

DETERMINANTS OF ENVIRONMENTAL DISCLOSURE PRACTICES OF US RESOURCE COMPANIES: HARD COPY VERSUS INTERNET REPORTING

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Abstract

Environmental issues have emerged as a prominent social issue of the 1990's and in the beginning of the 21st Century. In more recent times, electronic dissemination of information online is also becoming commonplace for larger as well as smaller corporations. This study examines the determinants of voluntary environmental disclosures (VED) over the internet versus hard-copy reports of a sample of resource companies listed on the New York Stock Exchange over the 2000, 2004 and 2008 fiscal years. These resource companies were chosen on the basis of their operations having a potential impact on the environment. The aim of this study is to note any changing motivations driving the disclosure of VED information in hard copy and internet reports.

The results of this study indicate that US resource companies favour the Internet over hard copy annual and sustainability reports for dissemination of environmental information. Size significantly predicted the level of environmental disclosure in hard copy reports in all of the 3 years examined whilst Size and Economic Performance had also consistently and significantly predicted the level of environmental disclosures on the Internet in all of the 3 periods examined. The results of the study indicate that the motivations driving the choice of medium for VED disclosures hasn't changed in the last 8 years. What is perhaps puzzling is the conservative levels of disclosures of VED information overall. The political visibility of organizations and factors that go beyond stakeholder theory such as the technological know-how of the management may possible reasons for the observed VED levels. This study throws more light into the motivations of US companies in choosing hard copy reports and/or the Internet for disclosure of environmental information.

Keywords: Hard Copy, Internet, Environment

1.0 INTRODUCTION

The concept of public environmental reporting received greater publicity since the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in June 1992. Following that initiative, many studies (see for example, Adams and Whelan, 2009; Belal and Owen, 2007; Tregidga and Milne, 2006; Deegan, Cooper and Shelly, 2006; Gray, Kouhy and Lavers, 1995) have noted the growing popularity and importance of environmental reporting. Voluntary environmental reporting is one way to communicate effectively with stakeholders and also in building trust and loyalty and thereby contributing to business performance (Wheeler and Sillanpaa, 1998). While traditionally hard copy reports have been used to disseminate the environmental performance of companies, many companies are realizing that simply using paper-based environmental and

social reports do not build sufficient 'value' with key stakeholders (Cho, Phillips, Hageman and Patten, 2009; Ball, Owen and Gray, 2000). This study examines, using Stakeholder Theory, possible determinants for the choice of environmental disclosure (ED) over the Internet versus ED in hard copy reports. 102 of Fortune 500 companies chosen from three environmentally-sensitive resource industries of chemical, mining and petroleum, and energy and utilities are scrutinized to determine the factors that influence choice of reporting medium. Internet ED includes environmental disclosure in annual reports available on the Internet (if any), environmental reports available on the Internet (if any) and environmental information on the Internet besides those on the Annual Report and environmental reports. Hard copy report ED includes environmental disclosure available in hard copy annual reports and in hard copy environmental reports. This is consistent with studies such as Trabelsi, Labelle, Dumontier (2008), KPMG (2008) and Ho and Taylor (2007).

The primary research question is:

“What are the determinants of voluntary environmental disclosure by resource companies in the US”

This study is important for several reasons. Some of the more important reasons are firstly; Jones and Xiao (2003) reported that the majority of the experts were of a view that the Internet will become increasingly important in disseminating corporate information in the near future. However few studies (see Ziek, 2009) have studied the changing communication behaviour of companies and possible underlying behaviour behind such a phenomenon. This study addresses this gap. Secondly, whilst studies such as Guthrie, Cuganesan and Ward (2008) and Adams and Frost (2006, 2008) argued for the demise of hard copy annual report as the medium of VED disclosure, this present study undertakes an analysis as to what still drives companies to disclose information in hard copy and internet mediums. Such an analysis will present insights into the factors that inhibit/encourage companies to disclose VED information in hard copy and internet mediums.

The findings of the study will both update the conclusions of extant literature and will serve to provide a better understanding of the choice of disclosure medium (Internet versus Hard Copy Reports) for the dissemination of environmental information.

2.0 LITERATURE REVIEW

A wide range of theoretical arguments has been employed in disclosure studies including, agency costs, political costs, signaling and information asymmetry, capital needs, litigation costs, and audit firm reputation. This study adopts the stakeholder theory as its theoretical framework.

Stakeholder theory is an organisation-centred theory (Roberts, 1992). This theoretical perspective considers corporations to have a number of different stakeholders, defined as "groups and individuals who can affect and are affected by the achievement of an organisation's mission" (Freeman, 1983, p.38). Organisations are thus responsible to these stakeholders and rely upon their continued approval to maintain a successful

operating environment (Roberts, 1992). Stakeholder theory concentrates upon defining factors influencing the continued existence of corporations.

Ullman (1985) suggested that there are three dimensions within a stakeholder model, namely, (i) stakeholder power; (ii) a strategic posture and (iii) economic performance, allowing an assessment of the quality of the voluntary environmental disclosures being made and their usefulness to stakeholders. Stakeholder power has been described as an organisation's willingness to respond to the intensity of stakeholders demands (Roberts, 1992); and strategic posture is "the mode of response of an organisation's key decision makers towards social demand...(and, further)...an active posture implies a position in which managers seek to influence their organisations relationship with important stakeholders in order to achieve optimal levels of interdependence (Ullman, 1985, p.552). Studies such as Callan and Thomas (2009) have successfully adopted stakeholder theory to study the environmental disclosure of US companies.

In this study stakeholder power is measured by leverage (debt to asset ratio); strategic posture is measured through the level of environmental disclosure on the Internet and in Hard Copy Annual Reports; and economic performance is measured through Return on Assets. The size of company (as measured by Total Assets) is the control variable.

2.2 Voluntary environmental disclosure

The past 20 years of empirical investigation into corporate social reporting practice (CSR) of which Voluntary Environmental Disclosure (VED) is a subset of, has seen a wide variety of literature adopting different theoretical perspectives (explicitly or implicitly); employing many different research methods and motivated by a wide range of research questions; and which covers many different countries and time periods. The CSR literature is generally dominated by USA investigations (see for example KPMG, 2008; Ho and Taylor, 2007; Deegan et.al., 2006; Holland and Boon Foo, 2003, Ullman, 1985).

Some of the findings of previous studies are that CSR and VED disclosure seem to vary according the popularity of the subject as well as with the organisation that is providing the disclosure. These findings include: country of origin is significantly associated with the levels of CSR (Laan Smith et.al., 2005); size is related significantly to the levels of CSR (Laan Smith et.al., 2005; Jaffar Mohd Iskandar and Nordin Muhamad, 2002; Cormier and Magnan, 2003); media visibility is significantly associated with levels of VED (Cormier and Magnan, 2003; Deegan, Rankin and Tobin, 2002); technological influences is positively associated with level of VED (Bichta, 2003); leverage is negatively associated with VED (Jaffar Mohd Iskandar and Nordin Muhamad, 2002); negative association between environmental performance and economic performance (Wagner, Phu Azomahou and Wehrmeyer, 2002); presence of environmental management system is significantly associated with the level of VED (Frost and Seamer, 2002); and positive association between economic performance and level of VED (Stanwick and Stanwick, 2000). Laan Smith et.al. (2005) also found that companies face differential corporate social disclosures in different countries and will adjust their disclosure strategies accordingly.

Prior studies (such as Sobhani, Amran and Zainuddin, 2009; Branco, Eugenio and Ribeiro, 2008; Ho and Taylor, 2007; Llana, Moneva and Hernandez, 2007) have focused solely in hard copy environmental report and hard copy annual report disclosures. This is despite several studies (such as Ziek, 2009; Kishi, 2008; Bassili, 2008; Guthrie et.al., 2008; Isenmann and Lenz, 2002; Wheeler and Elkington, 2001; Skillius and Wenberg, 1998) noting that different mediums reach different stakeholders and hence a variety of communication vehicles is necessary and not a single report. This was also echoed by Lodhi (2006) who noted that the vast majority of internet based studies do not consider how the medium in question affects the disclosure on information in that medium.

This present study examines any changing predictors of VED in hard copy reports over a longitudinal period. The VED information in hard copy reports comprises of VED information disclosed in both hard copy annual reports and hard copy sustainability reports.

2.3 Internet disclosure

Studies have noted that a growing number of companies are using the Internet for communicating financial information. However, these studies also highlighted that there has been little progress in online reporting as online corporate reports consist mainly of displaying hard copies annual reports in an electronic format (see, for example, Ziek, 2009; Brennan and Hourigan, 1998; Marston and Leow, 1998).

Other studies have examined Internet Financial Reporting and their determinants. These include Callan and Thomas (2009) and Marston (2003) who examined a sample of US companies. These studies found that while company size was significantly (and positively) associated with the existence of a website, the extent of information disclosed online was positively related to size and economic performance. Adams and Frost (2006) undertook an examination of the motivation of US resource companies in disclosing voluntary environmental information online. This study echoed the growing use of the Internet for corporate dissemination of information. Furthermore, these studies also note some cross -country differences arising in the quantity and quality of online information disclosed.

Similar to the literature examining hard copy VED information, literature examining Internet VED has been surprisingly candid about observed effects whilst making little effort to understand why companies were adopting the Internet to present VED information. This present study examines the predictors of VED of internet based environmental disclosures over a longitudinal period in the aim of understanding factors driving choice of the internet as a medium for disclosure of VED information.

3.0 RESEARCH APPROACH

The variables for this study are based on the stakeholder theoretical framework as discussed above. Direct association between the independent and dependent variables are postulated based on the framework.

This study aims to understand the level of environmental disclosure on the Internet by developing a series of testable hypotheses using Stakeholder theory. Consistent with Debrenceny et.al. (2002), a similar direction is proposed for Internet Environment reporting as compared to prior research that were based on hard-copy annual reports. The following section details the hypotheses development.

Strategic posture

As expounded earlier, strategic posture describes the mode of response of a company's key decision makers concerning social demands. Hence the greater a company's strategic posture, the more likely that the company will carry out environmental activities and hence the more the disclosures will appear in the annual reports (Sobhani, Amran and Zainuddin, 2009; Ho and Taylor, 2007; Llana, Moneva and Hernandez, 2007, Williams, 2004; Ullman, 1985). In this study, strategic posture is measured through the level of environmental disclosure in different mediums (i.e. annual report and the Internet). The level of environmental disclosure is measured via an environmental disclosure index. This measure becomes the dependent variable for this study.

Leverage

Debt providers are a class of stakeholders who are also concerned with the financial performance and stability of the organisation. They may also be concerned over the possibility of assumed responsibility for environmental liabilities on liquidation of the company (Neu, Warsame and Pedwell, 1998). In response to debt providers, corporate management may seek to legitimise environmental performance through additional disclosure and thereby reducing the need for further scrutiny to understand the firm's risk profile.

Malone, Fries and Jones (1993) observed that leverage was influential in the extent of financial disclosure by oil and gas companies. Using a stakeholder based argument, the higher the leverage, the higher the stakeholder power and hence the higher the company's disclosure levels to legitimise its operations (Latridis and Kadorinis, 2009; Prado-Lorenzo, Rodriguez-Dominguez, Gallego-Alvarez and Garcia-Sanchez, 2009). In this study, leverage is measured as the ratio of debt (Non-current liabilities) to asset (average total asset) ratio. Hence, the first set of testable hypotheses:

H1a: Firms with a higher leverage disclose more environmental information on the *Internet* than those with a lower level of stakeholder power

H1b: Firms with a higher leverage disclose more environmental information in the *Hard Copy Reports* than those with a lower level of stakeholder power

Economic Performance

According to stakeholder theory, economic performance of a firm affects management's decision to disclose social responsibility information. When companies are not performing well, economic demands take precedence over social responsibility expenditures (Roberts, 1992). Furthermore, such a firm is less likely to have the financial ability to disclose more information to satisfy the needs of the various stakeholders of the company (Meek et.al. 1995).

Stakeholder theory postulates a positive relationship between economic performance and the level of environmental disclosure. While some studies (see for example, Prado-Lorenzo et.al., 2009; Prado-Lorenzo, Gallego-Alvarez and Garcia-Sanchez, 2009; Cho and Patten, 2007; Dittrick, 2007; Cerin, 2002; Niskanen and Nieminen, 2001; Brignall and Modell, 2000) have concluded a positive relationship between the economic performance and the level of voluntary disclosure, Patten (1991) noted a negative relationship. Due to the conflicting findings in prior literature, this study will examine a non-directional association between economic performance and the level of environmental disclosure on the Internet and hard copy reports. This study uses return on assets (measured by the ratio of Net Profit before income tax and interest and average total assets) as a measure of economic performance consistent with Hackston and Milne (1995) and Roberts (1992). Hence, the second set of testable hypotheses:

H2a: There is an association between the economic performance of the organisation and the extent of environmental information presented on the *Internet*

H2b: There is an association between the economic performance of the organisation and the extent of environmental information presented in the *Hard Copy Reports*

Control Variable - Size

Advocates of stakeholder theory state that larger companies come under more scrutiny than smaller companies. These companies thus feel the pressure to disclose more social information to obtain approval from the stakeholders for continued survival (O'Donovan, 1997). Larger firms are also perceived to be important economic entities and therefore have greater demands placed on them to provide more information for customers, suppliers, analysts and government bodies (Cooke, 1991). Provision of information is also made easier because these larger firms possess the necessary resources to furnish stakeholders with the relevant information and hence producing extra data at a competitive cost than smaller firms (Cooke, 1991, 1992).

A positive association between size of a corporation and the amount of environmental disclosure has been consistently found by prior studies (see for Prado-Lorenzo et.al., 2009a; Prado-Lorenzo et.al., 2009b; Stanny and Ely, 2008; Ho and Taylor, 2007; Jaffar, Mohd. Iskandar and Nordin Muhamad, 2002). Roberts (1992) however found a negative relationship between the size of the company and the level of CSR disclosure. This study postulates the third set of hypotheses as:

H3a: Size of a firm is significantly positively associated with the level of environmental information disclosed on the *Internet*

H3b: Size of a firm is significantly positively associated with the level of environmental information disclosed in the *Hard Copy Reports*

Cooke (1991, p.76) points out that "...size can be measured in a number of ways and there is no overriding theoretical reason to select one (measure) rather than another". The measure of corporation size adopted in this study is total assets presented in the annual reports. This measurement technique was adopted because it has been applied

regularly in prior voluntary environmental and social disclosure studies (see for example, Prado-Lorenzo et.al., 2009a; Prado-Lorenzo et.al., 2009b; Ho and Taylor, 2007; AlNajjar, 1995, 1996; Patten, 1991, 1992; Hackston and Milne, 1996; Gray, Kouhy and Lavers, 1995).

Disclosure Index

The most well-known charter that has been developed is the CERES Principles which outlines a voluntary code of conduct established after the Exxon Valdez oil spill (see www.ceres.org accessed on 12th April 2009). CERES issued reporting guidelines to assist organisations in improving environmental reporting practices. Another study, a survey by KPMG (2008) of statements and studies on what environmental information should be disclosed, found a number of key issues common to many sources. The studies by KPMG (1999,2002,2005,2008) highlighted that potential users of the annual reports desire information on the full range of environmental issues. The survey also highlighted the annual report users' desire for information on the financial impact of environmental issues and a commitment to environmental management by organisations.

The Global Reporting Initiative (GRI) (see www.globalreporting.org accessed 12 April 2009) is a large multi-stakeholder network of thousands of experts, in several countries, who participate in GRI's working groups and governance bodies and use the GRI Guidelines to report. The GRI framework sets out the principles and indicators that organizations can use to measure and report their economic, environmental and social performance.

Based on the review above, this study developed an environmental disclosure index with 20 items. Table 1 provides the disclosure items and extant literature supporting the various disclosure items.

Insert Table 1 about here

Based on the environmental index in Table 1, a disclosure score-sheet was developed. The websites and the hard copy annual reports were then scrutinised for the disclosure/non-disclosure of the above items. Companies were rated '1' for disclosure and '0' for non-disclosure of the above information. A final overall 'level of environmental disclosure' score was derived and regression analysis was undertaken between the predictors and the 'level of environmental disclosure'.

4. DESCRIPTIVE STATISTICS AND RESULTS

The research question of this study is to compare environmental reporting on the Internet versus Hard-Copy reports by environmentally sensitive listed companies. Hence US companies selected in this study had to fulfill three criteria namely: (i) be listed on New York Stock Exchange; (ii) belong to an environmentally sensitive industry classified as chemical, mining and petroleum, and energy and utilities in this study; and (iii) have a functioning website. A total of 300 companies were first

randomly chosen and of these 300 companies, 210 companies met the criteria described above. This is consistent with many studies that have adopted such an approach (see for example, Ho and Taylor, 2007; Neu, Warsame and Pedwell, 1998; Hackston and Milne, 1996; Patten, 1992). Addresses of companies selected from the above process were then obtained from hard copy business directories as well as from the World Wide Web Sources.

Each company was then sent a letter of request for the English version of their annual reports and any environmental/sustainability reports of fiscal year-end 2000, 2004 and 2008. A further follow-up letter and e-mail was sent three weeks after the initial contact to canvass the annual reports of companies that had not responded to the first request. Hard copy annual and environmental/sustainability reports were requested rather than relying on annual reports on the Internet as it was time consuming to ascertain whether the copies of the annual reports on the Internet were exact replicas of hard copy annual reports. This resulted in a total of 135 usable hard copy reports for this study and so a further 23 companies were deleted. Following the merger and dissolution of a further 33 companies in 2004 and 2008, a final sample of 102 was used for further analysis in 2000, 2004 and 2008. US resource companies in this study had to have a hard copy annual report and a functioning website to be included in the sample. Similar to previous studies such as Adams and Frost (2006), US resource companies did not have to provide a hard copy environmental report or present an internet environmental report and/or internet annual report to be included in the study.

Table 2 below presents selected company characteristics of US companies. The average US Company has log of total assets² of 6.8435, economic performance of 8.9% and leverage of 28%. Fortune 500 companies are larger than the average US companies and hence the noted characteristics (Ho and Taylor, 2007; Patten, 1992; Louwers, Pasewark and Typpo, 1996).

Insert Table 2 about here

Of the 102 companies in this study, 21.6% (22) of US companies are involved in the Chemical Industry, 22.5% (23) are in the Mining and Petroleum industry whereas 55.9% (57) of US companies are classified as Energy and Utilities Companies.

Of the 102 US companies in this study, in 2008, one company's financial statements has been audited by a then non-big 5 (now non-big 4) firm whereas 101 companies have been audited by a Big 5 firm. This variable is not included in further analysis due to the absence of variance in the type of audit firm between the different companies. In 2008, 18.5% of US companies had also received environmental awards in recognition of their environmental contribution. 21 of the 102 US companies (20.6%) had voluntarily participated in environmental group such as Responsible Care Group, Coalition of Environmentally Responsible Economies (CERES) and World Business Council for Sustainable Development (WBCSD).

In the fiscal year 2008, 77.5% (79 companies) of the US companies had provided a

separate environmental report, which indicates that US companies are disseminating environmental information in several mediums including annual report, environmental reports and on the Internet. Of the 79 US companies that had provided a separate environmental report, all companies had provided Internet-based environmental reports while 28 companies had provided hard-copy environmental reports. The Internet environmental reports were primarily in HTML format. These findings are consistent with those observed by Ho and Taylor (2007) who noted that a significant amount of social and environmental disclosures were provided in stand-alone reports.

5.0 ENVIRONMENTAL REPORTING PRACTICES

As noted earlier, an environmental disclosure index comprising of 20 disclosure items was constructed from the extant literature. All companies in this study were then scrutinized as to their disclosure practices on the Internet and in Hard Copy Reports.

Insert Table 3 about here

Interesting results emerge in Table 3 as the mean levels of environmental disclosure in hard copy reports decreases from 9.67 (48.3% in 2000) to a high of 11.10 (55.5% in 2004) and to a fall of 10.12 (50.6%) in 2008. However, the mean levels of environmental disclosure on the Internet has increased steadily from 9.98 (49.9% in 2000) to 13.50 (67.5% in 2008). A paired t-test was undertaken to note if there are any significant differences in the levels of environmental disclosure in hard copy reports versus on the Internet. Apart from 2000 and 2004 where the paired t-test yielded a *p*-values of 0.397 and 0.267 respectively, in 2008, there was a significant difference (*p*-value of 0.001) indicating that companies are showing significantly more environmental information on the Internet than in hard copy reports in 2008. However, both the levels of Internet and hard copy report environmental disclosures are low (out of a possible 20 disclosure items) signaling that in the period preceding a mandatory legislation on environmental disclosures, US companies had shown very limited levels of environmental information online and in hard copy reports.

As it can be observed, in 2000, a large proportion of the levels of VED disclosures (see Table 3) was disclosed in only the hard copy annual report with much of the same information shown on the Internet. However, in 2008, this phenomenon is reversed as there is a fall in the levels of VED information shown in hard copy reports as compared to the levels of VED information shown on the Internet. Both these observations are consistent with KPMG (2005, 2008) studies that examined the social and environmental disclosure of a sample of companies from across the globe. The year 2000 was the advent of Y2K bug and many companies had invested large amounts of resources on technology including websites (see <http://www.smartcomputing.com/> accessed on 1st September 2009) but social and environmental disclosure on corporate websites was relatively thin (see KPMG, 1999, 2002). In 2004, with many of the US resource companies having made in roads to new technologies, some of the VED information had ‘migrated’ to online technologies and as observed in Table 3, there is an increase in VED information that is shown only on the Internet.

A noteworthy observation is the decrease in levels of VED shown only in hard copy annual reports. Similar observations are noted in 2008 where there is a decrease across most levels of hard copy annual report VED disclosures and an increase in most levels of internet only VED disclosures. This is consistent with studies such as Guthrie et.al. (2008) who notes that hard annual reports are losing their focus as the medium of disclosure for VED information.

6.0 RESULTS AND DISCUSSION

Figure 1 below presents the conceptual schema for this study. The dependent variable is the total level of environmental information disclosed by US companies and the predictors include size (proxied by log of total assets), economic performance, and leverage.

Insert Figure 1 about here

A general linear model was then constructed. Tables 4 and 5 present the findings of the general linear model incorporating the predictors of environmental disclosure versus the dependent variables of environmental disclosure in hard copy reports and on the Internet respectively. The second column ‘Simple Regressions’ was obtained through running each predictor against the dependent variable of hard copy environmental report disclosures. The third column ‘Multivariate Regressions’ was obtained through fitting all the predictors in one general linear model. The last column ‘After Backward Elimination’ was obtained through a backward elimination process whereby the insignificant independent variables were removed one by one till the all the remaining independent variables were significant. These statistical steps were run to ensure the integrity of the final results.

Table 4 first provides the results of the general linear model of the independent variables of predictors of hard copy environmental disclosures and the dependent variable of the level of environmental disclosure in Hard Copy Reports by US companies.

$$TOTAL\ ENVIRONMENTAL\ HARD\ COPY\ DISCLOSURES = A*LOGASS + B*ECOPERF + C*LEVERAGE + INTERCEPT$$

Insert Table 4 about here

From Table 4, it can be observed that all three statistical manipulations yield size (as proxied by log of total assets) highly significant at the 1% significance level. This finding indicates that larger companies are providing more voluntary environmental information than smaller companies in hard copy reports. This finding is consistent with many prior studies, which have noted that size influences the level of VED made by companies (see for example, Ho and Taylor, 2007; Jaffar, Mohd. Iskandar and

Nordin Muhamad, 2002; Hackston and Milne, 1996; Gray, Kouhy and Lavers, 1995).

Table 5 provides the results of the general linear model of the independent variables of predictors of Internet environmental disclosures and the dependent variable of the level of environmental disclosure on the Internet by US companies.

$$TOTAL\ INTERNET\ DISCLOSURES = A*LOGASS + B*ECOPERF + C*LEVERAGE + INTERCEPT$$

Insert Table 5 about here

Table 5 presents a slightly different picture. Size (proxied by log of total assets) and economic performance are highly significant predictors of levels of environmental information on the Internet in all of the years examined in this study. The predictors had also explained 9.9% through to 17.8% of the variation in the environmental disclosure levels on the Internet over the 2000 to 2008 fiscal years. Similar findings were echoed by Ho and Taylor (2007); Marston (2003), Lee (2003), Bonson and Escobar (2002), Pirchegger and Wagenhoofer (1999) and Craven and Marston (1999).

CONCLUSIONS

Based on the above results, Hypothesis H2b, H3a and, H3b were supported whereas the other hypotheses were rejected. The results indicate larger companies showed higher levels of environmental disclosure in hard copy reports. As for the Internet, larger companies that have a higher level of economic performance showed significantly higher levels of environmental disclosure on the Internet.

This study has found that the motivation that US companies have in disclosing VED information in hard copy reports and on the Internet hasn't changed over the years. This finding is consistent with Ullman's (1985) dimensions of stakeholder theory that postulates a similar association between the level of environmental disclosures and the disclosure in hard copy and internet mediums. These findings are also consistent with many studies such as Ho and Taylor (2007), Laan Smith et.al. (2005), Jaffar et.al. (2002) and Hackston and Milne (1996).

However, what is intriguing is that though the same motivations drive US resource companies to disclose VED information in hard copy reports and on the Internet over the three periods examined in this study, there is a movement of VED information away from the hard copy reports to that of the Internet. This is consistent with studies such as Guthrie et.al. (2008). Guthrie et.al. (2008) and Striukova, Unerman and Guthrie (2008) argued that that the annual report as the most important medium for disclosure of social and environmental information does not hold true anymore. Adams and Frost (2008) on the other hand recommended a multi faceted approach to communicating corporate environmental information using both the hard copy and internet mediums.

It may be argued that stakeholder theory doesn't go as far as to address a multi faceted approach to environmental communication. Stakeholder theory, whilst providing insights into what drives companies to provide VED information, stops short of addressing how different mediums may be used to communicate different types of information. Whilst the motivation that drives US resource companies to show VED information over the years hasn't changed, what has changed is where the US resource companies show these VED information.

What is also puzzling is that companies are not utilising the Internet more to disclose environmental information. The companies in the sample of this study are some of the largest companies in the world and have potentially the biggest impact on the environment. Hence one would expect these resource companies to be in the forefront of corporate environmental transparency (see Adams and Frost, 2008). Frost and Seamer (2002) noted that the level of political visibility is associated with the level of environmental disclosure and the presence of an environmental management system. This was echoed by a later study (see Adams and Frost, 2006). Size and economic performance have been noted by prior literature to be proxies of political visibility (Lim and Mckinnon, 1993; Razeed, 2007). This study has found these variables to be significant predictors of environmental disclosure in hard copy reports as well as that in the Internet. Hence companies that are more politically visible are disclosing more environmental information in both hard copy reports and on the Internet.

The varying significant predictors in hard copy report environmental disclosures and Internet environmental disclosures signals that companies may have different motivations for using different mediums for environmental disclosure (Debrecey et.al., 2002). While the environmental information disclosed on the Internet is less costly and timelier, it inevitably increases the political visibility of US companies compared to annual report disclosures (Frost and Seamer, 2002).

Many studies (see Jones and Xiao, 2003; Wheeler and Elkington, 2001; Isenmann and Lenz, 2000a, 2000b) have predicted the increased use of the Internet to disseminate environmental information, yet the conservative levels of environmental disclosure on the Internet by US companies is a worrying sign. It is thus not surprising that lobby groups such as the Friends of the Earth (www.edie.net/news/Archive/5054.cfm accessed on 20th January 2008) are demanding that the government introduce mandatory legislation as a result of poor environmental reporting by FTSE 350 companies. This sentiment is also echoed by Sustainability and UNEP (1998) that noted that corporate social and environmental reporting has reached a bottleneck and that the only way to encourage firms to disclose more social and environmental information is through regulatory intervention or increased market pressures.

There may also be factors that go beyond stakeholder theory that explains the environmental disclosure levels on the Internet. The conservative levels of Internet disclosure may be due to the level of technology prevalent in an organization (Adams and Frost, 2008; Debrecey et.al, 2002; Kawaguchi, 1999). Other possible factors such as the technological know-how of the board of management; the level of e-commerce implementation in the organization; Internet Penetration (number of Internet users) in a country may possibly explain the variation in disclosure levels between hard copy and Internet disclosures (Debrecey et.al., 2002). However, it

appears that the low levels of environmental disclosure in both hard copy reports and on the Internet impedes any inferences to be gained from postulating a preference of medium for environmental disclosure by US companies.

This study acknowledges a limitation with the disclosure index developed. Buzby (1975, p.30) argued that “extent of disclosure is not synonymous with adequacy of disclosure”, therefore measurement based on extent of disclosure “.... Cannot be taken as a measure of the overall quality in annual reports” (p.30). The index developed in this study, however, does not incorporate the quality or extent of disclosure. Each component of the index is equally weighted and hence no distinction is made between information disclosures that may be of more importance to firms than the others. Ho and Taylor (2007) also acknowledged this limitation in their study.

A possible extension of this study would be to compare the results of US companies with companies in Australia. Understanding any trends may also aid in inferring the motivations of US companies in choosing hard copy reports and/or the Internet for disclosure of environmental information.

Figure 1 Conceptual schema of dependent versus independent variables for US companies

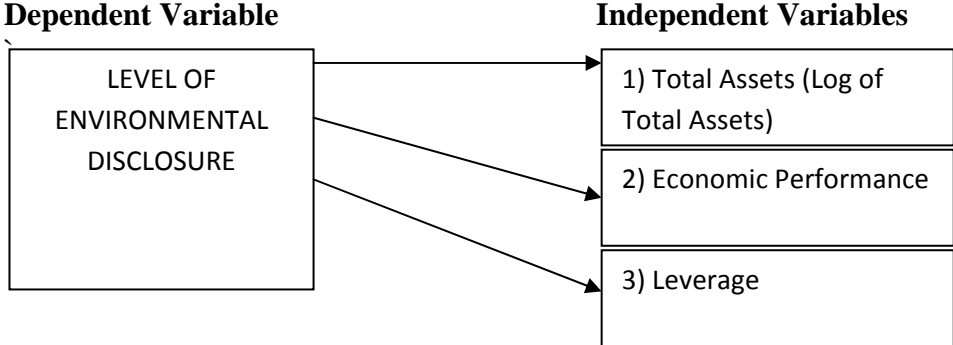


Table 1 Environmental Disclosure Index

S/ No	Environmental Disclosure Index	GRI (2008)	KPMG (2008)	Ceres Principles (2008)
1.	Statement/Existence/ Disclosure of Environmental Concern	X	X	X
2.	Steps taken to monitor compliance with policy statement	X	X	X
3.	Environmental Targets/Standards	X	X	X
4.	Performance against environmental targets	X	X	X
5.	Structural and responsibility changes undertaken in the organization to develop environmental sensitivity	X	X	X
6.	Environmental Awareness Training			
7.	Recognition of Government Regulations			
8.	Presence of Environmental Department and Personnel	X	X	X
9.	Acknowledgement of impact of activities	X	X	X
10.	Presence of Environmental Management System (EMS)	X	X	X
11.	Environmental programs – Restoration/ Rehabilitation	X	X	X
12.	Involvement with community projects	X	X	X
13.	Environmental audit-compliance	X	X	X
14.	Environmental audit-EMS	X	X	X
15.	Environmental programs-Response to environmental audits	X	X	X
16.	Environmental Accounting Policy	X	X	
17.	Amount spent on environmental protection	X	X	
18.	Anticipated pattern of future environmental spend	X	X	
19.	Assessment of actual/contingent liabilities	X	X	
20.	Physical unit analysis of materials/energy/waste		X	X

Table 2 Selected characteristics of US Companies

	Minimum	Maximum	Mean	Std. Deviation
Log of Total Assets	3.41	9.89	6.8435	.77489
Economic Performance	-28	81	8.9	10.424
Leverage	1	64	28.01	12.753

Table 3 Environmental Disclosure on Hard Copy Reports and on the Internet

	Overall Disclosure in Hard Copy Reports			Overall Disclosure on the Internet		
	2000	2004	2008	2000	2004	2008
Minimum	1	1	1	0	2	8
Maximum	20	18	15	20	20	20
Mean	9.67	11.10	10.12	9.98	12.00	13.50
Std Deviation	4.928	4.827	5.102	4.623	4.013	4.001

Table 4 Predictors of hard copy environmental disclosures

	2000				2004				2008			
	SR	MR	BE	CT	SR	MR	BE	CT	SR	MR	BE	CT
Log of Total Assets	0.001	0.000	0.00 0***	2.040	0.001	0.000	0.000 ***	2.189	0.000	0.000	0.000 ***	2.764
Economic Performance	0.166	0.124	0.09 2	6.354	0.249	0.179	0.164	6.890	0.189	0.164	0.123	6.387
Leverage	0.254	0.249	0.22 2	5.320	0.289	0.276	0.231	5.478	0.456	0.432	0.389	4.356
Adjusted R Squared	0.175				0.189				0.201			

SR = Simple Regression MR = Multiple Regression BE = Backward Elimination CT=Coefficient

***** Highly Significant at the 1% significance level**

**** Significant at the 5% significance level**

*** Moderately significant at the 10% significance level**

Table 5 Predictors of internet environmental disclosures

	2000				2004				2008			
	SR	MR	BE	CT	SR	MR	BE	CT	SR	MR	BE	CT
Log of Total Assets	0.008	0.003	0.00 3***	1.465	0.004	0.003	0.003 ***	1.589	0.000	0.000	0.000 ***	1.581
Economic Performance	0.008	0.004	0.00 3***	10.94 1	0.009	0.007	0.001 ***	8.479	0.001	0.001	0.000 ***	3.469
Leverage	0.796	0.756	0.75 1	5.672	0.388	0.359	0.283	4.502	0.403	0.400	0.389	4.489
Adjusted R Squared	0.099				0.129				0.178			

SR = Simple Regression MR = Multiple Regression BE = Backward Elimination CT=Coefficient

***** Highly Significant at the 1% significance level**

**** Significant at the 5% significance level**

• Moderately significant at the 10% significance level

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