in the New Zealand context.

2.1. Hypothesis Development

2.1.1 Firm Size, Industry and Profitability

Legitimacy theory holds that large firms are under the scrutiny of the public and therefore need to disclose the legitimacy of their activities in relation to environmental and sustainability reporting (Kusey & Uyar, 2017; Nazari et al., 2015). Larger firms have greater resources and can therefore produce sustainability reports more readily (Nazari et al., 2015). Kusey and Uyar (2017) argue that larger firms tend to publish standalone sustainability reports due to stakeholder expectations and pressure from the public to be transparent on such issues. Consequently, they tend to adopt high-level GRI-based sustainability reporting to legitimate their operations.

Reverte (2009) indicates a significant positive association between a firm's size and its sustainability disclosure ratings in Spanish-listed firms. Hackston and Milne (1996) supported the association between company size and corporate social disclosure in the New Zealand context. They argue that because larger companies engage in more activities than smaller companies, and more stakeholders are involved, sustainability disclosure requirements are more often met to show their stakeholders that the company is operating legitimately. Following these theoretical and empirical arguments, we formulated the following hypothesis:

> *H1. Firm size has a positive association with publishing GRI-based environmental reporting practices.*

Kuzey and Uya (2017) argue that the industry a firm operates in could impact its decision to make social and environmental disclosures. Their findings show that manufacturing sector organisations in Turkey tend to publish sustainability reports at a higher rate than service firms. One reason for this could be that manufacturing firms in the power generation and chemical sectors have greater environmental impacts than service firms due to their greater GHG emissions. Hackston and Milne (1996) supported the association between the nature of a company's industry and corporate social disclosure in the New Zealand context. Their industry classification was based on 'high-profile' and 'low-profile' industries; their findings indicated that high-profile industry companies engage in more sustainability reporting than low-profile industry companies. While researchers use different industry classifications, what is commonly seen is that the level of sustainability reporting varies between industries.

Reverte's (2009) study on Spanish-listed firms and Legendre and Coderre's (2013) study on Fortune 500 Global companies both found that environmental reporting practices vary between industries. Reverte (2009) categorised companies based on industry environmental sensitiveness and argued that manufacturing sector companies are more susceptible to a negative influence on the environment than non-manufacturing firms. The findings of both studies indicate a significant positive association between industry environmental sensitivity and corporate social responsibility disclosures.

Previous studies found that the power generation, metal, chemical, and agriculture sectors tend to have high environmental impacts (Legendre & Coderre, 2013; Reverte, 2009). In contrast, the service sector industries such as investment, banks and property sales are associated with fewer environmental issues and lower environmental impacts. Our study,

therefore, used this approach to categorise companies according to industry environmental sensitivity. Following these theoretical and empirical arguments, we formulated the following hypothesis:

> *H2. Industry environmental sensitivity has a positive association with publishing GRI-based environmental reporting practices.*

Prior research in this area based on signalling theory has argued that a firm's profitability impacts its social and environmental reporting practices (Branco et al., 2014; Kansal et al., 2014; Legendre & Coderre, 2013). Branco et al. (2014) found that Portugal-listed firms with high profitability tended to disclose high-level sustainability information because they were more subject to public inspection of their financial and sustainable reports than their less profitable counterparts. Larger, more profitable firms that can afford to publish voluntary sustainability reports can gain social acceptance by disclosing such information (Branco et al., 2014). Similarly, Kansal et al. (2014) found the same positive link among India's top-listed companies. It should be noted that the empirical evidence does not always support a positive relationship between profitability and sustainability reporting, however. Kuzey and Uyar's (2017) study in Turkey and Orazalin and Mahmood's (2018) in the Russian oil and gas industry both reported a non-significant relation between these two variables. Similarly, in the New Zealand context, the study by Hackston and Milne (1996) did not support the association between the company's profitability and corporate social disclosure. Based on the theoretical arguments and empirical findings, we formulated the following hypothesis:

> *H3. Firms with higher profitability have a positive association with GRI-based environmental reporting practices.*

3. METHODOLOGY

3.1 Estimation Model

The dataset we used in this study comprises 50 companies, whose reporting activities were analysed over two years (2018–2019), resulting in 100 observations. Thus, longitudinal analysis was the most suitable methodology for this study.

The basic class of models that can be estimated using panel (longitudinal) techniques is presented in Equation 1.

$$Y_{it} = f(X_{it}, \beta) + \delta_i + \gamma_t + \epsilon_{it} \qquad \textit{Equation 1}$$

The leading case involves a linear conditional mean specification, which leads to Equation 2:

$$Y_{it} = \alpha + X'_{it}\beta + \delta_i + \gamma_t + \epsilon_{it} \qquad \textit{Equation 2}$$

where Y_{it} is the dependent variable, X_{it} is a *K*-vector of regressors, and e_it is the error terms. The α parameter refers to the mean intercept for all cross-sections in the model, while δ_i and γ_t represent cross-section or period-specific effects (random or fixed). Using panel regression allowed us to specify equations in general form and permitted non-linear coefficients mean equations with additive effects.

A brief description of the generalised method of moments (GMM) estimator is presented below; for detailed surveys of the relevant literature, see Baltagi (2005). The basic GMM panel estimators are based on moments of the form presented in Equation 3.

$$g(\beta) = \sum_{i=1}^{M} g_i(\beta) = \sum_{i=1}^{M} Z_i' \, \epsilon_i(\beta) \qquad \textit{Equation 3}$$

where Z_i is the T_i *x P* matrix of instruments for cross-section i. ϵ_i *(β)* is presented in Equation 4.

$$\epsilon_i(\beta) = \left(Y_i - f(X_{it}, \beta)\right) \qquad \textit{Equation 4}$$

3.2 Sample Selection

The study sample included the top 50 companies listed on the main board of the NZSX in terms of market capitalisation as of 1 December 2020. They all operated within New Zealand and were regulated under the Companies Act 1993. All data on environmental reporting firm-specific data and governance were manually gathered from the companies' annual reports and sustainability reports (if available) for 2018 and 2019. 14 (28%) companies have published a separate sustainability report. Other 36 (72%) companies included environmental reporting data in their annual report without publishing a separate sustainability report. The study adopted the GRI environmental index (Annexure 1) to examine the extent of compliance with voluntary environmental reporting disclosures by the selected 50 companies. Data were analysed using EViews 10 statistical package for Windows (EViews, 2017). In the investigation process of finding the correct structure for panel regression, three models— namely, the pooled OLS (POLS) model, fixed effect model (FEM), and random effect model (REM) were evaluated, and the most correct model was employed to test each of the study's hypotheses.

3.3 Measurement of Variables

3.3.1 Dependent variable

We used the disclosure occurrence method for measuring the extent of environmental disclosures. Disclosure occurrence involves counting the number of disclosure items presented in the annual report as per the requirements in the GRI environmental standards (Joseph & Taplin, 2011). The GRI environmental standard lists disclosure requirements under eight topics: material, water effluents, energy, emissions, effluents and waste, biodiversity, environmental compliance, and supplier environmental assessment. Each topic has a small number of subtopics, meaning data were collected for a total number of 32 items for each of the 50 firms for two years. Each of these 32 items in the GRI environmental index was assigned a score of 1 or 0. A score of 1 was recorded if any disclosure was made regarding the item, and a score of 0 was recorded if no disclosure was made.

The item scores were then summed to obtain an overall score for each company. The proportion of the 32 items disclosed was then calculated for each overall score and converted into a percentage. Consistent with prior studies (Allegrini & Greco, 2013; Mahmood & Orazalin, 2017), we used the unweighted index approach, whereby each disclosure item is deemed equally important and assigned the same score (1) when disclosed. Hence, the dependent variable of this study was the extent of the environmental reporting practices

measured by an Environmental Reporting Score (ERS) ranging from 0 to 100, where 0 indicates no environmental disclosures in the company annual report and 100 indicates total adherence to the GRI environmental disclosure requirements.

3.3.2 Independent variables

The study's independent variables consisted of the following firm-specific variables: firm size, industry sensitiveness, and profitability. The firm size was measured using the natural logarithm of the firm's total assets (Kuzey & Uyar, 2017). The industry variable was dummy coded as one (1) if a firm operated in the manufacturing or "more environmentally sensitive" sector and zero (0) if a firm is operating in the service sector. Based on the prior literature, environmentally sensitive industries were identified as oil and gas, agriculture, mining, forestry and paper, chemical production, electricity, gas distribution, water, steel, and other materials (Reverte, 2009). Consistent with prior research, profitability was measured using return on assets (ROA) (Branco et al., 2014; Kuzey & Uyar, 2017).

4. RESULTS

4.1 Descriptive Statistics

Tables 1–4 summarise the sample characteristics. As can be seen, the highest ERS in 2018 was 64.76%; in 2019 it was 67.89%. The lowest ERS was 0.00, which was scored by 21 firms that did not provide any GRI-environmental disclosures in their annual reports in both years. The average ERS was 10.51% in 2018 and 13.11% in 2019, indicating a low-level application of GRI environmental standards. On a positive note, GRI-environmental disclosures in annual reports slightly increased in 2019 compared to 2018, suggesting an upward trend in environmental reporting. Correlation statistics show that ERS positively correlated with firm size and profitability (ROA) in 2018 and 2019, and this relationship is statistically significant at 5%.

Table 1: Descriptive statistics of the 2018 sample

Variables	No.	Mean	Std. Dev.	Min	Max
ERS	100	10.5%	0.159	0.000	64.76%
Firm size (Ln of total assets)	50	7.950	1.751	3.545	13.757
ROA	50	0.356	1.922	-0.719	13.600
Industry (0- service 1- manufacturing)	50	-	-	0.000	1.000

Table 2: Descriptive statistics of the 2019 sample

Variables	No.	Mean	Std. Dev.	Min	Max
ERS	100	13.11%	0.1676	0.000	67.89%
Firm size (Ln of total assets)	50	8.080	1.683	3.983	13.796
ROA	50	0.277	1.238	0.016	8.800
Industry (0- service 1- manufacturing)	50	-	-	0.000	1.000

Table 3: Correlation analysis 2018

Variables	ERS	Industry	Firm Size	ROA
ERS	1.000	0.181	0.666**	0.393**
Industry	-	1.000	-0.071	-0.105
Firm size	-	-	1.000	0.286**
ROA	-	-	-	1.000

***Significant at 0.05 level*

Table 4: Correlation analysis 2019

Variables	ERS	Industry	Firm Size	ROA
ERS	1.000	0.219	0.609**	0.358**
Industry	-	1.000	-0.095	-0.121
Firm size	-	-	-	0.259**
ROA	-	-	-	1.000

***Significant at 0.05 level*

4.2 Hypotheses Testing

Panel data analysis was performed to test Hypotheses 1–3. The analysis consisted of two steps: the first step was running the POLS model, and the second step was choosing between the REM and FEM models. POLS showed a regression for all the companies; however, this pooled data analysis ignores time series and cross-sectional features. It also overlooks the heterogeneity or individuality of the companies. Due to these reasons, we performed the second step of choosing between the REM and FEM models by performing the Breusch-Pagan Lagrange multiplier (LM) test (1980). The null hypothesis of the model was POLS is more appropriate than FEM or REM is tested.

Table 5: Breusch-Pagan test results

	Cross-section	Time	Both
Breusch-Pagan	36.725	0.3525	37.077
	(0.000)	(0.553)	(0.000)

***Significant at 0.05 level*

Table 5 provides the Breusch-Pagan LM test results. These results show the cross-section test has a significant p-value; however, the time effect of the intercept is insignificant. Thus, the Breusch-Pagan LM test is statistically significant for cross-section but insignificant for time. These findings led us to reject the null hypothesis (i.e., confirming POLS is not appropriate), and the most suitable model is the one-way cross-section REM or FEM (Green & McKenzie, 2015). The model appropriateness between REM and FEM was tested via the Hausman test (Hausman, 1978). The Hausman test results are presented in Table 8. A null hypothesis that the preferred model is REM is evaluated.

Table 6: Correlated random effects – Hausman test

Test cross-section random effects

Summary	Chi-Squared Statistic	Chi-Squared d.f.	Probability
Cross-section random	2.818	2	0.244

The Hausman test results show that the p-value is more than 5%, and the null hypothesis cannot be rejected. Hence the preferred model is REM. One-way REM was applied and confirmed the estimated REM was correct. We used generalised least squares (GLS) instead of OLS because REM incorporates a non-random error component. Table 7 reports the Panel GLS results for explanatory variables of the study.

Table 7: Panel GLS results for explanatory variables of the study

Dependent Variable: ERS; Sample: 2018 and 2019 (n=100)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-0.392	0.077	-5.074	0.000
Industry	0.091	0.034	2.682	0.008
Firm Size	0.059	0.009	6.384	0.000
ROA	0.013	0.008	1.655	0.101

R-squared	0.358
Adjusted R-squared	0.338
F-statistic	17.867
Prob(F-statistic)	0.000
Durbin-Watson stat	2.007

***Significant at 0.05 level*

The estimated coefficient for firm size (β=0.059, p=0.00) and industry (β=0.091, p=0.00) indicates a significant positive association with ERS at the 0.05 significance level. The estimated coefficient for ROA (β=0.013, p=0.10) shows a weak positive association with ERS at the 0.1 significance level. These findings support Hypotheses 1 and 2 and partially support Hypothesis 3. Hypothesis 1 states that larger firms tend to disclose a higher level of environmental reporting than smaller firms because they have greater financial and human resources. Consistent with prior studies (Hackston & Milne, 1996; Kusey & Uyar, 2017; Nazari et al., 2015), our results suggest firm size positively impacts environmental reporting. Hypothesis 2 is accepted where the industry coefficient is 0.091 (p=0.00), showing a positive association with ERS. This finding indicates that firms operating in environmentally sensitive sectors such as manufacturing tend to report more environmental disclosures than those operating in service industries.

The difference between industries shows a significant positive association with GRI-based environmental reporting practices, making our findings consistent with those of prior studies (Kuzey & Uya, 2017; Legendre & Coderre, 2013; Reverte, 2009). The model results suggest that profitability (ROA) has a weak positive impact on environmental reporting practices, meaning Hypothesis 3 was not rejected at the 0.1 significance level (β=0.013, p=0.10). This weak positive association could be due to the limited sample size. Prior research findings indicated that firms with higher profitability have a significant positive association with GRI-based environmental reporting practices. For instance, Branco et al. (2014), Legendre and Coderre (2013), and Nazari et al. (2015) all found that more profitable firms are more likely to publish voluntary sustainability reports and gain more social acceptance than their counterparts by disclosing environmental and sustainability information.

In contrast, Reverte (2009) in the context of listed companies in Spain in 2005–2006, and Hackston and Milne (1996) in the context of listed companies in New Zealand in 1992, both found that profitability is not a determinant of social sustainability reporting. Both studies adopted ROA to measure profitability. Hackston and Milne (1996) used additional variables to measure profitability, such as return on equity and sales; none of these measures was significantly associated with sustainability reporting disclosures. Based on our findings and those of previous research, it is evident that sample size and profitability measurement does influence results.

The proposed model's explanatory power is statistically significant at the 0.05 significance level, with an adjusted R^2 value of 0.358. In other words, the variance of firm size, industry and profitability collectively explains 35.8% of the variance in GRI-based environmental reporting practices. The F-statistic (F = 17.867, p=0.000) is statistically significant, and this is acts as confirmation that the independent variables used in the model jointly influence the dependent variable.

5. DISCUSSION

The purpose of the study reported here was to examine the relationship between firm-specific variables (firm size, industry, and profitability) and GRI-based environmental reporting practices among the top 50 market-capitalised firms on the NZSX. The research findings indicate that firm size, industry environmental sensitivity, and profitability positively impact environmental reporting practices. In accordance with legitimacy theory, this study found that firm size and the industry in which the firm operates affects sustainability reporting because larger firms could potentially suffer greater losses due to illegitimate activities. By fulfilling its disclosure requirements, a company fulfils the needs of its stakeholders and earns a higher reputation. The findings also show that firms operating in environmentally sensitive industries are more likely to have environmental reporting practices. Firms in the manufacturing sector, such as power generation, mining, oil and gas, chemicals and agriculture, are likely to have higher environmental impacts—such as higher GHG emissions, energy consumption, and waste levels—than service firms. They would therefore be under more pressure from stakeholder groups to make environmental disclosures.

Notably, 14 listed firms (28%) in the research sample published their sustainability reports and voluntary environmental disclosures in both years. Interestingly, the sample included 21 listed firms (42%) that did not engage with environmental reporting, and these companies have not disclosed any significant environmental data. These findings suggest that even though GRI-based environmental reporting practices are widely accepted globally, in New Zealand, it is mainly the larger firms that adopt them. Since environmental disclosures are voluntary, not all firms in the energy provider category disclosed their environmental data, such as GHG emissions, water consumption, and waste levels. The descriptive analysis shows that the sample included seven energy providers. Only three of these companies

had a high adherence level to environmental reporting in their sustainability reports. This finding shows that there is no consistency concerning environmental disclosures among energy providers in New Zealand.

However, we do note a possible positive trend represented by the slight increase in environmental reporting disclosures in 2019 compared to 2018. One reason could be, in 2017 NZX Corporate Governance Code introduced non-financial reporting guideline, which includes material environmental, social and governance (ESG) factors to form part of its disclosure regime (NZX Corporate Governance Code, 2017). In 2021, the New Zealand Government passed the Financial Sector (Climate-related Disclosures and Other Matters) Amendment Bill to implement mandatory reporting on climate risks (External Reporting Board, 2022). The climate-related disclosures on carbon emissions and other environmental impacts integrate climate change mitigation aspects into the financial statements of an entity. Successfully lowering GHG emissions will require companies to be more transparent by making climate-related disclosures that show that they are actively reducing their emissions. New Zealand will need this trend to continue in order to meet the 2030 GHG emission goals pledged under the 2016 Paris Agreement (Stats NZ, 2020).

6. LIMITATIONS AND CONCLUSION

Like all studies, this one is not without its limitations. As an exploratory pilot study, its main limitation is the sample size and the data collection period being restricted to two years. A panel regression analysis expanding the sample to a larger time horizon would be a fruitful avenue for future research. Another limitation is that the ERS was calculated based on the information made available on firms' websites and in their annual and sustainability reports. The voluntary nature of GRI's disclosure requirements does not motivate firms to engage in environmental reporting, and clearly more research is needed to identify why firms are not motivated to include environmental reporting in their communications.

Annexure 1: Global Reporting Initiative Environmental Disclosures

GRI 301 (Materials)
Management approach disclosures *(GRI 103)*.
301-1 Materials used by weight or volume.
301-2 Recycled input materials used
301-3 Reclaimed products and their packaging materials
GRI 302 (Energy)
Management approach disclosures *(GRI 103)*.
302-1 Energy consumption within the organisation.
302-2 Energy consumption outside of the organisation
302-3 Energy intensity
302-4 Reduction of energy consumption
302-5 Reduction in energy requirements of products and services
GRI 303 (Water and Effluents)
Management approach disclosures *(GRI 103)*.
303-1 (Interactions with water as a shared resource)
303-2 Management of water discharge-related impacts
303-3 Water withdrawal
303-4 Water discharge
303-5 Water consumption
GRI 304 (Biodiversity)
Management approach disclosures *(GRI 103)*.
304-1 Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas
304-2 Significant impacts of activities, products, and services on biodiversity
304-3 Habitats protected or restored
304-4 IUCN Red List species and national conservation list species with habitats in areas affected by operations.
GRI 305 (Emissions)
Management approach disclosures *(GRI 103)*.
Disclosure 305-1 Direct (Scope 1) GHG emissions
Disclosure 305-2 Energy indirect (Scope 2) GHG emissions
Disclosure 305-3 Other indirect (Scope 3) GHG emissions
Disclosure 305-4 GHG emissions intensity
Disclosure 305-5 Reduction of GHG emissions
Disclosure 305-6 Emissions of ozone-depleting substances (ODS)
Disclosure 305-7 Nitrogen oxides (NOX), Sulphur oxides (SOX), and other
GRI 306 (Effluents and waste)
306-1 Waste generation and significant waste-related impacts (activities)
306-2 Management of significant waste-related impacts (activities prevent waste generation)
306-3 Total weight of waste generated in metric tons
306-4 Total weight of waste diverted from disposal in metric tons (e.g. Recycling -breakdown)
306-5 Total weight of waste directed to disposal in metric tons (e.g. Landfilling)
GRI 307 (Environmental Compliance)
Management approach disclosures *(GRI 103)*.
Disclosure 307-1 Non-compliance with environmental laws and regulations
GRI 308 (Supplier environmental assessment)
Management approach disclosures *(GRI 103)*.
308-1 New suppliers that were screened using environmental criteria
308-2 Disclosures

REFERENCES

Allegrini, M., and Greco, G. (2013). Corporate boards, audit committees and voluntary disclosure: Evidence from Italian listed companies. Journal of Management & Governance 17, 187-216. https://doi.org/10.1007/s10997-011-9168-3

Baltagi, B. H. (2005). Econometric Analysis of Panel Data, Third Edition. New York: John Wiley & Sons.

Braam, G. J., de Weerd, L. U., Hauck, M., & Huijbregts, M. A. (2016). Determinants of corporate environmental reporting: The importance of environmental performance and assurance. Journal of cleaner production, 129, 724-734. https://doi.org/10.1016/j.jclepro.2016.03.039

Blackburn, N., Hooper, V., Abratt, R. and Brown, J. (2018), Stakeholder engagement in corporate reporting: towards building a strong reputation, Marketing Intelligence & Planning, Vol. 36 No. 4, pp. 484-497. https://doi.org/10.1108/MIP-10-2017-0236

Branco, M. C., Delgado, C., Gomes, S. F., and Eugénio, T. C. P. (2014). Factors influencing the assurance of sustainability reports in the context of the economic crisis in Portugal. Managerial Auditing Journal 23, 237-252. https://doi.org/10.1108/MAJ-07-2013-0905

Dobbs, S., and Van Staden, C. (2016). Motivations for corporate social and environmental reporting: New Zealand evidence. Sustainability Accounting, Management and Policy Journal 7, 449-472. https://doi.org/10.1108/SAMPJ-08-2015-0070

Deegan, C.M. (2019). Legitimacy theory: Despite its enduring popularity and contribution, time is right for a necessary makeover, Accounting, Auditing & Accountability Journal, Vol. 32 No. 8, pp. 2307-2329. https://doi.org/10.1108/AAAJ-08-2018-3638

de Villiers, C., Naiker, V., & Van Staden, C. J. (2011). The effect of board characteristics on firm environmental performance. Journal of Management 37, 1636-1663. https://doi.org/10.1177/0149206311411506

de Villiers, C., and Van Staden, C. (2012). New Zealand shareholder attitudes towards corporate environmental disclosure. Pacific Accounting Review 24, 186-210. https://doi.org/10.1108/01140581211258470

EViews. (2017). EViews 10 user's guide.

External Reporting Board (XRB). (2022). Climate-related Disclosures. https://www.xrb.govt.nz/standards/climate-related-disclosures/

NZX Corporate Governance Code (2017). http://nzx-prod-s7fsd7f98s.s3-website-ap-southeast-2.amazonaws.com/attachments/NZXR/300888/257864.pdf

Joseph, C., & Taplin, R. (2011). The measurement of sustainability disclosure: Abundance versus occurrence. Accounting Forum, 35(1), 19-31. https://doi.org/10.1016/j.accfor.2010.11.002

Greene, W., & McKenzie, C. (2015). An LM test based on generalised residuals for random effects in a nonlinear model. *Economics Letters, 127*, 47-50. https://doi.org/10.1016/j.econlet.2014.12.031

Global Reporting Initiative. (2020). https://www.globalreporting.org/standards/gri-standards-download-center/

Hahn, R., & Kühnen, M. (2013). Determinants of sustainability reporting: a review of results, trends, theory, and opportunities in an expanding field of research. Journal of cleaner production, 59, 5-21. https://doi.org/10.1016/j.jclepro.2013.07.005

Hackston, D., & Milne, M. J. (1996). Some determinants of social and environmental disclosures in New Zealand companies. Accounting, auditing & accountability journal, 9(1), 77-108. https://doi.org/10.1108/09513579610109987

Hausman, J. A. (1978). Specification Tests in Econometrics. Econometrica, 46(6), 1251–1271. https://doi.org/10.2307/1913827

Joseph, C., and Taplin, R. (2011). The measurement of sustainability disclosure: Abundance versus occurrence. In Accounting forum 35, 19-31. https://doi.org/10.1016/j.accfor.2010.11.002

Kansal, M., Joshi, M., and Batra, G. S. (2014). Determinants of corporate social responsibility disclosures: Evidence from India. Advances in Accounting 30, 217-229. https://doi.org/10.1016/j.adiac.2014.03.009

Kuzey, C., & Uyar, A. (2017). Determinants of sustainability reporting and its impact on firm value: Evidence from the emerging market of Turkey. Journal of cleaner production 143, 27-39. https://doi.org/10.1016/j.jclepro.2016.12.153

Legendre, S., and Coderre, F. (2013). Determinants of GRI G3 application levels: the case of the fortune global 500. Corporate Social Responsibility and Environmental Management 20, 182-192. https://doi.org/10.1002/csr.1285

Mahmood, M., and Orazalin, N. (2017). Green governance and sustainability reporting in Kazakhstan's oil, gas, and mining sector: Evidence from a former USSR emerging economy. Journal of Cleaner Production 164, 389-397. https://doi.org/10.1016/j.jclepro.2017.06.203

Masud M. A. K., Nurunnabi, M., and Bae, S.M. (2018). The effects of corporate governance on environmental sustainability reporting: empirical evidence from South Asian countries. Asian Journal of Sustainability and Social Responsibility 3, 1-26. https://doi.org/10.1186/s41180-018-0019-x

Nazari, J. A., Herremans, I. M., and Warsame, H. A. (2015). Sustainability reporting: external motivators and internal facilitators. Corporate Governance 15, 375-390. https://doi.org/10.1108/CG-01-2014-0003

Orazalin, N., and Mahmood, M. (2018). Economic, environmental, and social performance indicators of sustainability reporting: Evidence from the Russian oil and gas industry. Energy policy 121, 70-79. https://doi.org/10.1016/j.enpol.2018.06.015

Reverte, C. (2009). Determinants of corporate social responsibility disclosure ratings by Spanish listed firms. Journal of business ethics 88, 351-366. https://doi.org/10.1007/s10551-008-9968-9

Stats NZ: New Zealand's greenhouse gas emissions. (2020). Stats NZ. https://www.stats.govt.nz/indicators/new-zealands-greenhouse-gas-emissions

Task Force on Climate-related Financial Disclosures. (2022). https://www.fsb-tcfd.org/