DISPLAYING ENVIRONMENTAL INFORMATION TO SATISFY UTILITY AND SUFFICIENCY IN ENTITY REPORTING

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Abstract

Entity reporting of environmental information may take many forms and assessing the utility and sufficiency of environmental reports could assist in determining which display formats provide greater usefulness to users for decision making. The utility and sufficiency of certain display formats were assessed in this study by providing three user groups (shareholders, shareholder/environmentalists and environmentalists) with a scenario (vignette) and one of four alternative report displays: monetary, statistical, narrative or pictorial. The preference by user groups for narrative disclosure and the deemed inadequacy of the display in terms of sufficiency were significant findings of this study.

Keywords: *Environmental reporting, display formats, utility, sufficiency.*

Introduction

Reporting of environmental information may be displayed in various forms such as monetary, statistical, narrative and pictorial formats. Determining which display formats provided greater usefulness to users for decision making was the aim of this study. Furthermore, the four display formats were considered in terms of the utility and sufficiency they provided to the following user groups : shareholders, shareholder / environmentalists and environmentalists. If a particular format allows users to understand more readily the information being transmitted, then this has implications for users, preparers and regulators. Dierkes and Antal note that:

> … the process of identifying information needs in a specific way and responding to them in a *useful form* is therefore not only an extremely important but also a very difficult research task. (1985, p30)

The research undertaken in environmental accounting has been largely content analyses of disclosures in annual reports rather than determining the most 'useful form' of disclosures. Whilst content analysis of disclosures research describes the types of display formats, it does not provide any indication of either the utility or sufficiency of those disclosures (Gray, Kouhy and Lavers, 1995). This was a worthwhile area of investigation, particularly with the identification of an expanded group of users that included non-traditional users.

The utility and sufficiency of display formats for decision making, particularly with regard to environmental issues, received little attention from researchers and would be the next step alluded to above by Dierkes and Antal (1985). Whilst establishing which display formats provide greater utility presents problems of providing the same or similar information about an environmental event it remains a worthwhile research activity. In this context research conducted on the 'useful form' of environmental disclosures would be a significant contribution to the literature in this area.

The terms 'user' and 'stakeholder' have tended to be used synonymously. Attempts have been made to distinguish between traditional and non-traditional users and stakeholders. Faux (2002) used the terms explicit and implicit users and distinguished between the terms on the basis of fiduciary rights. O'Dwyer, Unerman and Hession (2005) identify that "there has been a relative absence of studies examining CSD (corporate social disclosure) from the perspective of non-managerial stakeholders". The non-managerial stakeholders have been described by Clarkson (1995) as 'secondary' stakeholders and having less influence than primary stakeholders. In this study, a differentiation was made between traditional users of entity reports (shareholders) and non-traditional users, such as, environmentalists.

The remainder of the paper is organised as follows. Section two reviews the literature describing display alternatives through content analyses followed by a discussion of the display and sufficiency research. Section three describes the multi-method research approach that combines the questionnaire and experiment methods adopted in this study. Section four discusses the findings and provides insights into the perceptions of users relating to the form, utility and sufficiency of alternative display formats from a user perspective. The final section presents the summary and concluding comments.

Literature Review

The research that contributes to an understanding of display preferences of users does so in an indirect manner through content analyses of disclosures in annual reports and, more recently, some experimental work conducted on the usefulness of narrative disclosures (Gibson and O'Donovan, 2000; Beattie and Jones, 1992).

Content Analyses

Social and environmental accounting researchers tended to focus on determining the extent to which companies disclosed social and environmental information in annual

reports (eg., Trotman, 1979; Guthrie and Parker, 1990; Gray et al., 1995; Gibson and O'Donovan, 1994). Studies of this type are called content analyses and they attempt to quantify the disclosures. Content analysis was described by Krippendorff (2004, p. 18) as a "research technique for making replicable and valid inferences from texts (or other meaningful matter) to the context of their use". Under this methodology the systematic conversion of descriptions into a numeric form allows for quantitative analysis. Describing the coding units, or variables of analysis, presents particular problems of subjectivity in content analyses and clear explanations of units are essential (Krippendorff, 2004).

Counting the words or sentences in annual report disclosures devoted to environmental reporting does not necessarily mean that a company disclosing less words or sentences than another is not conveying an effective message. The effect of 'shared meanings' discussed by Gray et al., (1995) has greater implications when users of reports are considered. If semantic differences can be identified between the descriptions offered by researchers and accountants who, presumably, are familiar with accounting jargon, then the situation is magnified when considering the diversity of opinion, meaning and understanding of users. As a consequence of this type of problem the usefulness of content analysis maybe restricted (Milne and Adler, 1999). The main attraction of this particular research method is the ability to use public documents, such as, annual reports of companies (Gray et al., 1995).

Content analysis studies in environmental accounting have used varying descriptions of the information supplied by companies. The analysis typically includes a description of the disclosure, the format style, and the location of the disclosure in the document analysed (Trotman, 1979; Guthrie and Parker, 1990; Gray et al., 1995; Gibson and O'Donovan, 1994). The following discussion of previous content analysis studies highlights the limitations.

Trotman (1979) considered three classification methods of quantification of environmental information; monetary quantification, non-monetary quantification and no quantification. Trotman included a fourth category of both monetary and non-monetary quantification to describe those companies displaying a mix of disclosures. For the purpose of discovering format preference, the failure to provide examples or a detailed description of terms used restricts the usefulness of Trotman's study.

Guthrie and Parker (1990) assessed disclosure against four 'testable' dimensions: theme, evidence, amount and location. Evidence was further categorised into monetary, non-monetary, declarative and no disclosure. It was noted during the project that disclosure was often a mix between monetary and non-monetary quantification. As a consequence, a 'mixed' category of disclosure was identified and the results reflect this identification. No description of the terms monetary, non-monetary or declarative was provided in this study leaving the reader to ponder and interpret the terms according to individual meanings. Given the diversity of descriptions, some explanation should have been made.

Gibson and O'Donovan (1994, p. 9; 2000) define disclosures relating to the environment in annual reports as follows:

> 'financial environmental information' referred to any quantifiable information contained in the financial statements; 'quantifiable non-financial information' referred to contents of the annual report relating to environmental issues presented in a quantifiable form but not forming part of the financial statements; and, 'descriptive environmental information' referred to narrative forms of information typically contained in the body of the annual report'.

The reference to 'quantifiable non-financial information' is unclear and refers to financial and non-financial information which does not form part of the statutory financial statements. The information offered includes graphs and tables depicting both financial and non-financial information. Photographs are included as narrative rather than as a separate category.

Gray et al. (1995, p. 99) describe types of disclosure as:

> *'monetary quantitative' if it contained and was related primarily to financial disclosure of actual financial numbers; 'other quantitative' if it contained and was primarily related to actual numbers of a non-financial nature; and 'declarative' otherwise'.*

Gray et al., (1995), when discussing the principle characteristics of content analysis, suggest that the method requires the adoption of 'shared meaning' so that the same 'referents' are shared by all researchers. This is justified and indeed essential. However, in Gray et al.'s study, shared meaning is not achievable because of definitional changes and the format focus adopted. The Gray et al., (1995)'s work was intended to be the definitive work on content analysis concerning environmental disclosures drawing together the descriptions of disclosures from previous research. Without the adoption of shared meaning of terms adopted in content analysis studies, further research is limited.

Display Research

The usefulness of pictorial displays, such as graphs, were examined by Beattie and Jones (1992 and 1997), and Mather, Ramsay and Serry (1996). The findings suggest that the complexity of issues for decision making purposes can be simplified when using pictorial displays. However, in some circumstances, this may result in less than satisfactory decisions. There is a growing tendency for companies to display information in a pictorial format. Whilst the display of information in annual reports has resulted in either a quantifiable or non-quantifiable display, this dichotomy can be too simple. Quantifiable information in annual reports is usually of a monetary nature but with the advent of a broader group of non-traditional users seeking environmental information, other forms of reporting are being employed.

References to financial information are subjective as users may refer to a range of types of information when making decisions. Traditional and non-traditional users may determine the utility of information in different ways. The environmental user may not understand financial disclosures and therefore not use information displayed in customary formats. Categorizing quantifiable information as monetary or statistical and non-quantifiable information as narrative or pictorial allows for user preference to be evaluated in greater detail.

Moriarity and Barron (1979) investigated students' and accounting practitioners' judgements regarding the likelihood of possible bankruptcy relating to merchandising firms. Participants were given a number of cues, either financial ratios or faces depicting various expressions, reflecting the financial ratios. The faces are known as 'Chernoff faces' after research conducted by Chernoff and Rizvi (1975). Those participants that received the 'faces' to predict failure performed better than the participants who made judgements based on financial ratios. Chernoff and Rizvi (1975) found that a pictorial presentation was shown to be more effective than a monetary display. In practice, the association of a facial expression with an indicator of performance would be highly subjective without rigid prescriptions as to the meaning of certain facial expressions.

The effectiveness of graphs and other similar pictorial displays in annual reports was investigated and findings indicated that there was significant use of graphs to depict key financial information (Beattie and Jones, 1992, 1997, Mather et al., 1996). However, selectivity in the use of variables to be graphed and possible distortion in the construction of graphs led the above-mentioned researchers to conclude that users' decisions might affected by the problems of selectivity and distortion. The use of alternative displays, such as graphs, to those required by regulation can lead to conjecture as to the motives of management. Neu (1991) suggests that management will select information for disclosure that provides the best impression of a company's activities. Whether management engages in impression management is difficult to determine. It is possible that management is also trying to provide users with greater information in a more usable form (O'Donovan, 2002). The lack of comparative studies between alternative display formats prevents conclusive comments regarding display usefulness.

Sufficiency of Corporate Disclosures

Tilt (1994) attempted to gauge the attitudes to disclosure and the possible usefulness to pressure groups of corporate disclosures. Tilt's findings indicate that pressure groups have definite viewpoints on corporate social disclosures and that these disclosures, generally, are insufficient and lack credibility. The annual report is seen as the appropriate place to make disclosures because some of the disclosures are regulatory requirements. This appears to give the annual report more credibility according to those surveyed by Tilt (1994) as indicated by the high 'credibility' mean (3.159 on a 5 point scale) and standard deviation (0.86). Pressure groups feel that corporations and subsidiaries have 'moral' responsibilities and that legislation should be put in place to ensure corporate behaviour meets societal expectations of 'moral' conduct.

Whilst Tilt's (1994) study was exploratory and largely descriptive, there were some interesting results. For example, the study found that the understanding of social information was relatively high although most studies of shareholders indicated that annual reports were not read because of the lack of understandability (Anderson 1979). Content analysis studies in this area confirmed that environmental information provided in annual reports, although on the increase, was insufficient for decision purposes (Gray et al., 1995; Gibson and O'Donovan 2000).

The suggestion by Tilt (1994) that the report format should include a combination of descriptions in narrative and statistical form fails to address the issue of the sufficiency of reporting by related entities.

> The format of the report would be a combination of descriptive and quantified terms and would include information on all related interests and subsidiaries of the parent company. (Tilt 1994, p. 64)

With the 'sufficiency' mean (1.95 on a 5 point scale) and standard deviation (0.76) being quite low and varied, the quotation offers little by way of assistance in determining an adequate reporting model. The sufficiency of information in a report goes beyond format and should provide information to users for making decisions.

Beattie, McInnes and Fearnley (2002), rather than discuss sufficiency *per se*, refer to three basic ingredients specifically for narrative disclosures.

- the *amount* of disclosure (adjusted for size);
- the *spread* of disclosures across topics, with a degree of balance (though not necessarily equal coverage) being desirable; and
- the *type of attributes* of these disclosures in the context of the topic. (Beattie et al., 2002, p. 97)

The discussion of report format by Tilt (1994) is extended to content of disclosures in reports by addressing amount, spread and type of attributes (Beattie et al., 2002). Issues of the sufficiency of a reporting model are further enhanced with a discussion of the effectiveness of communication in reports.

Effectiveness of Forms of Reporting

The normative perspective of reporting content offered in the preceding section is further clarified by a discussion of the effectiveness of communication between the content of the report and the report user. Smith and Smith (1971) describe communication as follows.

> Communication occurs in financial reporting only if the meanings intended by the information source are assigned to the financial statement messages by the destination (Smith and Smith 1971, p. 552).

This implies that the meaning of the information contained in an entity report is understood (comprehended) by users of the report. Smith and Smith (1971) also discuss how comprehension can be measured by the readability of certain narratives found in annual reports. Adelberg (1979) also measured the understandability of annual report narratives through a readability research method known as the 'Cloze readability procedure'. Measuring the effectiveness of narrative in accounting through the medium of readability allows an assessment of the effectiveness of narratives to users. The assignment of meanings through messages, as stated by Smith and Smith (1971), need not be solely through narratives. The predominant format for display of financial information has been in a monetary form, the effectiveness of which is difficult to determine (Adelberg, 1979). Measuring or comparing the preference of alternative displays, between user groups, could be difficult given the variation in the level of detail or specificity between those alternatives.

Using an experimental research design, Milne and Chan (1999) investigated the usefulness of narrative corporate social disclosures for investment decisions of users. The intention of Milne and Chan was to test the decision-usefulness model suggested by Dierkes and Antal (1985). The results of the study indicated that the investment decisions of participants were not significantly affected by the inclusion of social information. Perhaps, as the following quotation seems to indicate, participants of the study should have represented a broader cross section of possible users.

> It is not social information per se that is unimportant, but rather the kind of analysis it either does or does not facilitate. Not surprisingly, most of the accountants and investment analysts were interested in the financial performance of the firm rather than its social performance (Milne and Chan 1999, p. 452).

Asking users making investment decisions to use social information is less likely to result in changed investment strategies, which, as Milne and Chan state, is 'not surprising'. Milne and Chan assume that the Dierkes and Antal (1985) test for the usefulness of social information refers to economic decisions. Dierkes and Antal do not specify economic or financial decision usefulness. Their reference to decision useful might just as easily refer to the usefulness of social information for decision making. Narrative disclosure of social information is the most common form of social disclosure used by companies and to test the usefulness of such disclosures using an experimental research method would advance the social accounting literature into new areas.

Literature Summary and Research Direction

With more diverse user groups, the issue of display format becomes more relevant, as it can be assumed that non-traditional users may not be familiar with the monetary display. In other words, more user groups may be able to interpret information better if presented in ways other than the traditional monetary display. For example, a chemist making a buy, sell or hold decision on certain shares may use statistical information to make the same

decision that a financial adviser makes with monetary information. The essence of providing information in alternative formats is that whilst the facts transmitted are similar, the changed format may improve understanding. In the circumstances described above, the decision becomes the focal point of what determines information to be financial.

Accounting reports have tended to have a monetary construction, described as financial and depicting the economic performance of the entity. Financial information includes "monetary amounts and other quantitative and non-quantitative information closely related to monetary amounts" (Kenley and Staubus 1972, p.37). The issue of defining environmental information and distinguishing between financial and 'physical' accountings as noted by Burritt (1996) becomes less important if a user perspective is adopted. A user perspective challenges the above notions in that users may make both financial and non-financial decisions regarding an entity with financial and non-financial information.

The display choices derived from the literature and discussed above are not the same in terms of the generality of information conveyed. A simple description of the display choices follows:

- **Monetary**: depicted in monetary terms and reflects traditional accounting formats for profit and loss statements and balance sheets.
- **Statistical**: may contain numerical descriptions of pollution or degradation other than in money terms but may also provide, for example, percentages or averages of money amounts.
- **Pictorial**: includes graphs and may also describe monetary and statistical information regarding corporate performance.
- **Narrative**: written description of corporate performance and may include monetary and statistical information in written form.

Monetary or statistical displays can be quite technical and specific. Whilst a pictorial display may cover statistical and monetary information it may be designed to have a dramatic impact on the user. Narrative displays can also include monetary and statistical information in a technical fashion but with less precision than the monetary or statistical displays. It could therefore be said that different display formats offer different degrees of specificity. The preferred method of display will depend on a number of variables, weighted differently by different users, as individuals interpret information differently. As a consequence, users may make different decisions with the same information. Effective communication should maximise the utility of information transfer through the display medium to meet the needs of users.

Research Method

A multi-method research instrument including both survey and experiment was used to gather data. An abridged version of the survey was included as the survey was quite

extensive and covered areas unrelated to this paper (see Appendix 1). The vignette (experiment) was intended to add depth or understanding to descriptive questions asked about display usefulness by providing a contextual basis. A potentially significant environmental event needed to be established with which respondents could identify but which did not replicate any actual event. The use of a vignette allowed format preference to be revealed and the relevance of the various displays could be determined by the response to certain questions. User group (shareholder, shareholder/ environmentalist and environmentalist) and display type (monetary, statistical, pictorial and narrative) formed the analysis matrix.

The construction of the questionnaire went through several stages. In the early stage, the questionnaire was revised several times to ensure that questions related to the concepts being tested. General issues of question flow, usefulness of instructions and readability of the questionnaire were considered on several occasions prior to pre-testing. This screening took place with researchers experienced in postal questionnaires. Whilst pre-testing with experienced researchers was crucial, it was also important to pre-test on potential respondents and this was also undertaken.

Shareholders were randomly chosen from three Australia-based companies that were randomly chosen from the top fifty listed companies of the Australian Stock Exchange. The rationale for this was that the vast majority of shareholders are represented in the top fifty companies. Surveyed environmentalists were drawn from the total membership of a significant environmental association based in Australia. All of these respondents were involved in day-to-day decisions about the environment and were highly qualified technically. Participants were Australia citizens over the age of eighteen. Organizations and companies, that formed a significant part of the databases mentioned above, were excluded when establishing mailing lists.

The level of commitment was considered as the basis for selection of shareholders and environmentalists. For shareholders, commitment was determined by share ownership whilst for environmentalist the issue of commitment was deemed to be membership of an environmental organization. The specification of shareholders and environmentalists as described gave rise to a third category of user (shareholder/environmentalist) exhibiting characteristics of both shareholder and environmentalist categories. Three 'follow-up' phases were implemented to maximize the response rate. Valid responses were received from 876 (46.5%) from a potential 1882 participants surveyed (810 shareholders, 1072 environmentalists). Shareholder responses were 253, shareholder/ environmentalists amounted to 240 and responses from environmentalists were 383.

A perusal of Table 1 reveals that valid responses in the 12 categories of the analysis matrix were achieved. Between-and within-group percentages provided information on the relative counts in each of the 12 categories, highlighting the large response counts of the environmentalists.

Table 1: Number and Percentage Response Rates According to User Group and Display Type

Display Type	Shareholders	Shareholders & Environmentalists	Environmentalists	Total
Monetary				
Count	67	65	98	230
% within user group	26.5	27.1	25.6	100.0
% within display	29.1	28.3	42.6	26.3
Statistical				
Count	67	47	103	217
% within user group	26.5	19.6	26.9	100.0
% within display	30.9	21.7	47.4	24.8
Pictorial				
Count	60	63	85	208
% within user group	23.7	26.2	22.2	100.0
% within display	28.8	30.3	40.9	23.7
Narrative				
Count	59	65	97	221
% within user group	23.3	27.1	25.3	100.0
% within display	26.7	29.4	43.9	25.2
Total				
Count	253	240	383	876
% within user group	28.9	27.4	43.7	100.0
% within display	100.0	100.0	100.0	100.0

Respondents were asked to specify whether the event described (see Appendix 1) and the environmental report display, monetary, statistical, pictorial or narrative, was considered a significant environmental event. Further questions were designed to determine whether they considered the actions of the company to be positive, the type of action that may be taken considering the environmental report and, where shares were held, whether a buy, sell or hold decision could be made on the basis of the report. The effectiveness of the various displays for decision purposes was evaluated on the basis of whether a disclosure provided for an 'action' or 'no action' response. An example for a shareholder of an action decision would be to 'buy' or 'sell' shares and a no action response would be a decision to 'hold' shares.

In constructing the four variations to the environmental report, careful attention was paid to ensuring that the information displayed was similar. The vignette and four environmental report displays are shown in Appendix 1. The monetary display showed total sales from operations and specific expenses relating to site deterioration such as the loss on sale of medium-polluted and low-polluted sites and the amortisation of reclamation expenses. The statistical display was based on total hectares held as retail petrol sites and hectares polluted, which was further divided between high, medium and low levels of pollution based on the quantity of hydrocarbons present at sites. The pictorial display presented both the monetary and statistical information in the form of bar charts. The narrative report described both the monetary and statistical information. Loss on sale of retail

outlets and the reclamation expenses amount to $60 million or 6% of sales. The percentage of retail sites held in terms of hectares as opposed to polluted hectares was also 6%.

Findings and Discussion

The utility of certain display formats was assessed by the vignette and associated questions that revealed respondent preference to one of the four display formats (see Appendix 1). The display multiple-measure was used to appraise the sufficiency of the display formats in relation to the three user groups. An examination of the utility and sufficiency of display formats follows.

Display Utility

The intention was to determine whether belonging to one of the three user groups, and having information provided in one of the four formats would predict decision as either action or no action. As the four different types of questionnaire were issued randomly and display format was the only variation to the vignette, any differences in identifying the significance of the event could be attributed to the comprehensibility of the format of the environmental report. Variations in the information displayed between format alternatives might cause 'noise' in the instrument. Of particular interest, however, was whether the user group and display format had an impact on the response to the significance of the vignette event. To ascertain whether the user group and display format could predict the significance of the event, a log it analysis was used.

Three particular models for explaining the variability within and between groups were envisaged.

Model A	the display format as the independent variable and significance of the vignette event as the dependent variable;
Model B	the user group as the independent variable and significance of the vignette event as the dependent variable; and,
Model A + B	the display format and user group as the independent variables and significance of the vignette event as the dependent variable.

The explanatory powers of the three models can be determined by which model's likelihood ratio is less than the critical value and taking into account the degrees of freedom.

Table 2: Logit Analysis for the Significance of the Vignette Event

Model	Likelihood Ratio	DF	Critical Value
A	14.56	8	15.507
B	21.55	9	16.919
A + B	4.85	6	12.592

Using the Chi Square Distribution Table in Zikmund (1994, p.732) critical values at a 5% significance level taking into account the relevant degrees of freedom was calculated. The explanatory powers of the three models were assessed by determining which the model's likelihood ratio was less than the critical value. This enables an explanation of the significance of the event through the user category variable and the display format variable. Both Model A and Model A+B had explanatory power, as their likelihood ratios were less than the relevant critical value. Model A+B appeared to explain the variability in the '**event significance**' variable (see Appendix 1) better than Model A because there was a greater difference between the likelihood ratio and the critical value. The difference between the models was ascertained by calculating the extra 'fit' offered by Model A+B. With two degrees of freedom and a likelihood ratio of 9.71 (14.56-4.85) the critical value was 5.99. As the statistic was greater than the critical value, Model A+B explained more of the variability in the 'event significance' variable and, therefore, was the preferred model.

Responses in the 12 categories of format and user group ranged from a mean of 0.73 to 0.96 representing a very high acknowledgment of the significance of the event. Within-group differences were attributable to varying levels of understanding. The 'monetary' display was ranked third with shareholders and shareholder/environmentalists and last with environmentalists. When only monetary information was provided, a lower percentage of respondents, in general, tended to view the event as significant. The between-group differences were highlighted by the mean variation of the 'pictorial' display between shareholder/environmentalists and environmentalists. The latter ranking the display last whilst the former ranks the display third. The logistic regression indicates that the preferred model for predicting the response is Model A+B.

The intention of the question regarding the '**company's actions**' (see Appendix 1) was to establish, whether, given the respondent's user group and the display format, an opinion concerning company behaviour could be determined. The responses to the question determined the effectiveness of the different report displays. Participants were asked whether they believed the actions of the company were positive or negative. The option of holding no opinion was also provided. The three models used above for explaining the variability within and between groups were used again. The difference being that the dependent variable was the response to company's actions.

Table 3: Logit Analysis of the Company's Actions

Model	Likelihood Ratio	DF	Critical Value
A	33.77	24	36.42
B	50.14	27	40.11
A + B	15.20	18	28.87

With regard to Model A, the likelihood ratio was less than the critical value of 36.42 and hence provided adequate explanation of the response. This indicates that the display format assists in making a prediction about a company's actions. Conversely, Model B had a likelihood ratio of 50.14 and with 27 degrees of freedom provided little explanatory

power given that the critical value was less at 40.11. Therefore, 'user category' alone was not a good predictor of 'company's action'. The combined model, which considered both the user category and the display format, provided a more effective explanation. The likelihood ratio was 15.20 and with 18 degrees of freedom was much less than the critical value of 28.87. Therefore, Model A+B provided the greater explanation of the variability in responses and was the preferred model.

The extra explanation of variability of Model A+B compared to Model A was also significant as the following calculation indicates. The difference in the degrees of freedom between Model A and Model A+B was 6 (24-18) whilst the difference in the likelihood ratio was 18.57 (33.77-15.20) compared to the critical value of 12.59. As the likelihood ratio of 18.57 was higher, in this instance, than the critical value greater explanatory powers were attributable to Model A+B.

The responses to the '**environmental decision**' question (see Appendix 1) reflect several action possibilities and a no action choice that were later dichotomised into an action or no action response. The environmental event described in the vignette and the accompanying environmental report, one of four possible report formats, was constructed so that participants could determine the size of the event. Logit analysis was used again to determine if the variability in responses were significant. The three models used above for explaining the variability within and between groups were used again, the difference being that the dependent variable was the response to an 'environmental decision'.

Table 4: Logit Analysis of the Environmental Decision

Model	Likelihood Ratio	DF	Critical value
A	23.23	8	15.51
B	10.62	9	16.92
A + B	4.37	6	12.59

In Table 4 the likelihood ratio (23.23) for Model A (display effect) was greater than the critical value of 15.51 and hence provided little explanation of the response. This indicates that the display format variable does not provide any degree of predictability in the 'environmental decision' variable. In contrast to this result, Model B (user effect) had a likelihood ratio of 10.62 which was less than the critical value of 16.92 and therefore was a good predictor of the 'environmental decision' variable. The combined model, which considered both effects, provided the most meaningful explanation. The likelihood ratio was 4.37 with 6 degrees of freedom which was much less than the critical value of 12.59. To determine whether Model A+B provided greater explanation of the variability in responses, further testing was required.

The following calculation indicated that the additional explanation of variability of Model B (user effect) was not improved by adding the display variable. The difference in the degrees of freedom between Model B and Model A+B was 3 (9-6). The difference in the likelihood ratios between the models was 6.25 (10.62-4.37) which was compared to a

critical value of 7.815. As the likelihood ratio was less than the critical value no greater explanatory powers were attributable to Model A+B. This means including the display variable did not significantly improve Model B.

The purpose of the '**economic decision**' was to determine, given the environmental event described, whether respondents wished to reduce their holding, increased their holding or took no action (see Appendix 1). Determining the significance of the relationships described by a comparison of the means was needed in order to be able to evaluate the usefulness of the display and user variables as they related to an economic decision. For this purpose, once again, the three models used above for explaining the variability within and between groups were used.

Table 5: Logit Analysis of the Economic Decision

Model	Likelihood Ratio	DF	Critical Value
A	19.62	8	15.51
B	10.87	9	16.92
A + B	7.70	6	12.59

Both Model B (the user effect) and Model A+B (the display and user effect) had explanatory power as their likelihood ratios, 10.87 and 7.70 respectively, were less than the relevant critical values of 16.92 and 12.59 respectively. To determine which model explained more of the variability in the 'economic decision' variable, the difference between the likelihood ratios and the critical values required further evaluation.

The degrees of freedom between Model B and Model A+B were 3 (9-6). This had a critical value of 7.815. The difference between the likelihood ratios was 3.17 (10.87 – 7.70). This was less than the critical value. In this case the critical value was greater than the likelihood ratio and Model B explained more of the variability in the 'economic decision' variable and, therefore, was the preferred model. This means including the display variable did not significantly improve Model B. Whilst display was important in determining the circumstances of the event, such as significance and attitude towards a company's action, display did not directly affect environmental or economic decisions. Similar tests to those described above were conducted using only those respondents who deemed the event to be significant. The results of these tests, as in the environmental decision, served only to strengthen the conclusion that Model B had greater explanatory power.

There is a clear indication from the Logit analysis that questions regarding 'event significance' and the 'perceptions of the company's action,' are affected by the display format used and the user group. The environmental and economic decision questions are not affected by display but rather by association to a particular user group. It can be concluded that all groups use the narrative display more effectively than the other formats. This may suggest that displaying environmental events in narrative format provides users with a report that is more understandable and useful.

Display Sufficiency

The eight variables that form the display multiple-item measure exhibit a degree of validity. The dimensions (individual multiple-item measures) refer to display and format effectiveness and are listed below (see Appendix 1).

a.   Causal relationships can be established;
b.   Comparative data relationships can be established;
c.   Consistency in reporting from period to period;
d.   The data provided are complete;
e.   Further information is required;
f.   The data provided are adequate for decision purposes;
g.   The display is clear; and,
h.   The display is concise.

Cronbach's alpha for the 8 items was .78. By excluding 'e', (further information is required) and 'h', (the display is concise) the reliability of the scale measuring display sufficiency can be improved to .87. This particular statistic indicates a high level of scale reliability supporting the validity of the multiple item measure.

A one-way analysis of variance (ANOVA) was performed to determine if there were any differences between the user groups. The results indicated that a significant difference did exist. A post hoc test was then calculated to determine which user group/s was different. The means for the shareholder/environmentalists and environmentalists (refer Table 6) were negative indicating dissatisfaction with the sufficiency of the display. The shareholder's mean was – 0.714 and, whilst negative, was quite close to zero, considering the range. This result indicates neither satisfaction nor dissatisfaction but rather ambivalence to the sufficiency of the display.

Table 6: Post Hoc Analysis of Display Utility and User Group

	Shareholders	Shareholder/ Environmentalists	Environmentalists
N	227	215	348
Mean	-0.714	-4.321	-4.009
Significance between groups:			
Shareholders	/	0.000	0.000
Shareholder/Environmentalists	0.000	/	0.915
Environmentalists	0.000	0.915	/

The difference between groups was accentuated by the shareholder mean (-0.714) and the other two group's means (shareholder/environmentalists (-4.321) and environmentalists (-4.009). The shareholders were compared to the other two groups and as $p < 0.05$ there was a significant difference. As the $p > 0.05$ in respect of shareholder/environmentalists (0.915) and environmentalists (0.915) there was no significant difference between these groups in relation to sufficiency of the display.

The results concerning the sufficiency of the vignette display are interesting given that the vignette and display variations represent, in terms of significance, an average environmental disclosure (Milne and Chan 1999). Those groups with an environmental interest would like to see a better disclosure whilst shareholders, although having a negative mean, appear to have no particularly strong opinion as to the sufficiency of the display. It can be concluded that the sufficiency of the vignette display for shareholder/ environmentalists and environmentalists is inadequate.

Summary and Conclusions

The aim of this study was to determine the utility and sufficiency of environmental information displayed in monetary, statistical, narrative and pictorial format to shareholders, shareholder / environmentalist and environmentalists. There is little research that compares the utility and sufficiency of alternative display formats in the context of environmental reporting and as such this paper contributes research in this area. The literature is intermittent and includes descriptive content analyses, research on narrative disclosures (Milne and Chan 1999) and exploratory work on the sufficiency of environmental disclosures (Tilt 1994; Beattie et al., 2002). The multi-method research approach developed in this study to evaluate format usefulness and the development of a sufficiency scale, provides an effective method to undertake further studies.

Using Logit analysis to determine usefulness, it can be concluded that all groups use the narrative display more effectively than the other formats. This is an indication that environmental events would be better understood if in narrative format. The Logit analysis indicates that display does affect the circumstantial detail such as event significance and attitude towards a company's action but may not directly affect decision-making. The results concerning the sufficiency of the vignette display are interesting given that the vignette and display variations represent, in terms of size, an average environmental disclosure. Environmentalist and shareholder/environmentalist groups would like to see disclosure of environmental information more useful for decision making. The shareholder group, although having a negative mean, appear to have no particularly strong opinion as to the sufficiency of the display. This study concludes that the sufficiency of the vignette display for shareholder/environmentalists and environmentalists is inadequate.

The implication of the findings of this study for entity report preparers and regulators is to consider the way in which environmental information is displayed for users. As accounting concerns communicating information, the effectiveness of communications should be an imperative. The law fraternity has investigated 'plain English' reports to improve the understandability of documents produced and perhaps it is time that accountants also consider how the communication of information contained in entity reports can be improved.

Whilst every effort has been made in this study to address possible limitations, comparing four different display methods with differing degrees of specificity places constraints on the conclusions that can be reached. The chosen formats, whilst representative of those

found in entity disclosures, are not exclusive and combinations and variations in format are quite common. The results are limited by the specific nature of the vignette event (environmental degradation). Another aspect of the vignette is that it represents an in-isolation event. Further studies may wish to pursue a string of events of varying significance which may better reflect the decision process of users. The differences contained within the vignette and the display alternatives may cause some statistical 'noise' with regard to the results. However, the above limiting factors serve as a useful starting point for further research. Countermanding the above limitations is the sample size of 876 respondents providing large numbers across each category of the analysis matrix. Another strength in this study is the inclusion of an identifiable environmental user group established on the basis of commitment.

References

Adelberg, A. (1979). A Methodology for Measuring the Understandability of Financial Report Messages, *Journal of Accounting Research*, 17, 2: 565-592.

Anderson, R. (1979)**.** The Usefulness of Annual Reports, in Communication via Annual Reports, AFM Exploratory Series No. 11, Courtis, J. (ed.): 61-85.

Beattie, V. and Jones, M. (1992)**.** The Use and Abuse of Graphs in Annual Reports: Theoretical Framework and Empirical Study, *Accounting and Business Research*, 22: 291-303.

Beattie, V. and Jones, M. (1997).A Comparative Study of the Use of Financial Graphs in the Corporate Annual Reports of Major US and UK Companies, *Journal of International Financial Management and Accounting*, 8, 1: 33-68.

Beattie, V., McInnes, B. and Fearnley, S. (2002)**.** *Through the Eyes of Management: A study of Narrative Disclosures,* ICAEW, London.

Burritt, R. (1996). Corporate Environmental Performance Indicators: Cost Allocation Boon or Bane? Paper presented at the Australian Academy of Science, Fenner Conference on the Environment, Sydney.

Chernoff, H. and Rizvi, M. (1975). Effect of Classification Error on Random Permutations of Features in Representing Multivariate Data by Faces, *Journal of the American Statistical Association,* 70: 548-54.

Clarkson, M. B. E. (1995). A Stakeholder Framework for Analyzing and Evaluating Corporate Social Performance, *Academy of Management Review*, 20, 1: 92-118.

Dierkes, M. and Antal, A. (1985). The Usefulness and Use of Social Reporting Information, *Accounting, Organizations and Society*, 10, 1: 29-34.

Eco, U. (1997). The Search for the Perfect Language, Fontana Press, London.

Faux, J. (2002). Users of Environmental Financial Information and Aspects of Company Reporting, *Interdisciplinary Environmental Review*, 4, 2: 89-98.

Gibson, K. and O'Donovan, G. (1994). Green Accounting in Australia: Myth or Reality? Paper presented at the Accounting Association of Australia and New Zealand Annual Conference, Wollongong.

Gibson, K. and O'Donovan, G. (2000). Environmental Disclosures in Australia: A Longitudinal Study, RMIT University, School of Accounting and Law Seminar Series, Melbourne.

Gray, R., Kouhy, R. and Lavers, S. (1995). Methodological Themes: Constructing a Research Database of Social and Environmental Reporting by UK Companies, *Accounting, Auditing and Accountability Journal*, 8, 2: 78-101.

Guthrie, J. (1982). *Social Accounting in Australia*: *Social Responsibility Disclosures in the Top 150 Listed Australian Companies, 1980 Annual Reports*, M. Acc. thesis, Western Australia Institute of Technology, Perth.

Guthrie, J. and Parker, L. (1990). Corporate Social Disclosure Practice: A Comparative International Analysis, *Advances in Public Interest Accounting*, 3: 159-175.

Hess, D. (2007). Social Reporting and New Governance Regulation: The Prospects of Achieving Corporate Accountability through Transparency, *Business Ethics Quarterly*, 17, 3: 453-476.

Krippendorff, K. (2004). *Content Analysis*: *An Introduction to its Methodology*, 2nd. Ed., Sage Publications, London.

Libby, R. (1981). Accounting and Human Information Processing: Theory and Applications, Prentice Hall, Englewood Cliffs.

Mather, P., Ramsay, A. and Serry, A. (1996). The Use and Representational Faithfulness of Graphs in Annual Reports: Australian Evidence, *Australian Accounting Review*, 6: 56-63.

McBride, P. (1997). Beyond the Numbers: Reporting Non-Financial Information, *Australian Accountant*, 67, 8: 20-21.

Milne, M. and Adler, R. (1999). Exploring the Reliability of Social and Environmental Disclosures Content Analysis, *Accounting, Auditing and Accountability Journal*, 12, 2: 237-256.

Milne, M. and Chan, C. (1999). Narrative Corporate Social Disclosures: How Much of a Difference do They Make to Investment Decision-Making, *British Accounting Review*, 31: 439-457.

Moriarity, S. and Barron, F. (1979). A Judgement-Based Definition of Materiality, *Journal of Accounting Research*, 17: 114-136.

Neu, D. (1991). Trust, Impression Management and the Auditing Profession, *Critical Perspectives on Accounting*, 295-313.

O'Donovan, G. (2002). Environmental Disclosures in the Annual Report: Extending the Applicability and Predictive Power of Legitimacy Theory, *Accounting, Auditing & Accountability Journal*, 15, 3: 344-372.

O'Dwyer, B., Unerman, J. and Hession, E. (2005). User Needs in Sustainability Reporting: Perspectives of Stakeholders in Ireland, *European Accounting Review*, 14, 4: 759-787.

Smith, J. and Smith, N. (1971). Readability: A Measure of the Performance of the Communication Function of Financial Reporting, *The Accounting Review*, 197: 552-561.

Tilt, C. A. (1994). The Influence of External Pressure Groups on Corporate Social Disclosure: Some Empirical Evidence, *Accounting, Auditing and Accountability Journal*, 7, 4: 47-72.

Trotman, K. (1979). Social Responsibility Disclosures by Australian Companies, *The Chartered Accountant in Australia*, Mar: 24-28.

Zikmund, W. G. (1994). Business Research Methods, Int. Edn, The Dryden Press, Florida.

Appendix 1   Abridged Multi-Method Research Instrument

Please read the following and answer the questions that follow.

An Australian retail petroleum company, listed on the Australian Stock Exchange, is confronted with a situation whereby a significant number of its inner city petrol stations are showing signs of deterioration. The sites have been held for many years. Last year the company reported that it had assessed the polluted sites and placed them in three categories; low, medium and high pollution. During the current year the 'low' and 'medium' polluted sites have been sold off at a loss, and clean up has been started on the 'high' polluted sites. Reclamation will take 8 years. Petrol stations have been relocated in order to allow reclamation to begin and to avoid loss of sales. The company makes the following voluntary disclosure in its annual report for the current year.

Environmental Report

(One of the following four 'environmental reports' would be included)

Environmental Report

	$'000
Sales	1,000,000
Expenses Associated with Site Deterioration	
Loss on Sale of Retail Outlets	52,000
Amortisation of Reclamation Expense ($8,000 incurred)	1,000

Environmental Report

Hectares	
Hectares Held as Retail Petrol Sites	1000
Hectares Polluted	60
Degree of Pollution	% of Hectares Polluted
High (Hydrocarbons: Greater than 1000 mgs per kg.)	35
Medium (Hydrocarbons: 500 - 999 mgs per kg.)	40
Low (Hydrocarbons: Less than 499 mgs, per kg.)	25

Environmental Report
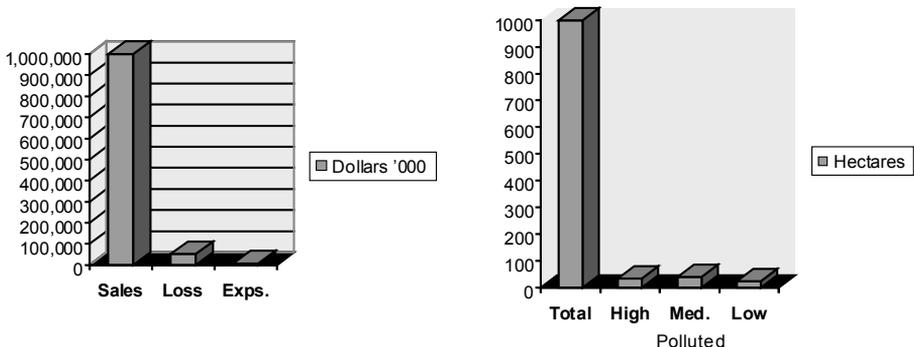
Environmental Report

The company is undertaking a clean-up of polluted retail sites which represent 60 hectares of the total retail outlet hectares of 1,000. 21 hectares have been determined highly polluted and reclamation is costing $8,000,000. Medium and low polluted sites have been sold. The transactions resulted in a loss of $52,000,000.

1. Do you consider the event described above to be significant.

    Yes   No

2. Do you believe the company's actions are:

    Positive   Negative   No Opinion

3. Assuming you did not hold shares in the petroleum company, on the basis of the environmental report, would you:

    Contact the company
    Contact a government agency
    Contact a Member of Parliament
    Contact an environmental group
    Contact a newspaper
    No action warranted
    Take other action (*indicate*) ....

4. Assuming you held shares in the petroleum company, on the basis of the environmental report, would you:

    Reduce your holding
    Increase your holding
    Take no action

The following questions represent different dimensions of <u>display usefulness</u> and require you to mark in the boxes provided whether you agree (+), disagree (-) or have no opinion (0). The intensity with which you agree or disagree can be indicated on the scale 1 to 3.

5. The format of the 'environmental report' allows for the following:

a. Causal relationships can be established		b. Comparative data relationships can be established	
	+3		+3
	+2		+2
	+1		+1
	0		0
	-1		-1
	-2		-2
	-3		-3

c. Consistency in reporting from period to period		d. The data provided are complete	
	+3		+3
	+2		+2
	+1		+1
	0		0
	-1		-1
	-2		-2
	-3		-3

e. Further information is required		f. The data provided are adequate for decision purposes	
	+3		+3
	+2		+2
	+1		+1
	0		0
	-1		-1
	-2		-2
	-3		-3

g. The display is clear		h. The display is concise	
	+3		+3
	+2		+2
	+1		+1
	0		0
	-1		-1
	-2		-2
	-3		-3