

Voluntary Environmental Disclosure by Australian Listed Mineral Mining Companies: An Application of Stakeholder Theory

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Abstract

Within the stakeholder theory framework this paper examines the extent of voluntary environmental disclosure (ED) in relation to characteristics of Australian listed mineral mining firms. Three indexes, words, unweighted and weighted index, are calculated to measure the association of total ED and categories of disclosure are significantly associated. consequently, a single construct is employed as a surrogate for the indexes. The result of Ordinary Least Squares Regression of this construct as a dependent variables with ownership diffusion, financial leverage and membership of the Australian Mining Industry Council (AMIC) as proxies for stakeholder power; the presence of a corporate environmental committee as a proxy for strategic posture; return on equity and systematic risk as proxies for economic performance ; and firm size and commercial production as control variables showed that membership of AMIC and size were statistically significant. The implication of this finding is that financial variables do not explain voluntary ED and that the variables used in the strategic posture and economic performance dimensions of stakeholder theory are not significant. This implies, subject to limitations of the study, that the regulators of accounting information will need to issue an accounting standard if they

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require decision useful information and uniformity in the annual report of mineral mining companies.

I. Introduction

Concern for the environment has received considerable public attention, particularly during the past decade. An increasing societal concern for environmental matters has heightened the demand for companies to be environmentally responsible. Stakeholders are interested in environmental information because environmental activities may have significant financial implications for companies (Gowland, 1995) and for the environment.

Australian mining companies tend to be pressured from environmental groups since their activities can have a significant impact on the environment (Deegan and Gordon, 1994). their activities require environmentally responsible actions and, as a consequence, there is a need for mining companies to provide environmental information to their stakeholders. Mining companies respond by implementing environmental protectionist activities and disclosing them in their annual reports. Annual reports are a source of information actively sought by financial report users (Anderson and Epstein, 1995; Tilt, 1994; Roberts, 1991; Zeghal and Ahmed, 1990) because they contain information which enable users to assess the potential financial effects of environmental concerns (Gibson and O'Donovan, 1994).

While there are various environmental acts in Australia ¹, disclosure of environmental information in the annual report is not mandatory. Voluntary environmental disclosure (ED), however, has long been practiced by Australian entities (Trotman, 1979; Guthrie and Parker, 1989). Researchers argue that there are factors which motivate firms to voluntarily disclose environmental information and this has resulted in a number of theories explaining the incidence of ED. ² We use stakeholder theory to examine the factors that influence voluntary disclosure of environmental information by Australian listed mineral mining companies in their 1993 annual reports. All three dimensions of stakeholder theory as defined by Ullmann (1985) are examined: Stakeholder power, strategic posture, and economic performance.

This study extends prior research by examining the relation between a number of corporate characteristics within the dimensions of stakeholder theory and categories of voluntary ED based on three disclosure indexes. We believe the principal contribution of this study is the examination of the extent of ED using three indexes, words, unweighted index (dichotomous) and a weighted index, where the

relative importance of items is based on the perceptions of financial analysts, in a single study.

The findings of this study are expected to be relevant to any decision by the regulators of accounting information to introduce an accounting standard in the area of ED. In particular the regulators will find it useful in understanding management motivation of voluntary ED and therefore be in a better position to gauge management motivation of voluntary ED and therefore be in a better position to gauge management reaction to any proposed accounting standard in this area of disclosure. The findings will also be of interest to stakeholders.

II. Prior Research

A number of prior studies examine the association between corporate characteristics and the voluntary disclosure in Australia by Trotman and Bradley (1981), Kelly (1981) and Deegan and Gordon (1994); overseas research on the determinants of voluntary disclosure by Cowen et al (1987), Belkaoui & Karpik (1989), Ness and Mirza (1991), Roberts (1992) and Maheshwari (1992); and research on the relation between financial performance and social and environmental performance by McGuire et al (1988) and Jaggi and Freedman (1992). These prior studies are relevant to this study because they indicate which variables in the past have been significantly associated with social and ED.

The significant variables reported in these studies are firm size, social pressures, management's decision horizon report recipients, environmental sensitively, nature of industry, social responsibility committee, systematic risk, social performance, leverage, political action committee, public affairs, philanthropic foundation, return on equity, age and return on assets. Roberts (1992) has special significance for this study as it was the only study which utilised the stakeholder theory framework. Further discussion of these variables is provided during the development of the hypotheses.

Some prior studies use an index of environmental and/or social disclosure as the dependent variables. These include number of pages (Trotman, 1979; Guthrie & Parker, 1989; Cowen et al., 1987; Maheshwari, 1992; Gibson and O'Donovan, 1994), line by line (Trotman and Bradley, 1981), dichotomous (Kelly, 1981; Ness and Mirza, 1991), number of words (Deegan and Gordon, 1994), specificity of item (Wiseman, 1982) and relative importance (Jaggi and Freedman, 1992).

The current study addresses shortcomings in these studies. Prior studies have not considered categories of ED. Where an index was used as the dependent variable, the impact of alternative indexes was not investigated. Consequently, alternative indexes, words, an unweighted index and a weighted index, are applied to categories

of voluntary ED. Also, other variables, which have not been previously tested (membership of the Australian Mining Industry Council (AMIC) and commercial production), are included.

III. Theoretical Framework and Hypotheses

Three dimensions of stakeholder theory are examined in this study: stakeholder power, strategic posture, and economic performance. Ownership diffusion, financial leverage and political pressure are used as proxies for stakeholder power; the presence of a corporate environmental committee is used as a proxy for strategic posture; and return on equity and systematic risk are used as proxies for economic performance. Firm size and commercial production are included as control variables.

Stakeholder Power

A stakeholder has differential power dependent on the degree of control over resources required by the company (Ullmann, 1985). The more critical the stakeholder resources, the greater the willingness of the company to satisfy the stakeholder demands. Environmental activities may absorb a considerable amount of an entity's resources. Knowledgeable investors may consider corporate environmental responsibility activities in making their investment decisions because environmental expenditures can reduce surplus (earnings) available for owners (Cooper, 1988). Consequently, stakeholders demand information about environmental responsibility activities.³ In response, companies may disclose these activities in their annual reports to reveal the financial implications of its environmental activities. However, companies may be reluctant to disclose environmental activities. However, companies may be reluctant to disclose environmental liabilities because such disclosure may be perceived as an admission of guilt (Cerf, 1993). Consequently there may be a selective disclosure problem with voluntary ED.

Ownership Diffusion

Ullmann (1985) argued that dispersed ownership, particularly environmentally concerned investors, may intensify the pressure for management to report environmental responsibility activities.

However, research on the relation between ownership and corporate social and ED has produced mixed results. Craswell and Taylor (1992) find the concentration of ownership in a firm explained the voluntary disclosure of oil reserves in the annual reports of Australian oil and gas companies. Patten (1992) reports that as a consequence of the Exxon Valdez accident, firms that affiliated with

Alaska Pipeline Service company (as a proxy of ownership) increasingly disclosed environmental information. In contrast, Roberts (1992) finds that ownership diffusion, i.e., 5% or more of outstanding ordinary shares held by management or other individuals, is not significantly related to the degree of corporate social responsibility disclosures.

We propose to further test the argument by Ullmann (1985) that firms widely held by shareholders are more likely to voluntarily disclose environmental information in their annual report than firms closely held by shareholders. The expected relation between ownership and voluntary ED is stated in hypothesis H1:

H1: The extent of voluntary ED in the annual reports of Australian listed mineral mining companies is positively related to ownership diffusion.

Ownership diffusion is defined as a percentage of outstanding ordinary shares owned by other than the top twenty shareholders.⁴

Financial Leverage

Leverage can capture the importance of creditors as stakeholders in a firm's wealth. Creditors and financial lending institutions may share in potential liabilities if their loans are secured by contaminated properties (Davey, 1994; Williams and Philips, 1994). As a result, they may demand additional information in the annual report in order to assess the probability of a firm meeting their debt obligations. This implies that disclosure of environmental responsibility may be linked to debt levels. If creditors are concerned with environmental responsibility activities, the company is more likely to disclose its environmental activities.

Research on the relation between leverage and corporate social responsibility has produced mixed results. Belkaoui and Karpik (1989) and McGuire et al. (1988) report a significant negative association between leverage (total debt to total assets) and the level of social disclosure and social performance. On the other hand, Roberts (1992) employs a different leverage measure and finds that leverage (total debt to total equity) has a positive relation with social responsibility disclosure.

McGuire et al. (1988) suggest that, on the basis of the results of their study, it is worthy to consider prior financial performance as an explanatory variable influencing corporate social responsibility disclosure rather than concurrent or subsequent performance. Their suggestion implies that there may be different effects of prior and current leverage on the extent of environmental disclosure.

We propose to further test the leverage argument and to incorporate the McGuire et al. (1988) suggestion to consider the effect of prior leverage. The

expected relation between leverage and voluntary ED is stated in hypotheses H2a and H2b:

H2a: The extent of voluntary ED in the annual reports of Australian listed mineral mining companies is positively related to leverage in the previous year.

H2b: The extent of voluntary ED in the annual reports of Australian listed mineral mining companies is positively related to leverage in the current year.

Leverage is measured as the ratio of total debt to total assets as used by Belkaoui and Karpik (1989) and McGuire et al. (1988).

Political Pressure

Mineral mining companies may bear political constraints. These pressures stem from international as well as national legislation. At an international level, firms that are operating in overseas countries, particularly in developing countries, have to comply with the requirements of the United Nations, the World Bank and the International Finance Corporation (O'Neill, 1993) in addition to related-country regulations. At a national level, the Australian government has placed strict regulations on the environment at Federal, State and local government levels (Australian Mining Industry Council (AMIC), 1993b; Gibson and O'Donovan, 1994). For example, New South Wales requires 50 permits, whereas Northern Territory requires 600 permits for new mining companies (Gomez, 1992).

Bell and Warhurst (1993) conclude that large firms associated with the Business Council of Australia (BCA) tend to be more politically active, in terms of dealing with the political environment and the level of relationship to government, than non-member firms. Similarly in the United States firms have become increasingly involved in political action committees to affect political decision making (Keim and Baysinger, 1988). Furthermo, Roberts (1992) points out that "higher levels of perceived governmental influence on corporate activity would be expected to lead to a greater effort by management to meet expectations of government" (p.602).

The development of strategic corporate reporting can be used to reduce the perceived political pressure or governmental influence (Huizing and Dekker, 1992). As government may introduce political constraints by requiring firms to address the perceived environmental problems, the firms disclose information about environmental program and policy in their annual report explaining that they comply with environmental standard and regulations.

Membership of the AMIC is selected as proxy of political constraints. There are two reasons why AMIC membership is chosen; first, despite the existence of many sub-mining organisations, the Council represents the majority of mining firms which operate throughout Australia. Second, the Council seems to be more politically powerful than other mining organisations to negotiate or lobby with government and environmental groups because the mining industry is fundamental to Australia's economic development (AMIC, 1994; Barnett, 1994). Third, the AMIC develops and proposes environmental objectives and standards to government in which these standards must be adopted by the members.

Different pressures of government on corporate environmental responsibility may lead to differential disclosure patterns across companies. The provision of ED is viewed as reactive response to social pressures (Guthrie and Parker, 1990). As the activities of mining companies are susceptible to detriment of the environment, the AMIC members may jointly develop strategies and policies to restore the environment including the provision of an environmental report. We predict that firms which are members of the AMIC are more likely to disclose environment and pressure groups because they are more informed than non-AMIC companies. Therefore, it is predicted that there will be a positive association between membership of the AMIC and corporate ED.

H3: The extent of voluntary ED in the annual reports of Australian listed mineral mining companies is positively related to membership of the AMIC.

Strategic Posture

Ullmann (1985) distinguishes a firm's strategic posture as either active or passive. Active strategic posture means that a firm is performing environmental activities proactively to address stakeholder influences. For example, a firm may establish a special department or committee, which is responsible for preparing and developing programs, policies and strategies relating to environmental matters. Passive strategic posture means that a firm does not develop a specific policy or program to address the existing environmental issues. Strategic posture of a company is positively associated with the extent of disclosure. Stakeholder theory posits that the more active the strategic posture, the more likely a company is to carry out environmental activities and disclose such activities to stakeholders.

The presence of an Environment Responsibility committee

Empirical evidence suggests that the presence of the social responsibility committee could explain the extent of social disclosure (Cowen et al., 1987; Maheshwari, 1992). Similarly, the existence of a corporate environmental responsibility committee can describe the strategy of a company in addressing

environmental issues. Therefore, an environmental responsibility committee is selected as a proxy of a firm's strategic posture.

Companies that have an environmental responsibility committee and mention it in the annual report are perceived to have an active strategic posture. If companies do not mention it in their annual report, they are assumed to have a passive strategic posture. We posit that companies that have an environmental responsibility committee are more likely to disclose environmental activities. Thus, we expect a positive relation between the presence of an environmental committee and voluntary ED in an entity's annual report. Hypothesis H4 is stated as follows:

H4: The extent of voluntary ED in the annual reports of Australian listed mineral mining companies is positively related to the presence of an environmental responsibility committee.

Economic Performance

The third dimension concerns the economic performance of the firm. Dealing with environmental matters can be costly. For example, in the US, environmental, health and safety expenditures by the Fortune 500 may be as high as \$46 billion per year or 2% of sales (Greeno and Robinson, 1992) or 25% to 60% of earnings (Mastrandonas and Strife, 1992) and these costs are likely to increase in the future. Therefore, economic performance will directly affect a firm's ability to establish and maintain environmental programs.

Economic performance and environmental responsibility activities are related (Bowman and Haire, 1975; Spicer, 1978) and they are inseparable components of sustainable development (AMIC, 1993a; Bebbington, 1993; Batley and Tozer, 1993). This implies that more favourable the economic performance of a firm, the more likely it is to engage in environmental activities and disclosures. In contrast, financially distressed firms are less likely to engage in environmental activities and, therefore, they may have less disclosures. Profitability and systematic risk, as measures of economic performance, are perceived as causal factors that allow management to undertake more extensive environmental responsibility programs.⁵ Economic performance is measured on two dimensions, profitability and systematic risk.

Return on equity

We expect that the more profitable a firm is, the more likely it is to make environmental disclosures since such firms are better able to finance environmental programs. The reason is that, better performing firms want to signal the superior skill

of the management keeping the firm profitable while achieving environmental responsiveness (Bowman and Haire, 1976; Alexander and Bucholz, 1978; 1992).

Return on Equity has been used as a measure of economic performance in prior studies and has resulted in conflicting findings. The findings of certain studies indicate a positive association between Return on Equity and social and environmental responsibility disclosure (Spicer, 1978; Mills and Gardner, 1984; Roberts, 1992) whereas the findings of other studies suggest a negative association with social and environmental performance (Bowman and Haire, 1975; Jaggi and Freedman, 1992). This implies that companies tend to have environmentally responsible activities but they are contingent upon their financial profiles (Mills and Gardner, 1984). Therefore, this study predicts that firms with larger Return on Equity are likely to voluntarily disclose more environmental information. Hypothesis H5a is expressed as follows:

H5a: The extent of voluntary ED in the annual report of Australian listed mineral mining companies is positively related to the Return on Equity in the current year.

Return on Equity is defined as net income after tax and extraordinary items to total ordinary shares.

Roberts (1992) indicates that a time dimension of Return on Equity appeared to have effects on the level of environmental disclosure. More importantly, he concludes that strong Return on Equity in the prior period is positively associated with current Return on Equity and current social disclosure to check the association. This study takes account of that association and therefore the hypothesis is formulated as:

H5b: The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to the Return on Equity in the prior year.

Systematic Risk

Previous studies on the relationship between systematic risk and corporate social and ED has produced mixed results. Thotman and Bradley (1981) and Belkaoui and Karpik (1989) found that systematic risk and the extent of social disclosure were positively related. Thotman and Bradley conclude that corporate management reduced risk by undertaking social disclosure. However, Roberts (1992) viewed corporations with low systematic risk as more likely to have higher levels of social disclosure. He argued these companies tended to have more stable patterns of stock market returns and stable economic performance would enhance the ability of a company to commit to socially responsible activities and disclosures. Roberts (1992)

found a negative relationship between the extent of social disclosure and systematic risk.

We propose to further test the systematic risk relationship argument by Roberts (1992). The expected relation between systematic risk and voluntary ED is stated in hypothesis H6:

H6: The extent of voluntary ED in the annual reports of Australian listed mineral mining companies is negatively related to the systematic risk.

Systematic risk is defined as the contribution of the individual security to portfolio risk.

Control Variables

Size and commercial production are considered control variables because they may intervene with other variables and therefore they should be controlled (Ullmann, 1985; Cowen et al., 1987; Belkaoui and Kalpik, 1989; Roberts, 1992). Roberts further notes that they may also represent some aspects of stakeholder power, strategic posture and economic performance.

Company Size - Total Assets; Total Sales; Market Capitalisation

Previous research indicates that company size has explanatory power to the extent of social and environmental disclosure (e.g., Trotman and Bradley, 1981; Cowan et al., 1987). Chen and Metcalf (1980) conclude that size, as a background factor, influences the association of corporate environmental activities and financial indicators. However, size is associated with environmentally sensitive industries and cannot be generalised to industries which are not environmentally sensitive (Deegan and Gordon, 1994).

There are three rationales for selecting firm size as an independent variables. First, larger companies are more likely to have greater political visibility or political costs (Watts and Zimmerman, 1986; Deegan and Carroll, 1993) and they produce environmental disclosure to mitigate political costs (Deegan and Gordon, 1994) or political visibility (Belkaoui and Karpik, 1989). As mining companies can have a detrimental effect on the environmental (Dierkes and Preston, 1977). Large mining firms are likely to be scrutinised by the general public, government, and environmental interest groups. In other words, they have political pressures from public. To avoid claim they are destroying the environment, corporate management tend to develop environmental policies and strategies and disclose them in the annual report. The intention is to show that their actions are in harmony with the environment in order to achieve a sustainable corporation (Elkington, 1994; Greeno

and Robinson, 1992). The second reason is that larger firms are more likely to have better environmental activities (Spicer, 1978; Chen and Metcalf, 1980). Third, larger firms are better able to afford the cost of producing the voluntary information to be disclosed. ⁶

Hackston and Milne (1996) studied social and environmental disclosures and selected total assets, total sales and market capitalisation as the measure of company size. They concluded that company size was significantly and positively associated with the extent of company size. This study considers all three measures of size.

Consequently, larger firms are expected to produce more voluntary disclosures of environmental information. This leads to hypothesis H7:

H7: The extent of voluntary ED in the annual reports of Australian listed mineral mining companies is positively related to size.

Commercial Production

It is possible that some mineral mining companies are merely carrying out exploration and other companies are actively drilling and extracting minerals from the earth. Clearly, the latter are more likely to have an adverse effect on the environment. Commercial production means that a company has extracted crude minerals and might need to process them further in order to market the product to customers. Thus, firms that are in commercial production are likely to deplete natural resources and be more detrimental to the environment than non-commercial firms.

This variable has not been tested in prior studies. It is expected in this study that commercial operations are associated with voluntary ED. Hypothesis H8 is stated as follows:

H8: The voluntary ED in the annual reports of Australian listed mineral mining companies is related to commercial operation.

IV. Method

Data Sources and Sample Selection

The sample comprises Australian mineral mining companies listed on the Australian Stock Exchange (ASX) in 1993. The sample was selected from the microfiche Annual Report File of the Australian Graduate School of Management (AGSM). The AGSM File consists of the top 500 listed companies in Australia by market capitalisation. To maintain homogeneity in the sample, oil and gas firms were excluded as they are using different equipment and technology. Also, one mineral

mining firm that has oil activities was excluded from sample.⁷ Table 1 describes the number of firms included in the sample.

Table 1
Sample of the Study

Number of mining firms listed on Australian Stock Exchange	386
Number of firms not listed on the AGSM Annual Report File	251
Number of mining firms listed on the AGSM Annual Report File	135
Number of Oil & Gas firms (excluded)	31
Number of Sample firms in the study	104

Measuring the Extent of Disclosure

This study uses three different indexing systems. These are word index, unweighted index and weighted index.⁸ A summary of the indexing procedure used to score each index is contained in Table 2.

Table 2
Indexing Procedure

Method	Procedure
1. word Index	<ul style="list-style-type: none"> a. Count individual words or numbers relevant to the selected environmental items. b. Numbers are converted into words. c. The amount of environmental disclosures (total and categories) is calculated by summing the words for items disclosed by each company.
2. Unweighted Index	<ul style="list-style-type: none"> a. Score '1' for the presence of an environmental item and score '0' for the absence. b. The amount of environmental disclosures (total and categories) is calculated by summing the items disclosed by each company.
3. weighted Index	<ul style="list-style-type: none"> a. Each item is weighted on the basis of the relative degree of importance. b. The weights of the items is the average scores of all scores given by financial analysts. c. The amount of environmental disclosures (total and categories) is calculated by summing the weights of items disclosed by each company.

Identifying the Individual ED Items Used in the Disclosure Indices

The first step in developing our disclosure indexes was to identify individual environmental disclosure items. By referring to prior studies (e.g., Trotman and Bradley, 1981; Wiseman, 1982; Cowen et al., 1987; deegan and Gordon, 1994) and reviewing a random sample of 10 annual reports, a list of environmental items was generated. The checklist was constructed to measure the quantity of non-mandatory environmental information. To ensure the homogeneity of the items (Marston and Shrives, 1991), the items were classified into four categories. These are corporate environmental policy, recognition of environmental activities, prevention or repair of environmental damage, and environmental liabilities. A senior academic and an honours student were asked to review the environmental items and their classification into the four categories. The senior academic checked the classification for duplication and that none of the items were required under existing accounting standards while the honours student compiled an independent list of items. A meeting was held and after adjustment this resulted in a final list of 22 items and their classifications. These are shown in Table 3.

Table 3
Categories of Voluntary environmental Items

	Mean Score of Analysts
Environmental Policies	
1. Adoption of environmentally sensitive management technique	4.00
2. Departments of offices for environmental affairs	2.18
3. Setting up objectives and strategies for the environment	4.18
4. Environmental awareness campaign	3.14
5. Compliance with government environmental principles and regulations	8.20
6. Implementation of environmental audit	5.00
7. Establishment of environmental programs	6.00
Recognition of Environmental Activities	
8. evidence of public support or approval	3.40
9. Awards for environmental protection	3.00
Prevention or Repair of Environmental Damage	
10. Treatment of waste disposal (e.g., recycling efforts)	5.87
11. Adoption of safe environmental practices or improvements in environmental facilities	5.95
12. Air, water and soil emissions	4.60
13. Undertaking wildlife preservation	3.30
14. Estimated future costs for environmental rehabilitation (restoration) activities (not as parts of financial statement)	6.80
15. Environmental impact assessment and research programs for environment	4.46
16. Conservation of natural resources or energy saving measure	3.40
17. Land reclamation	4.36

18.	Current costs for environmental rehabilitation (restoration) activities (not as parts of financial statement)	5.36
19.	Tree replanting (revegetation) scheme	3.68
	Environmental Liabilities	
20.	Admission of causing environmental problems (i.e. health related) for residents	3.56
21.	Acknowledgement of detrimental effects of activities	4.10
22.	Litigation related to environment (not listed in contingent liabilities)	<u>5.46</u>
	Total	100

Developing the Weighted Index: Rating the Importance of Individual ED Items

The relative importance of the individual environmental items as rated by financial analysts was used to develop a weighted index. This was done to reduce the subjectivity involved in determining the weightings to be applied to the individual disclosure items. Financial analysts often use the annual report for making financial assessment, investment decisions and for advising other user groups and are considered to be “sophisticated users” (Anderson and Epstein, 1995; Marston and Shrikes, 1991). Consequently, their views are considered appropriate for the purpose of this study.

The ASX Members’ Directory for 1994/1995 was used as a reference to distribute questionnaires as described below. There are 259 organisations which are members of the ASX and these organisations comprise 87 different securities and stockbroking firms. A questionnaire consisting of the 22 items was sent to all members with a covering letter and a reply paid envelope.⁹ The covering letter was addressed to the Research Department of the respondents. They were asked to score the 22 items such that the total score for the items equals 100.

A total of 21 replies were usable yielding a 24 percent response rate.¹⁰ The mean values of the scores were calculated and used as the weights of the items for the weighted disclosure index. The mean scores of analysts are shown in Table 3.

Research Design

Total ascertain underlying constructs Principal Components Analysis was used to transform the indexes (dependent variables) and the firm-specific characteristics (independent variables) into a new set of linear combinations. Coefficient Alpha was used to test the reliability of the dimensions obtained from the Principal Components Analysis for the indexes and firm characteristics. The explanatory power of the model constructed was tested using Ordinary Least Squares Regression.

The various analyses resulted in a mixture of variables and these are retailed below.

V. Results

Descriptive Statistics.

The Descriptive Statistics for the continuous independent variables are presented in Table 4.

Table 4
Descriptive Statistics for continuous independent variables before standardisation

Variable	Mean	Standard Deviation	Minimum	Maximum
Total Assets	406760466	1060088598	439350.00	8792000000
Sales	231681611	670294034	.00	5928000000
Market				
Capitalisation	573572549	1530638629	2000000.0	10930000000
Leverage 92	43.52	61.81	.00	574.90
Leverage 93	45.83	94.52	.60	857.20
Return on				
Equity 92	30.07	130.47	-454.90	795.54
Return on				
Equity 93	25.65	95.09	-407.40	540.00
Ownership				
Diffusion	23.16	14.78	2.26	75.47
Systematic Risk	120.42	70.65	-69.00	424.00

Factor Analysis: Dependent Variables

Word Index

Principal Components Analysis of Word categories 1,2,3 and 4 reveal one factor with an eigen value greater than one which explains approximately 60% of variance. The four categories loaded on the single dimension which appeared to be a reliable measure as Coefficient Alpha is 0.61. The Pearson Correlation between the factor scores of Word categories 1 to 4 and Word Total is .97. On the basis of this result we conclude that 'Word Total' is a suitable surrogate for Word categories 1 to

4 and, consequently, Word Total is used as the dependent variable in subsequent analysis.

Unweighted Index

A Principal Components Analysis of Unweighted categories 1,2,3 and 4 reveals one factor with an eigen greater than one which explains approximately 70% of the variance. The four categories loaded on the single dimension which appeared to be a reliable measure as Coefficient Alpha is 0.74. The Pearson Correlation between the factor scores of Unweighted categories 1 to 4 Unweighted Total is .97. On the basis of this result we conclude that 'Unweighted Total' is a suitable surrogate for Unweighted categories 1 to 4 and, consequently, Unweighted Total is used as the dependent variable in subsequent analysis.

Weighted Index

A Principal Components Analysis of Weighted categories 1,2,3 and 4 reveals one factor with an eigen value greater than one which explains approximately 68% of the variance. The four categories loaded on the single dimension which appeared to be a reliable measure as Coefficient Alpha is 0.69. The Pearson Correlation between the factor scores of Weighted categories 1 to 4 and Weighted Total is .97. On the basis of this result we concluded that 'Weighted Total' is a suitable surrogate for Weighted categories 1 to 4 and, consequently, Weighted Total is used as the dependent variable in subsequent analysis.

Total Index

A Principal Components Analysis of Word Total, Unweighted Total and Weighted Total reveals one factor with an eigen value greater than one which explains approximately 91% of the variance. The Standardised Scores of the three total indexes loaded on to the single dimension which appeared to be a reliable measure as Coefficient Alpha is found to be 0.95. The Pearson Correlation between the factor scores of Word Total, Unweighted Total and Weighted Total are significant at the 0.00 level. On the basis of this of result we conclude that the single Factor Score is suitable surrogate for the dependent variables Word Total, Unweighted Total and Weighted Total and, consequently, this is used as the dependent variables for ED in subsequent analysis.

Factor Analysis: Independent Variables

The Principal Components analysis resulted in four factors with eigenvalues greater than one that, together, explained 86% of the variance. ¹¹ Table 5 shows the factor matrix after a varimax rotation to find simple structure.

Table 5
Varimax Rotated Factor Matrix *

	Factor 1 Size	Factor 2 Leverage	Factor 3 Return on Equity	Factor 4 Ownership
Total Assets	.98468			
Sales	.97075			
Market Cap'n	96791			
Leverage_92		.97718		
Leverage_93		97762		
ROE 92			.88023	
ROE 93			.87756	
Ownership				
Diffusion				.81741
Systematic				.76531
Risk				

* The factor loadings not reported were left out of the table to improve readability.

Factor 1 measured a Size dimension as it was related to Assets, Sales and Market Capitalisation; Factor 2 measured a Financial Riskiness dimension as it was related to Leverage 92 and Leverage 93; Factor 3 measured a Return on Equity dimension as it related to return on Equity 92 and Return on Equity 93; Factor 4 an Ownership dimension. ¹²

Reliability Tests are undertaken on the four factors and the Alpha Coefficients are found to be .90, .92, .66 and .20 respectively. Because of the low reliability of Factor 4 and lack of a theoretical relation between ownership diffusion and systematic risk they were used as separate variables in subsequent analysis.

Ordinary Least Squares Regression

The preceding analysis of the dependent and independent variables suggests the following model:

ED = Function (Size, Leverage, Return on Equity, Ownership Diffusion, Systematic Risk, Environmental Committee, Membership of AMIC)

The independent variables ownership diffusion and systematic risk were standardized prior to undertaking the Ordinary Least Squares Regression because of their different scales.

The model was estimated using Ordinary Least Squares Regression and the results obtained are shown in Table 6. The model had an adjusted R^2 of 0.42 which is statistically significant ($F = 11.05$; $p = 0.00$) and variables in Size ($p = 0.00$) and membership of AMIC ($p = 0.00$) are significant variables and in the expected direction. The high Tolerance level and the low Variables Inflationary Factor (VIF) indicate the absence of harmful multicollinearity. This was confirmed as there were low Conditional Indexes.

Table 6
Result of OLS Multiple Regression

Variable	Beta	Tolerance	VIF	T	Sig T One - tailed
Size	.360743	.738154	1.355	4.021	.0000
Leverage Return On Equity	-.016919	.887987	1.126	-.207	.4183
Ownership Diffusion	.036141	.942183	1.061	.455	.3250
Systematic Risk	.081424	.839354	1.191	.968	.1678
Environment Committee Membership of AMIC	-.000824	-.832078	1.202	-.010	.4960
	.001209	.810106	1.234	.014	.4944
	.424544	.773572	1.293	4.845	.0000

This result means that hypotheses H3 and H7 are accepted. The other variables in the model are not significant and therefore hypotheses H1 to H2b and H4 to H6 are rejected. The Stakeholder Power dimension partially (H3) explains ED. However, the Strategic Posture and Economic Performance dimensions do not explain the extent of ED.

VI. Summary and Conclusions

This study showed, at least in relation to voluntary ED in 1993 by Australian Listed Mineral Mining Companies, that the extent of total ED and four categories of ED as measured by three separate indexes are capable of being measured by single construct. The results of Ordinary Least Squares Regression of this construct as a

dependent variable with Membership of AMIC, Leverage 92, Leverage 93, Systematic Risk, Return on Equity 92, Return on Equity 93, Environmental Committee, Ownership Diffusion, Assets, Sales and Market Capitalisation as independent variables showed that membership of AMIC, Assets, Sales and Market Capitalisation were statistically significant at the 0.00 level.

The implication of this finding is that, accounting based financial measures do not appear to explain voluntary ED in the annual report of mineral mining companies. Consequently, users (e.g., lenders) can only expect consistent ED by larger companies that are members of the AMIC. This implies that the regulators of accounting information will need to issue an accounting standard on ED if they require decision useful information and uniformity in the annual report of all companies. Furthermore, categories of ED do not appear to provide additional information.

This study also provided empirical evidence on the voluntary ED by Australian listed mineral mining companies within the stakeholder theoretical framework. It was found that not all three dimensions of the theory were significant in the model. In the stakeholder power dimension, membership of the AMIC and Size a Control Variable were significant variables. Variables used as surrogates in the strategic posture dimension and the economic performance dimension, were found not to be significant.

Therefore, the stakeholder theoretical framework only weakly explained practice of environmental disclosure by Australian listed mineral mining companies. The implication of this finding is that other variables need to be included in the dimensions of the stakeholder model. For example, sources of information other than the annual report. Ideally, location of mining companies could be used to test the sensitivity of mining area but this is not possible for all companies as a considerable number have multiple locations.

The results of this study are subject to several limitations. The study was limited to mineral mining companies listed in the AGSM Annual Report File. This data source contains the top 500 firms by market capitalisation therefore the results may not be generalizable. In addition, this study includes only a single period of observations. Only one user group, financial analysts were used to assess the relative importance of each environmental item of disclosure and this may introduce bias into the results. Furthermore, ED is not restricted to the annual report, as some companies disclose the information in other media instruments. A stakeholder group may have sufficient power to demand information not voluntarily disclosed in the annual report.

The limitations of this study suggest directions for future research. A longitudinal study which includes all listed mineral mining companies would enhance the generalizability of the findings. Other user groups could be to assess the relative importance of the environmental items. Also, sources of environmental information other than the annual report could be investigated and included as an additional variable.

Further research could be undertaken in several directions. An investigation into the disclose processes may provide further insight into voluntary ED.¹³ The impact of different index systems to those used in this study on ED (e.g., number of pages). Research in ED could be extended to include oil and gas companies and industrial companies. The needs of different user groups and how they evaluate and utilise this information could be investigated. Finally, as environmental matters are a global issue, the practice of voluntary ED could be examined in other countries with different cultures.

Although the findings do not support all of the hypotheses, the application of the stakeholder theoretical framework together with the three different indexes and categories of disclosure in one study reflects the efficacy of the stakeholder framework on corporate environmental disclosure in Australia. A new variable, the membership of the AMIC, was significant. The results of this study augment the understanding of practice of voluntary ED by Australian listed mineral mining companies.

Notes

1. For example, Environmental Protection Acts.
2. For a discussion on the theories and their strengths and weaknesses see Gray et al (1995).
3. Mastrandonas and Strife (1992) reported that the information most frequently demanded by investors related to penalties and capital expenditures.
4. The percentage of ordinary shares owned by the top twenty shareholders is a disclosure requirement of Australian Corporation Law.
5. It is perceived that meeting environmental responsibility goals is a secondary objective because an acceptable level of economic performance is necessary prior to devoting resources for environmental activities (Ullmann, 1985; Roberts, 1992).

6. This argument assumes the information is costly to produce and that amount of the cost is material.
7. A list of these companies are available on request from authors.
8. For a full discussion on the strengths and weaknesses of indexes see Marston and Shrives (1991).
9. The order of the 22 items was randomised for each of the questionnaires that were mailed. The randomisation was done in order to avoid a possible bias that could occur from "order effects" due to the ordering of the 22 individual items.
10. Fowler (1993) contends that credible statistical results will be obtained if the response rate is not lower than 20 per cent. Three of the questionnaires with a score of greater than 100 (e.g., 103) were weighted to 100.
11. Commercial production was removed from the analysis because all companies in the sample had a commercial operation.
12. In an initial analysis Political Pressure and Environmental Committee loaded on the Size dimension. However, as these variables appeared unrelated to size they were removed and the analysis repeated and the dimensions remained unchanged. Consequently, it was decided to treat Political Pressure and Environmental Committee as separate independent variables.
13. See for example, Gibbins et al. (1990).

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