

**ENHANCEMENT AND OBFUSCATION THROUGH THE USE OF GRAPHS IN
SUSTAINABILITY REPORTS: AN INTERNATIONAL COMPARISON**

Charles H. Cho
Associate Professor
ESSEC Business School
Avenue Bernard Hirsch
BP 50105
95021 Cergy Pontoise Cedex
France
E-mail: cho@essec.edu

Giovanna Michelin
Department of Economics and Management
University of Padova
Via del Santo 33
35123 Padova, Italy
E-mail: giovanna.michelon@unipd.it

Dennis M. Patten
Department of Accounting - 5520
College of Business
Illinois State University
Normal, IL 61761-5520, USA
E-mail: dmpatte@ilstu.edu

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ABSTRACT

Purpose – In this study we investigate the use of graphs in corporate sustainability reports and attempt to determine, first, whether the use of graphs appears to be associated with attempts at impression management, and second, whether differences across three levels of reporting regulatory structure (Leuz, Nanda and Wysocki, 2003) are associated with differences in the level of impression management.

Design/methodology/approach - Based on a sample of 120 sustainability reports issued by firms from six different countries, we empirically test for differences in presentation of favorable as opposed to unfavorable items (enhancement) and for differences in the direction of materially distorted graphs (obfuscation).

Findings - For the overall sample we find substantial evidence of both enhancement and obfuscation in the graph displays. We also find more limited evidence that impression management differs across companies facing different regulatory structures.

Research limitations/implications – We investigate graph use for only one year’s reports and for a sample of large companies from only six different countries. Further, our enhancement findings are not evidence that the companies are necessarily providing misleading information. However, our results show that the way information is being provided in corporate sustainability reports appears to be manipulated by the firms to enhance a positive image and to obfuscate negative trends. The reports may thus be less about increasing corporate accountability across the social and environmental domains than about managing impressions. Hence, it may be beneficial for advocate organizations such as the Global Reporting Initiative to provide additional guidance on “how” information gets portrayed in sustainability reports.

Originality/value – Our study expands prior research into corporate manipulation of graphs to the domain of sustainability reporting and adds further evidence that the reporting needs to be carefully assessed.

Keywords – sustainability reporting, graph usage, impression management.

Paper type – Research paper.

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Introduction

Corporate issuance of stand-alone social responsibility reports, often referred to as sustainability reports, has grown dramatically over the past decade. And while such reporting offers opportunities for increased corporate accountability and transparency, it also has been criticized as being little more than corporate propagandizing (see, e.g., Aras and Crowther, 2009; Hopwood, 2009; Milne and Gray, 2007). Accordingly, in this study we examine whether one tool of information provision – the presentation of graphs – is being used in these reports as tools of impression management. Borrowing from the social psychology literature, Merkl-Davies, Brennan, and McLeay (2011) argue impression management construction can be accomplished either by emphasizing positive organizational outcomes (enhancement) or by obfuscating negative organizational performance (obfuscation). Because this classification appears to fit well with evidence on the corporate use of graphs in financial reports as tools of impression management (see, e.g., Beattie and Jones, 1992; 1997; 1999; 2000a; 2000b; 2002; Courtis, 1997; Godfrey, Mather, and Ramsay, 2003; Mather, Ramsay, and Steen, 2000; Muino and Trombetta, 2009; Steinbart, 1989), we investigate in this study, whether the strategies appear to be used as well in the presentation of graphs in stand-alone sustainability reports.¹

In addition to examining for evidence of enhancement and obfuscation in the use of graphs in sustainability reports, we also test for differences in their use across

¹ Authors in the graph literature typically refer to the choice to graph items with a positive trend as selectivity bias, while misrepresentation in underlying trends through incorrectly depicted graphs is called distortion bias. Because our focus is on the potential use of graphs in sustainability reports as tools of impression management, we use Merkl-Davies et al.'s (2011) terminology.

countries. Merkl-Davies et al. (2011) also argue that differences in the way managers perceive their accountability to shareholders and other stakeholders are expected to be related to differences in impression motivation, and thus also the use of impression management techniques. We proxy for differences in managerial perceptions of accountability using Leuz, Nanda, and Wysocki's (2003) three levels of reporting regulatory structure and examine for differences in the use of graphs in sustainability reports as tools of impression management by companies from countries across the three levels.

Based on a review of stand-alone sustainability reports issued by corporations from the United Kingdom and the United States (Cluster 1 companies), France and Germany (Cluster 2 companies), and Italy and Spain (Cluster 3 companies), we find first, considerable evidence of both enhancement and obfuscation in the use of graphs. More than 70 percent of the graphs included the standalone reports depict items with a favorable underlying trend. Similarly, for those graphs constructed with material distortion (based on the relative graph discrepancy index) more than 60 percent are biased in a direction that is favorable to the company (overemphasizing positive trends or underemphasizing negative ones). We also find more limited evidence of differences in enhancement and obfuscation across reporting regulatory structures. The difference in average number of graphs per company depicting favorable as opposed to unfavorable trends is statistically lower for the Cluster 1 firms than for companies from either Cluster 2 or Cluster 3 countries. We also find that the percentage of graphs constructed with material distortion increases across the three clusters (Cluster 1 companies have the lowest percentage of materially distorted graphs in their standalone sustainability reports

whereas Cluster 3 firms have the highest percentage). However, whereas the difference in the average number of materially distorted graphs per company with a favorable as opposed to an unfavorable bias is lower for Cluster 1 firms relative to the other two cluster companies, the mean difference (favorable minus unfavorable) is not statistically significant for the comparison between the Cluster 1 and Cluster 3 samples. Further, neither enhancement nor obfuscation strategies differs significantly across the Cluster 2 and Cluster 3 company graphs.

Overall, our results support claims by critics of voluntary sustainability reporting that the practice may be more about public relations than about increasing the transparency and accountability of corporations with respect to their sustainability performance. As such, our findings suggest that arguments calling for greater regulation and guidance in the use of graphs in financial reports (see, e.g., Beattie and Jones, 2008) are equally relevant with respect to graph usage in sustainability reporting. We begin with background on our topic.

Background and Justification for the Study

Impression Management in the Use of Graphs

Impression management in corporate reporting, according to Merkl-Davies et al. (2011, p. 318), “entails managers opportunistically taking advantage of information asymmetries” to bias readers’ perceptions of firm performance. These authors, borrowing from the social psychology literature (e.g., Leary and Kowalski, 1990; Leary, Tchividjian, and Kraxberger, 1994), differentiate impression management construction along two distinct patterns. They note (p. 318) that impression management can be accomplished either by emphasizing positive organizational outcomes (enhancement) or

by obfuscating negative organizational performance (obfuscation). Merkl-Davies et al. (2011) further note that enhancement entails the presentation of an accurate, but favorable, depiction of corporate activities, whereas obfuscation involves presenting images that are not accurate (Leary et al., 1994). This classification appears to fit well with prior evidence on the corporate use of graphs in financial reports as tools of impression management (e.g., Beattie and Jones, 1992; 1997; 1999; 2000a; 2000b; 2002; Courtis, 1997; Godfrey, Mather, and Ramsay, 2003; Mather, Ramsay, and Steen, 2000; Muino and Trombetta, 2009; Steinbart, 1989).

Muino and Trombetta (2009) note that one of the major findings of the financial report graph research is that the choice to include graphs in corporate reports and the choice of what variables get graphed appear to be associated with positive performance. Beattie and Jones (2000a), for example, report a significant positive relation between one-year changes in financial performance variables and the changes in the inclusion of graphs of those items. Thus the choice of what to highlight via graphical presentation appears to be related to the emphasis of positive performance (enhancement).

Prior research into graph use in corporate financial reports also provides evidence of attempts at obfuscation. The ‘obfuscation hypothesis’ suggests managers have an incentive to obfuscate failures and underscore successes (Adelberg, 1979). As explored by, for example, Courtis (1995), it suggests a lack of neutrality in how management presents information and a preference to communicate in a manner that conceals bad news using rhetorical devices. However, in addition to rhetorical manipulation, Merkl-Davies and Brennan (2007) argue that manipulation can also be visual and structural, which can be illustrated by the use of graphs. Using graphs to present information and

data is powerful because they give a “more direct and immediate” (Beattie and Jones 2000a, 216) view of the data and are easier to remember (Beattie and Jones, 1992). As noted by Muino and Trombetta (2009), the financial graph literature documents the existence of a substantial number of graphs that are materially distorted. To illustrate, Steinbart (1989), Beattie and Jones (1992), and Beattie and Jones (1999) all find that approximately 25 percent of the financial item graphs in their respective samples exhibited distortion at or above the 10 percent level.² Perhaps more troubling, prior studies also show that where distortion occurs, it is much more likely to portray the company favorably (either overstatement of a positive trend or understatement of a negative trend) as opposed to unfavorably. Thus, these findings suggest that managers appear to manipulate the presentations in order to obfuscate the underlying performance.

The evidence of enhancement and obfuscation strategies regarding the use of graphs summarized above suggests that corporations appear to be using graphs in their financial reports as tools of impression management. Our interest, however, lies not in the use (and potential misuse) of graphs in financial reports, but instead, with the question of whether managers also manipulate the use of graphs in a separate medium of corporate disclosure, stand-alone sustainability reports.

Stand-Alone Sustainability Reporting

As noted by Adams and Narayarnan (2007), Ballou, Heitger, and Landes (2006), and Erusalimsky, Gray and Spence (2006), among others, corporate sustainability reporting has grown dramatically over the past decade. Indeed, KPMG International

² Steinbart (1989), Beattie and Jones (1992), and Beattie and Jones (1999) all measure distortion using the graph discrepancy index developed by Tufte (1983). Interestingly, Tufte (1983) suggests that GDI measures above or below 5% should be classified as materially distorted. However, because Steinbart (1989) only reports GDI scores at 10% or more, we use that same level of distortion from the data presented by Beattie and Jones (1992; 1999) for this comparative discussion.

reported that by 2008 nearly 80 percent of the Global 250 companies were issuing such reports (KPMG International, 2008, p. 13). Often based on what Elkington (1997) refers to as triple bottom line reporting,³ these documents typically provide information on the issuing entity's social and environmental activities in addition to financial performance data.

The rise in stand-alone sustainability reporting has led to a debate in the academic literature over its potential for increasing organizational accountability versus its capture as just another tool for corporate public relations. With respect to the former, Unerman, Bebbington, and O'Dwyer (2007, p. 3) argue that "broader techniques of sustainability accounting and accountability" can be powerful tools for addressing the impacts of firms' social and environmental actions. As noted by Dingwerth and Eichinger (2010, p. 74):

The use of disclosed information is expected to enable stakeholders to make informed decisions, confront disclosers through shareholder motions or collectively organize against them if deemed necessary. In short, transparency is expected to become a tool for holding powerful actors accountable.

In contrast, others argue that the reporting may instead be used as a tool for corporate legitimization. Hopwood (2009, p. 437), for example, notes that corporations may use the reporting to provide "a new face to the outside world while protecting the inner workings of the organization from external view." To the extent that such practices work, he notes that fewer questions may be asked of the organization, and thus, less is really known. Our concern is that, just as corporations appear to use graphs in financial reports as tools of impression management relative to financial performance, they may be

³ Milne and Gray (2007) note that, although these reports are often referred to as sustainability reports, it is highly questionable whether even the best of the triple bottom line reports really reflect the concept of sustainability. Aras and Crowther (2009), Moneva, Archel, and Correa (2006), and Gray (2010), among others, raise identify similar concerns with corporate reporting. This vein of criticism is beyond the scope of our investigation.

using graphs in their sustainability reports to project a more favorable image of not only their financial performance, but of their social and environmental performance as well. As such, exploring the use of graphs in the reports can shed light on whether the disclosures are about increased transparency and accountability or more about corporate image manipulation.

Accordingly, the first intent of our investigation is to examine whether graphs used in corporate sustainability reports appear to be used as tools of impression management. More specifically, we attempt to determine the degree to which companies appear to be adopting strategies of enhancement (the inclusion of more graphs of items with a favorable underlying trend), and obfuscation (the degree to which graphs included in the reports suffer from material distortion, and whether, where it exists, this distortion portrays a more favorable representation of the underlying data being graphed).

Differences across Countries

In addition to identifying the existence of impression management in the use of graphs in corporate sustainability reports, we also examine whether it varies across countries. Merkl-Davies et al. (2011) note that, from the social psychology perspective, impression management consists of not only impression construction, but also of impression motivation. Because the act of impression management is “embedded in, and dependent on, social relations” the social “presence” of others is an essential part of the process (Merkl-Davies et al., 2011, p. 319). More specifically within the corporate reporting context, Merkl-Davies et al. (2011) argue that the accountability relationship between management and its stakeholders is expected to influence the level of impression motivation and thus the use of impression management. We posit that where managers

perceive greater accountability for their actions, the motivation for impression management will be reduced. We further argue that differences in institutional characteristics likely lead to differences in those managerial perceptions, and as such, the use of graphs as tools of impression management will likely vary across companies from countries with differing institutional characteristics.

Several recent studies attempt to differentiate aspects of impression management, sustainability reporting, or financial manipulation (a form of impression management) across countries grouped on various institutional characteristics. Beattie and Jones (2000), for example, rely on Nobes' (1983) classification of international accounting systems into micro-Anglo Saxon practices and macro-continental accounting practices, and attempt to determine whether bias in the use of financial graphs differs across the groupings. Simnett, Vanstraelen and Chua (2009) also use a dichotomous country classification scheme to test for differences in sustainability report assurance practices. However, Simnett et al. classify the countries as either stakeholder-oriented or shareholder-oriented based on whether they are a common law or a code law country.⁴

While both Beattie and Jones (2000) and Simnett et al. (2009) use a dichotomous country classification scheme, we believe a binary classification does not proxy for differences in managerial perceptions of accountability, the factor assumed to influence use of impression management methods, as well as Leuz et al.'s (2003) cluster analysis based on the reporting regulatory structure of the country. The latter's scheme takes into consideration the interdependencies between corporate reporting regulation and other elements of the institutional infrastructure that are likely designed to fit and reinforce

⁴ Simnett et al. (2009) follow Ball, Kothari, and Robin's (2000) argument that companies from common law countries have a more shareholder-oriented governance model.

each other (Leuz, 2010). In particular, Leuz et al. (2003) consider numerous institutional factors including legal origin, tradition, and enforcement, the level of investor rights, the importance of equity markets, ownership concentration, and the level of disclosure requirements. We believe the focus on a broader set of institutional parameters better captures the level of perceived accountability in each country. And while Leuz et al.'s (2003) classification scheme is designed relative to financial reporting, we believe the differences in perceived accountability would also be expected to influence managerial actions with respect to other public disclosure. We believe this to be particularly true where that disclosure is at least partially targeted at market participants, as is argued (Clarkson, Li, Richardson and Vasvari, 2008; Dhaliwal, Li, Tsang, and Yang, 2011; Guidry and Patten, 2010) for standalone sustainability report issuance.

Based on the underlying legal and institutional characteristics of the countries, Leuz et al. (2003, p. 507) identify three distinct country clusters. These are:

- (1) Outsider economies with large stock markets, dispersed ownership, strong investor rights, and strong legal enforcement;
- (2) insider economies with less-developed stock markets, concentrated ownership, weak investor rights, but strong legal enforcement; and
- (3) insider economies with weak legal enforcement.

Leuz et al. (2003) provide evidence that earnings management occurs least in their sample of firms from Cluster 1 countries and most for Cluster 3 companies. They note (p. 506) that their definition of earnings management is “the alteration of firms’ reported economic performance by insiders to either mislead some stakeholders or to influence contractual outcomes.” This is, we argue, another form of impression management, and as such, we posit that where managers perceive greater accountability for their actions,

the motivation for impression management will be reduced. Thus, weaker regulatory reporting structures, as captured by Leuz et al.'s clustering, might also be expected to be associated with managerial perceptions of reduced accountability. Accordingly, we expect companies from Cluster 1 countries (Cluster 3 countries) to exhibit the lowest (highest) incidence of enhancement and obfuscation in their use of graphs in sustainability reports.

Methods and Results

Sample

Our sample consists of 120 companies representing the 20 largest publicly traded firms from six different countries (in terms of market capitalization as of 31.12.2006) for which a 2006 stand-alone sustainability report was available for review. The sustainability reports were downloaded as PDF files from the corporate websites. Our country choices were based on the Leuz et al. (2003) cluster analysis and consist of the U.K. and the U.S. (Cluster 1 sample), France and Germany (Cluster 2 sample), and Italy and Spain (Cluster 3 sample).⁵ A list of sample firms is available from the authors.

We reviewed each of the 120 sustainability reports and hand-collected data on graph usage. Because our measures of enhancement and obfuscation (discussed below) require trend data, we limited our analysis to graphs with multiple year observations ($n = 461$ for Cluster 1, 482 for Cluster 2, and 691 for Cluster 3). Table 1 provides summary

⁵ In non-tabulated tests, we examined for differences in our enhancement and obfuscation measures across countries within the clusters. Only one difference was statistically significant. U.K. company reports contained significantly more materially distorted graphs with a favorable bias than did the reports for the U.S. sample firms (significant at $p = .078$, two-tailed). However, the average for the U.K. firms was not higher than the average for the sample companies from any of the cluster 2 or cluster 3 countries. Further, the means of the difference in materially distorted graphs with favorable versus unfavorable bias (favorable minus unfavorable) was not statistically significant. Thus, the results we report appear to be driven by differences across the clusters rather than being due to individual country effects.

information on the types of items graphed across both area (social versus environmental versus financial) and Cluster.

----- Table 1 about here -----

Impression Management - Enhancement

The primary intent of our investigation is to determine whether, consistent with findings from the research into graph usage in financial reports, companies appear to use the graphs as tools of impression management. Our proxy for enhancement is the selectivity of items graphed. As noted by Mather et al. (2000, p. 71), “selectivity is concerned with whether the choice to graph a variable is related to . . . performance,” and thus captures the attribute of impression management referred to by Merkl-Davies et al. (2011) as enhancement. Similar to Beattie and Jones (1992), we measure selectivity by examining the trend in the underlying data for the last two observations and test whether a significantly greater proportion of the items graphed portray an item whose underlying trend is in a favorable direction. It is important to note that changes in a given measure over time can be either favorable or unfavorable depending on the nature of the item being graphed. For example, increases in the percentage of management positions held by minority classes or the amount of material recycled would be classified as a favorable trend, but increases in the amount of greenhouse gas emissions would be considered unfavorable. Similarly, decreases in energy usage would be a favorable trend whereas decreases in charitable spending would be classified as unfavorable.

As reported in Table 2, there is clear evidence of favorable bias in the choice of items graphed across the overall sample (Panel A). Just over 70 percent of the graphs included in the sustainability reports (1,152 out of 1634) depict items with a favorable

trend. Assuming an equal likelihood of favorable or unfavorable trends, the binomial probability of such a proportion is statistically significant (at $p < .001$, two-tailed). Thus, similar to the use of graphs in financial reports, companies appear to use the depictions to enhance the positive attributes of their sustainability performance.

Panel B of Table 2 identifies the average number of graphs per company with favorable trends, the average number with unfavorable (or flat) trends, and the difference across favorable and unfavorable trends, on average, broken down by clusters. As highlighted in the table, while companies from all three clusters have, on average, more graphs depicting favorable trends than unfavorable trends, the mean difference (favorable less unfavorable) is smaller for Cluster 1 companies than for Cluster 2 and Cluster 3 firms. Cluster 1 companies, on average, include 3.98 more graphs with favorable trends than unfavorable ones, whereas the Cluster 2 and Cluster 3 firms show a difference of 6.30 and 7.30 graphs per company, respectively. Based on a t -test of means, the differences are statistically significant for Cluster 1 firms versus both Cluster 2 companies (at $p < .10$, one-tailed) and Cluster 3 firms (at $p < .05$, one-tailed). However, the difference in means across Cluster 2 and Cluster 3 companies is not statistically significant.

Overall, we find considerable evidence of an enhancement strategy in the choice of items graphed in the sample company sustainability reports. Our evidence also provides at least some support for our expectation that the degree of enhancement will be more prevalent moving from Cluster 1 to Cluster 3 companies, although the differences are limited to only Cluster 1 firms in comparison to the firms from the other clusters.

----- Table 2 about here -----

Impression Management - Obfuscation

The next stage of our analysis focuses on the incidence of obfuscation. We measure the degree of obfuscation by identifying the degree of graph distortion and whether, where it exists, the distortion appears also to be used as a tool of impression management. The fundamental principle of graph design is that the representation of numbers, as physically measured on the surface of the graph itself, should be directly proportional to the numerical values of the variables being presented (Tufte, 1983, p. 56). Violations of this principle are defined as measurement distortion. We measure graph distortion using the relative graph discrepancy (RGD) index. Mather, Mather and Ramsay (2005) developed this metric to overcome severe limitations inherent in the use of the graph discrepancy index (GDI) employed in most of the prior studies of graph distortion (e.g., Beattie and Jones, 1992; 1997; 1999; 2000a; 2000b; 2002; Curtis, 1997).⁶ Mather et al. (2005) define RGD as:

$$RGD = \left(\frac{g_2 - g_3}{g_3} \right)$$

where g_2 is the height of the last column in the graph and g_3 is the correct height of the last column if plotted accurately, i.e.,

$$g_3 = \frac{g_1}{d_1} * d_2,$$

where

g_1 = height of first column (graph);

⁶ See Mather et al. (2005) for a discussion of the limitations of the GDI measure.

d_1 = value of first data point (corresponding to the first column);

d_2 = value of last data point (corresponding to last column)

Following Mather et al. (2005) and Muino and Trombetta (2009), we choose a cut-off point of 2.5 percent as our threshold for classifying graphs as being materially distorted.⁷ In order to determine whether the materially distorted graphs are used as tools of impression management, we classify them as “favorable” or “unfavorable” distortions. Similar to the classification of selectivity discussed above, favorable distortion occurs when the trend of a good item (e.g., increases in the amount of materials recycled) is graphically overstated or the trend of a bad item (e.g., increases in toxics released to the air) is graphically understated. When the opposite occurs, the distortion is classified as unfavorable.

Figure 1 shows an example of how a materially distorted graph can convey an inaccurate message about the underlying data. Panel A depicts the decreasing trend in carbon dioxide emissions as it was shown in the sustainability report of one of our sample companies.⁸ When compared to the correspondent undistorted graph (Panel B), it is clear that the distortion bias portrays a more favorable view of corporate environmental performance by making the decrease in carbon dioxide emissions appear more dramatic.

----- Figure 1 about here -----

Panel A of Table 3 shows the incidence of favorable versus unfavorable distortion across all graphs for the overall sample.⁹ Based on a binomial probability test, the

⁷ Mather et al. (2005) suggest that a 2.5 percent RGD approximates a 5 percent GDI distortion, the level Tufte (1983) recommends as a materiality threshold.

⁸ For permission reasons, we changed all values and re-drew the graphs ourselves. The trends and distortions depicted are essentially identical to those in the original.

⁹ Six graphs are eliminated from the distortion analysis because the numerator value for the RGD calculation was zero.

evidence indicates a significantly (at $p < 0.001$) higher proportion of favorably distorted graphs. However, a review of Panels B and C of Table 3 shows that the favorable bias overall is being driven by bias in the depiction of the materially distorted graphs only. Whereas just over 60 percent of the graphs with material distortion depict the distortion in a way that is favorable to the firm (overstating positive trends or understating negative ones), the non-materially distorted graphs are almost equally likely to be either favorable or unfavorable. This indicates that where graphs are materially distorted in their presentation, it is significantly more likely to present an image that suggests more favorable trends in performance than the data actually represents. We interpret this as evidence of obfuscation.

----- Table 3 about here -----

In Table 4 we focus on the use of materially distorted graphs across clusters. As highlighted in the table (Panel A), the proportion of graphs with material distortion increases significantly (at $p < .001$) as we move from Cluster 1 to Cluster 3 (based on a Chi-square test for differences in proportion). Whereas only 24.6 percent of the graphs included in Cluster 1 reports exhibit material distortion, 36.7 percent of the Cluster 2 graphs and 40.8 percent of the Cluster 3 graphs are materially distorted. This mirrors the incidence of earnings management across the clusters as reported by Leuz et al. (2003). Panel B shows the average number of materially distorted graphs per company with favorable bias, the average number with unfavorable bias, and the difference across the number of materially distorted graphs with favorable and unfavorable bias, on average, broken down by clusters. Similar to the incidence of enhancement discussed above, companies from all three clusters have, on average, more materially distorted graphs

depicting favorable bias than unfavorable bias. However, while the mean difference (favorable less unfavorable) is smaller for Cluster 1 companies than for either the Cluster 2 or the Cluster 3 firms, this difference is statistically significant (at $p < .05$, one-tailed) only for the comparison of Clusters 1 and 2. Thus, our expectation for differences in obfuscation in the use of graphs across companies from differing clusters is only partially supported.

----- Table 4 about here -----

Discussion

The last decade has seen rapid growth in the use of stand-alone reports for reporting on corporate social and environmental performance, and as noted by Unerman et al. (2007), there is certainly much potential benefit to be gained from quality sustainability accounting and accountability. Unfortunately, the evidence we present above suggests, at least in terms of graphical presentations, companies appear to be guilty of systematic manipulation designed to paint a more favorable picture of the firm. This is evidenced by the use of both enhancement and obfuscation impression management strategies. Companies across all three reporting regulatory structure clusters are far more likely to graph items showing favorable rather than unfavorable trends, and where material distortion in the graphs exists, considerably more often than not, the bias in design presents an image favorable to the firm. These findings thus add support to those critics who lament that, rather than providing a meaningful accounting of corporate impacts across the sustainability domain, standalone sustainability reporting appears to be more about projecting an image of positive performance.

We also find some evidence that differences in impression management in the use of the graphs appears to vary across regulatory reporting structures. Based on Leuz et al.'s (2003) classifications, we find companies in Cluster 2 and Cluster 3 report a significantly higher degree of selectivity bias, and that the favorable bias in the use of materially distorted graphs is significantly higher for the Cluster 2 firms than for Cluster 1 companies. In general, these results suggest that companies in less restrictive reporting regulatory environments appear to be more likely to engage in impression management in their use of graphs.

The systematic manipulation of graphical presentations is perhaps more troubling for disclosure in the social and environmental arenas than for similar distortion in financial reporting. While financial disclosure is mandatory and subject to substantial regulatory rules, sustainability reporting remains voluntary and non-regulated. This allows for potential abuse and biased reporting. Thus, just as Beattie et al. (2008, 218) argue relative to the need for standards in the use of graphs in financial reporting, our findings suggest that “users would benefit from preparers’ adherence to a set of graphical guidelines.” In addition to presenting guidance on what types of information might be provided in sustainability reports, therefore, advocate organizations such as the Global Reporting Initiative may need to provide guidance as well on “how” the information gets portrayed.

Like all studies, ours is not without limitations. Our findings with respect to selectivity should not be interpreted as evidence of misrepresentation, but only as evidence of enhancement – the choice to highlight the positive nature of performance. In order to test whether the enhancement practices are misleading, it would necessary to

compare the practice with actual performance. Unfortunately, we are aware of no uniform measures of social, environmental, and financial performance for companies in the varied countries of our sample. Examinations of the extent to which enhancement strategies are consistent with, or contradictory to underlying performance across any of the three areas, or across the institutional structures would be a valuable avenue for future research.

A further limitation relates to our focus on only one year's reports and on only large firms from a limited number of countries. Whether the findings we report hold across other time periods and other samples remains untested. We also do not examine for longitudinal changes in the graphing of social, environmental, and financial items in the sustainability reports. And while we show evidence of enhancement and obfuscation in graph usage for our sample companies, we don't examine whether it actually influences user perceptions of performance across any of the triple bottom line areas. Finally, we limit our analysis to reports made available in a PDF format. The availability of richer data formats such as eXtensible Markup Language (XML) for Internet-based reporting might provide other opportunities for companies to manipulate the graphical presentations of their sustainability (or other) performance. We believe extension of our research across any of these issues could add interesting insights into the use of graphs as tools of impression management in the sustainability domain.

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Table 1 – Analysis of Items Graphed Within Each Area by Cluster

Area	Cluster 1		Cluster 2		Cluster 3		Total	
	No.	%	No.	%	No.	%	No.	%
<u>Social</u>								
Employee-Related	86	45.74%	81	55.10%	89	35.46%	256	43.69%
Safety and Health	64	34.04%	58	39.46%	62	24.70%	184	31.40%
Community Involvement	28	14.89%	0	0.00%	22	8.76%	50	8.53%
Supplier-Related	5	2.66%	2	1.36%	2	0.80%	9	1.54%
Customer-Related	0	0.00%	4	2.72%	65	25.90%	69	11.77%
Other	5	2.66%	2	1.36%	11	4.38%	18	3.07%
Sub-Total	188		147		251		586	
<u>Environmental</u>								
Emissions-Related	91	38.89%	71	31.00%	69	22.77%	231	30.16%
Energy Savings or Efficiency	33	14.10%	34	14.85%	47	15.51%	114	14.88%
Recycling/Non-Hazardous Waste	37	15.81%	32	13.97%	60	19.80%	129	16.84%
Hazardous Waste-Related	14	5.98%	8	3.49%	15	4.95%	37	4.83%
Incidents/Spills/Remediation								
Activities	16	6.84%	2	0.87%	2	0.66%	20	2.61%
Water-Related	24	10.26%	32	13.97%	51	16.83%	107	13.97%
Product-Related	16	6.84%	22	9.61%	18	5.94%	56	7.31%
Environmental Spending/Savings	1	0.43%	8	3.49%	6	1.98%	15	1.96%
Other	2	0.85%	20	8.73%	35	11.55%	57	7.44%
Sub-Total	234		229		303		766	
<u>Financial</u>								
Sales/Turnover-Related	8	20.51%	46	43.40%	49	35.77%	103	36.52%
Earnings-Related	9	23.08%	16	15.09%	12	8.76%	37	13.12%
Shareholder-Related	14	35.90%	8	7.55%	47	34.31%	69	24.47%
Investments-Related	1	2.56%	22	20.75%	7	5.11%	30	10.64%
Other	7	17.95%	14	13.21%	22	16.06%	43	15.25%
Sub-Total	39		106		137		282	
Total	461		482		691		1634	

Cluster 1 includes companies from the United Kingdom and the United States. Cluster 2 includes companies from France and Germany. Cluster 3 includes companies from Italy and Spain.

Table 2 – Enhancement**Panel A – Overall sample**

	Number of Graphs	Percentage of Graphs	Binomial Z (prob.)
Graphs depicting favorable trend	1,152	70.5%	
Graphs depicting unfavorable or flat trend	482	29.5%	16.52 ($< .001$)

Panel B – Average Graphs per Company by Cluster

	Graphs with Favorable Trend	Graphs with Unfavor./Flat Trend	Difference
Cluster 1	7.68	3.70	3.98
Cluster 2	9.15	2.85	6.30 ^a
Cluster 3	12.18 ^b	4.88 ^c	7.30 ^d

^a Significantly different from Cluster 1 at $p < .10$, one-tailed.

^b Significantly different from Cluster 1 at $p < .10$, one-tailed.

^c Significantly different from Cluster 2 at $p < .10$, two-tailed.

^d Significantly different from Cluster 1 at $p < .05$, one-tailed.

Cluster 1 includes companies from the United Kingdom and the United States. Cluster 2 includes companies from France and Germany. Cluster 3 includes companies from Italy and Spain.

Table 3 – Obfuscation - Distortion Bias in Depiction of Graphs

Panel A – Overall Sample, all graphs

	Number of Graphs	Percentage of Graphs	Binomial Z (prob.)
Graphs with favorable distortion	881	54.1%	
Graphs with unfavorable or no distortion	747	45.9%	3.30 ($< .001$)

Panel B – Bias in Depiction of Graphs, Materially Distorted Graphs Only

	Number of Graphs	Percentage of Graphs	Binomial Z (prob.)
Materially Distorted Graphs with favorable distortion	346	60.5%	
Materially Distorted Graphs with unfavorable distortion	226	39.5%	4.98 ($< .001$)

Panel C – Bias in Depiction of Graphs, Non-Materially Distorted Graphs Only

	Number of Graphs	Percentage of Graphs	Binomial Z (prob.)
Non-Materially Distorted Graphs with favorable distortion	535	50.7%	
Non-Materially Distorted Graphs with unfavor./no distortion	521	49.3%	0.40 (.689)

^a Material distortion is defined as a relative graph discrepancy score < -2.5 or > 2.5 .

Cluster 1 includes companies from the United Kingdom and the United States. Cluster 2 includes companies from France and Germany. Cluster 3 includes companies from Italy and Spain.

Table 4 – Obfuscation - Materially Distorted Graphs

Panel A – Incidence of Materially Distorted Graphs by Cluster

	Cluster 1	Cluster 2	Cluster 3	X²	sig.
Graphs with material distortion ^a	112 (24.6%)	174 (36.7%)	286 (40.8%)	32.72	0.000
Graphs with no material distortion	343 (75.4%)	299 (63.3%)	414 (59.2%)		

Panel B - Average Graphs per Company by Cluster, Materially Distorted Graphs Only

	Graphs with Favorable Distortion	Graphs with Unfavorable Distortion	Difference
Cluster 1	1.58	1.23	0.35
Cluster 2	2.93 ^a	1.48	1.45 ^a
Cluster 3	4.20 ^b	2.95 ^{b,c}	1.25

^a Significantly different from Cluster 1 at $p < .10$, one-tailed.

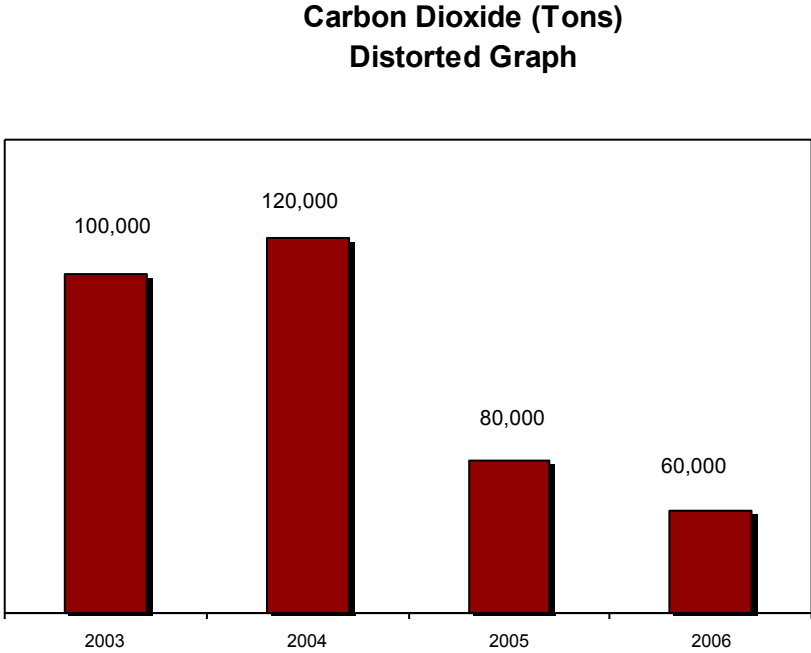
^b Significantly different from Cluster 1 at $p < .05$, one-tailed.

^c Significantly different from Cluster 2 at $p < .05$, two-tailed.

Cluster 1 includes companies from the United Kingdom and the United States. Cluster 2 includes companies from France and Germany. Cluster 3 includes companies from Italy and Spain.

Figure 1. Graph Distortion

Panel A. Example of Distorted Graph



Panel B. Corresponding Undistorted Graph

