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THE TONE IN THE ENVIRONMENTAL DISCLOSURE IN THE SUSTAINABILITY REPORTS OF THE EUROPEAN COMPANIES OF THE ENERGY, UTILITY, AND CHEMICAL SECTORS: AN IMPRESSION MANAGEMENT ANALYSIS

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The Tone in the environmental disclosure in the sustainability reports of European companies of the energy, utility, and chemical sectors: an impression management analysis

Abstract

In this paper we analyze the tone of environmental- information disclosures in three sectors with high environmental impact – chemical, energy, and energy utilities- to determine whether managers use impression management techniques.

After a deep analysis we detect evidences in one of the sectors (energy) that the tone of the language may conceal actual environmental performance by manipulating readers' perceptions, even when sustainability reports are prepared in accordance with mandatory rules.

1. INTRODUCTION

Social and environmental reporting to external and internal stakeholders and capital market participants is a highly sensitive matter for companies. Stakeholders increasingly expect to receive more and better quality non-financial information from companies (Boiral, 2013; Diouf & Boiral, 2017). The purpose of non-financial disclosures is to give stakeholders a deeper understanding of a company's social and environmental performance (Diouf & Boiral, 2017) and thus help them make business and investment decisions (Arena et al., 2014; Boiral, 2013; Cho et al., 2010; Triki et al., 2015).

However, the fact that these disclosures typically are written in a narrative rather than quantitative style allows companies to manage, monitor and shape users' perceptions (Talbot & Boiral, 2018). Managers can use narrative style and verbal tone to influence readers' understanding of the information presented (impression management) (Fisher et al., 2019). Impression management involves using positive keywords or ambiguous, opaque and evasive language (Cho et al., 2010; Triki et al., 2015) to convey a favourable impression of an organisation's performance (Merkl-Davies & Brennan, 2007; Moneva et al., 2006; Talbot & Boiral, 2018).

Verbal tone and language therefore play a key role in companies' non-financial disclosures. They are significant determinants of legibility and play a key role in any textual complexity assessment (Fisher et al., 2019). Most previous studies of tone and choice of language in environmental disclosures find evidence of selfish or manipulative use of these resources (Cho et al., 2010; Davis & Tama- Sweet, 2012; Diouf & Boiral, 2017; Solomon et al., 2013). Cho et al. (2010) claim that companies that paint a highly optimistic picture of their environmental performance tend, in practice, to have poorer environmental performance. In contrast, other researchers find a positive relationship between optimism and future environmental performance (Arena et al., 2014; Clarkson et al., 2008).

With reference to the environmental information provided in sustainability reports, Solomon et al. (2013) note that sustainability reports can be used to create and disseminate myths about social and environmental responsibility. Similarly, Boiral (2013), Talbot and Boiral (2018) and Moneva et al. (2006) are critical of sustainability reports that use the GRI (Global Reporting Initiative) format and find evidence of bias in environmental impact disclosures. They also find that reports often fail to meet many of the GRI requirements. In their view, companies adopt the GRI format merely for the sake

of visibility, when their commitment to environmental sustainability and their environmental performance are actually quite low.

To date, however, no data or research are available on tone or choice of language in mandatory sustainability reports. This is because disclosure of non-financial information was voluntary until the mid-2010s. There is therefore a clear interest in assessing verbal tone and language in sustainability reports prepared under European Directive 2014/95/EU, which makes it obligatory for certain companies to report on social and environmental matters. The purpose of this study is thus to investigate whether managers in sectors that have a significant impact on the environment, such as chemicals, energy and electric utilities, use tone and language in their environmental disclosures to manipulate the reader (impression management).

To do this we make two hypotheses. Based on Merkl-Davies & Brennan's (2007) theoretical framework of impression management strategies and the results of previous research, we expect companies in these three sectors to use a highly optimistic tone in their environmental disclosures (Hypothesis 1). The use of confusing, complex language with low levels of certainty is another way of implementing an impression management strategy (Li, 2008). Previous studies claim that the credibility and accuracy of sustainability information is linked to the fluency, clarity and intelligibility of the language used (Moneva et al., 2006). We therefore expect (Hypothesis 2) that the environmental information disclosed by companies in the aforementioned sectors will have low levels of certainty, thus concealing or blurring any negative impacts of their activities.

To test these hypotheses, we selected the 2018 sustainability reports of the 46 European listed companies in the chemical, energy and electric utility sectors that published their sustainability reports in the GRI format.

We applied the methodology in two phases. In the first phase, we analysed the content of the reports to measure the level of optimism and certainty. In the second phase, we performed an inferential analysis in which we estimated the probabilistic distribution of the mean value of certainty and optimism in each sector, using bootstrapping techniques. This is one of the study's main contributions, since the conclusions obtained from the sample data can be extended to the sector as a whole.

In our research we found no evidence of manipulation of optimism in environmental disclosures in the chosen sectors. In the energy sector, we found that certainty was, on average, below the levels considered normal. These results indicate that, in the energy sector, managers use complex, abstruse language, pointing to the use of impression strategies. For the chemical and utilities sectors, however, the results were inconclusive.

The rest of the article is structured as follows: in the second section we review the most relevant literature, lay out the theoretical foundations and state our hypotheses. In the third section we describe the methodology and the sample data. In the fourth and fifth sections we describe and discuss the results. We end with our main conclusions.

2. HYPOTHESES AND BACKGROUND

The narrative, rather than quantitative, style of environmental disclosures gives report writers scope to use impression management strategies to enhance their company's image (Livesey & Kearins, 2002; Sydserff & Weetman, 2002) and influence users' perception of the company's performance (Talbot & Boiral, 2018). The information thus provided may be biased (Merkl-Davies et al., 2011) and may lead to inappropriate capital allocations (Merkel-Davis & Brennan, 2007). Merkel-Davis & Brennan (2007) note that impressions can be managed either through concealment or through attribution.

Concealment uses highly optimistic language, emphasising positive results or good news, while attribution uses persuasive language, with low certainty, to conceal negative information (Cho et al., 2010). Tone and choice of language are thus key elements of the narrative style of any corporate report; they are significant determinants of legibility and key factors in any assessment of textual complexity (Fisher et al., 2019).

Various scholars have studied the manipulative use of tone and language in corporate documents (Baginski et al., 2018; Campbell et al., 2019; Cho et al., 2010; Diouf & Boiral, 2017; Fisher et al., 2019; Hassan, A., 2019; Huang et al., 2014; Rogers et al., 2011; Talbot & Boiral, 2018; Triki et al., 2015). In the context of sustainability and environmental disclosures, some authors have found evidence of selfish, opportunistic or manipulative use of tone and language (Cho et al., 2010; Davis & Tama-Sweet, 2012; Diouf & Boiral, 2017; Talbot & Boiral, 2018; Solomon et al., 2013). According to Cho et al. (2010), companies that describe their environmental performance in highly optimistic terms have worse environmental performance. In contrast, for a sample of companies in the oil and gas sector, Arena et al. (2014) find a positive relationship between optimistic reporting and future environmental performance. In this case, the optimistic bias would appear to serve informative or transparency purposes, indicating future performance (Baginski et al., 2004). The literature also includes studies of reports issued by certain types of firm on the activities of other companies. An example is Hassan, A. (2019), which assesses optimistic tone and certainty in reports issued by assurance firms certifying other companies' sustainability reports. The author finds that assurance reports tend to use a neutral tone, with high certainty, to convey credibility and professionalism.

Solomon et al. (2013) claim that sustainability reports are a way of creating and disseminating myths about companies' social and environmental responsibilities. Consistent with these observations, Boiral (2013), Talbot & Boiral (2018), Pahlen et al. (2014) and Moneva (2006) are critical of sustainability reports presented in GRI format. According to these authors, the disclosure of negative environmental impacts in these reports is heavily biased and many of the GRI requirements are not met. They further claim that companies adopt the GRI format merely for the sake of visibility, while their commitment to environmental sustainability and their actual environmental performance remain low. It should be pointed out that, because of external pressure to legitimise themselves, companies tend to use bias and manipulate the tone of their reports whether they use the GRI format or not, especially when their environmental performance is below standard (Cho et al., 2010).

It is therefore to be expected that companies operating in environmentally sensitive sectors (such as chemicals, energy and utilities) will use an optimistic tone in the environmental information contained in their sustainability reports, so as to give the company a good image and conceal any negative impacts.

Based on the above literature, we formulate the following hypothesis:

> *H1 Companies in the chemical, energy and electric utility sectors use a high level of optimism in the environmental information they provide in their sustainability reports*

Impression management involves manipulating stakeholders' perceptions not only by adopting an exaggeratedly optimistic tone but also by using obscure, complex and abstruse language with low levels of certainty (Li, 2008). Excessive optimism in environmental reporting and the use of obscure, convoluted, jargon-ridden language can be counterproductive, as it destroys credibility, transparency and coherence (Moneva et al., 2006). Li (2008) claims that less profitable companies have less readable communications: report legibility increases with earnings. However, use of the language

of certainty has been found to be directly and positively correlated with a company's environmental performance (Cho et al., 2010) and with investment in the company (De Franco et al., 2013; Fisher et al., 2019; Triki et al., 2015). Complicated language can serve to mask poor environmental performance, casting the blame for poor performance on external factors (Cho et al., 2010).

Other studies claim that the credibility and accuracy of sustainability reports is reflected in the fluency, clarity and intelligibility of the language they use (Moneva et al., 2006). This claim is supported by Cho et al. (2010), who find that companies with poor environmental performance use complex language that is difficult for users to understand.

Based on the above literature, companies operating in sectors that have a significant impact on the environment (such as chemicals, energy and utilities) can be expected to use a communication strategy with a low level of certainty. Our second hypothesis is thus expressed as follows.

> *H2: Companies in the chemical, energy and utilities sectors use a below-normal level of certainty to conceal or obfuscate any negative impacts of their activity.*

3. DATA AND METHODOLOGY

3.1 Sample

Our source for assessing the use of tone in companies' environmental impact and environmental risk management disclosures is the sustainability reports of large European companies recorded in GRI's Sustainability Disclosure Database. The GRI methodology is widely used by companies in preparing their sustainability reports and is recognised under European non-financial reporting rules (Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014).

The study is focused on three sectors that pose a particular threat to the environment: chemicals, energy and electric utilities. An initial search in the database yielded a sample of 223 companies, distributed as follows: chemicals, 47; energy, 97; and utilities, 79.

To obtain a homogeneous sample, we selected from this initial sample the companies that:

- Have published their sustainability report under the GRI Standard.
- Published a sustainability report for 2018, which is the first year in which non-financial reporting became mandatory for large companies.
- And are listed on a stock exchange.

A further criterion was that the reports had to have been published in English, to meet the requirements of the software we use.

The resulting final sample was made up of the 2018 sustainability reports of 46 companies: 24 in the energy sector, 11 utilities and 11 in the chemicals sector.

3.2. Content analysis

We used DICTION v.7.2 text analysis software to analyse the tone of environmental disclosures. DICTION was first used in the fields of psychology, communication and political science (Allison et al., 2013; Zaharopoulos & Kwok, 2017). In recent years, it

has become a vital tool in accounting research for studying financial and non-financial disclosures, as it facilitates the analysis of narrative text (Arena et al., 2014; Cho et al., 2010; Fisher et al., 2019; Hassan, A., 2019; Triki et al., 2015). Fisher et al. (2019) claim that DICTION is particularly useful for the study of impression management in corporate reports. Many researchers confirm the software's analytical power, based on the use of Big Data and artificial intelligence, assessing word frequency based on linguistic theories (Arena et al., 2014; Cho et al., 2010; Hart et al., 2013; Hassan, 2019), and the robustness and validity of its results based on automated analysis (Arena et al., 2014; Cho et al., 2010; Hassan, A., 2019; Patelli & Pedrini, 2014). Another reason for using DICTION is the measurement approach it uses, which fits the objectives of our study.

DICTION was created by Professors Roderick Hart and Craig Carroll as a scientific method of evaluating tone and choice of language for text analysis. It uses five general semantic features (certainty, activity, optimism, realism and commonality), which can be used to examine differences in tone. These features are defined as follows (Hart & Carroll, 2015):

- Certainty - Language indicating resoluteness, inflexibility, and completeness and a tendency to speak ex cathedra.

- Activity - Language featuring movement, change, the implementation of ideas and the avoidance of inertia.

- Optimism - Language endorsing some person, group, concept or event, or highlighting their positive entailments.

- Realism - Language describing tangible, immediate, recognisable matters that affect people's everyday lives.

- Commonality - Language highlighting the agreed-upon values of a group and rejecting idiosyncratic modes of engagement.

DICTION uses a generic dictionary and multiple custom dictionaries for different fields. For the field of business, for example, it has six subcategories, depending on the type of report being evaluated (company financial reports, corporate public relations, financial news, legal documentation, magazine advertising and television advertising). For this study we used the corporate public relations dictionary, as this is the category that best fits the reports we wanted to analyse (sustainability reports).

Our content analysis focuses on two features, optimism and certainty, with a view to identifying any impression management, concealment or attribution strategies used in the sustainability reports (Boiral, 2013; Cho et al., 2010; Merkl-Davies & Brennan, 2007; Moneva et al., 2006).

Following Cho et al. (2010), we measured optimism and certainty using the following equations, which are those used by DICTION (Hart & Carroll, 2015)

$$Optimism = (Praise + Satisfaction + Inspiration) - (Blame + Hardship + Denial) \quad (1)$$

$$Certainty = (Tenacity + Levelling + Collectives + Insistence) - (Numerical\ terms + Ambivalence + Self\ reference + Variety) \quad (2)$$

3.3 Statistical analysis

After calculating the main descriptive statistics for the values obtained for optimism and certainty, we performed an inferential analysis using the bootstrap sampling method. Bootstrapping is a useful statistical method for approximating the distribution of a statistic (Cao & Casal, 2020). It involves random resampling of the original sample and requires no prior knowledge of the distribution function (Hernández & Martínez, 2012).

One of the advantages of bootstrapping is that it simplifies statistical analysis, as it requires no complicated mathematical calculations to generate the statistic's sampling distribution and needs fewer assumptions, compared to classical statistical methods (Cao & Casal, 2020; Ledesma, 2008). Though founded on the MonteCarlo method, it is increasingly used for statistical inference, thanks to advances in technology and computing power (Cao & Casal, 2020).

According to Ledesma (2008), the algorithm or methodology used by the bootstrap to calculate the distribution of a statistic has two basic steps, which must be repeated *n* times. The more times the steps are repeated (i.e. the bigger *n* is) , the more accurate the estimate will be:

1. Generate a large number of random samples from the original sample, with replacement; and

2. For each random sample, calculate the value of the statistic of interest.

Once the cycle or loop is complete, we have an approximation to the distribution of the statistic, from which we can calculate the critical points and the confidence intervals or perform a significance test.

The statistical inference for this study has been done using this algorithm, as the characteristics of the sample data make this the ideal procedure for generating an approximation to the distribution and for calculating the confidence intervals of tone in each sector.

The procedure for the inference is as follows:

- From the original sample of values for optimism and certainty for each sector, Bootstrap generates multiple random samples (resampling) with replacement, so that some elements will not be chosen and others may be repeated more than once in each sampling.

- To make the random sampling and mean calculation process more accurate, it needs to be repeated many times. For our study, we chose 10,000 repetitions. Within this loop, the bootstrap not only generates the random samples but also, for each sample, calculates the sample mean (the statistic whose distribution we want to find).

- Based on the resulting statistical distribution of the means, we calculate the critical points and the relevant confidence intervals of each tone variable (optimism and certainty) for the chosen sectors.

- Lastly, we compare these confidence intervals with the 'normal values' specified by DICTION to determine whether the levels of optimism and certainty in each sector fall, on average, within this 'normal range'.

4. RESULTS

Table 1 presents some descriptive statistics for the sample. It shows the mean of the tone variables (optimism and certainty) for each sector.

Table 1
Descriptive Statistics

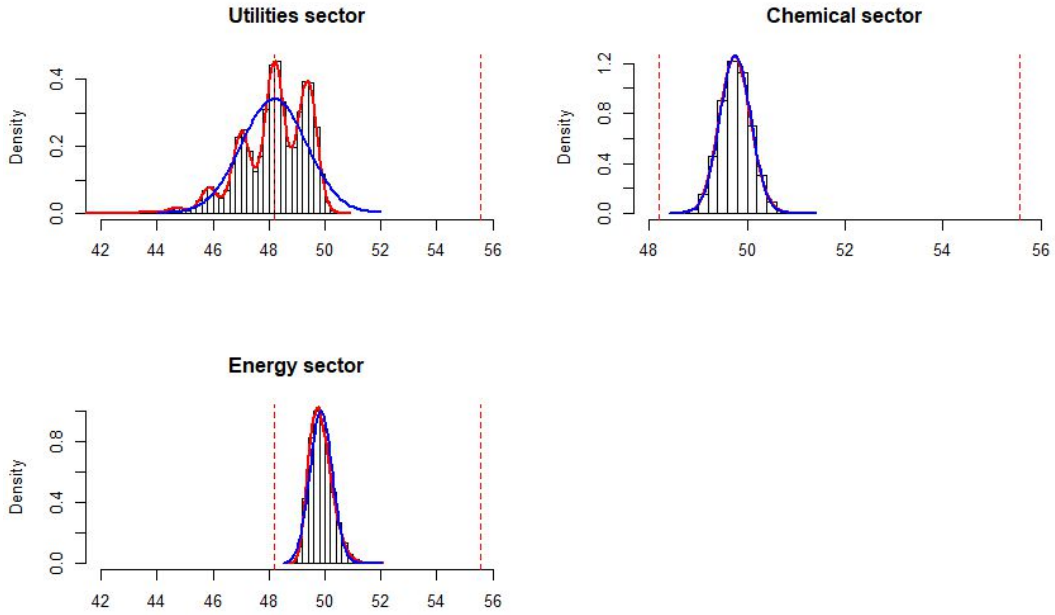
			CHEMICAL SECTOR	
	MIN	MAX	MEAN	SD
OPTIMISM	47.92	51.72	49.76	1,093
CERTAINTY	42.64	51.51	47.87	2,360
			ENERGY SECTOR	
OPTIMISM	47.39	57.83	49.87	1,997
CERTAINTY	21.06	52.11	46.16	6,496
			UTILITY SECTOR	
OPTIMISM	36.45	51.29	48.18	4,047
CERTAINTY	45.94	56.44	48.41	3,042

Source: compiled by the authors

We used the data for each company to generate the statistical distribution of the means of optimism and certainty for each sector, using bootstrapping techniques, as described in the methodology section.

Figures 1 and 2 show the estimated density functions of the means for certainty and optimism in the three sectors. The dotted vertical lines mark the boundaries of what DICTION identifies as the ‘normal range’, i.e. [48.21, 55.58] for optimism and [48.43, 52.71] for certainty. Values below the lower boundary indicate levels of optimism (tone) and certainty (language) below that of normal speech. Values above the upper boundary indicate levels of optimism and certainty above that of normal speech.

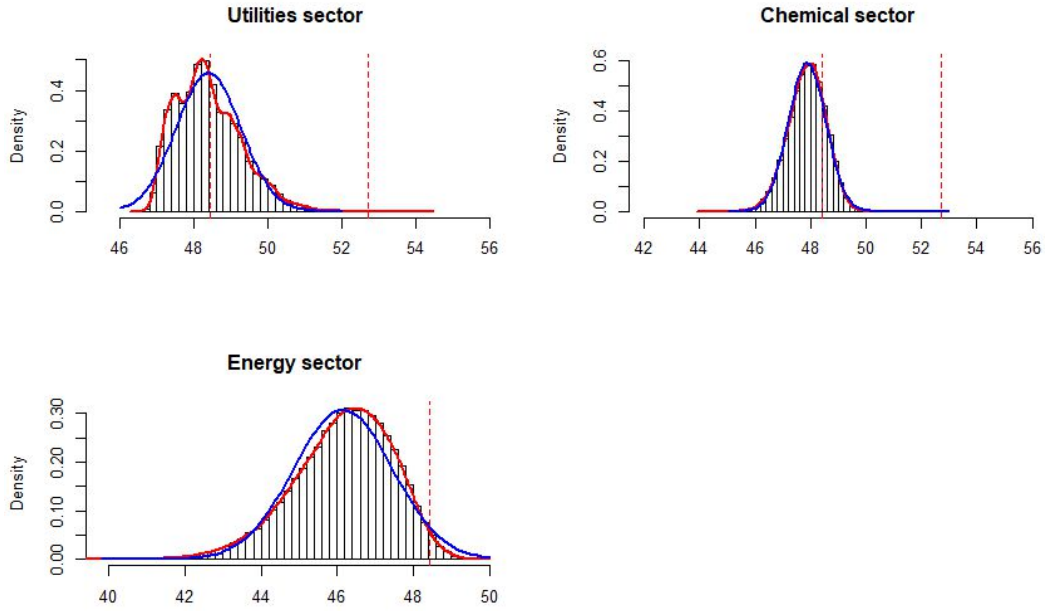
Figure 1. Density functions for optimism mean



Dotted vertical: boundaries for the tone ordinary values [48.21, 55.58]
Red line: density function adjusted to actual values
Blue line: normal distribution adjusted to actual mean and standard deviation

As can be seen in Figure 1, for optimism, in both the chemical and the energy sectors the statistical distribution of the means falls within the range for normal discourse. In the utilities sector, however, the distribution is biased towards values below the lower limit of that range.

Figure 2. Density functions for certainty mean



Dotted vertical: boundaries for the tone ordinary values [48.43, 52.71]
Red line: density function adjusted to actual values
Blue line: normal distribution adjusted to actual mean and standard deviation

In Figure 2, for certainty, in none of the three sectors does the statistical distribution of means lie within the range for normal discourse: in all three there is a certain bias towards low values.

Apart from the interpretation of the charts, to infer whether the levels of optimism and certainty in the environmental disclosures in each sector lie within the range of 'normal values', we calculated the probabilities for the confidence intervals defined by the limits of that 'normal' range.

Table 2 summarises the results for optimism, marking the last stage of our statistical analysis. The probability that the mean lies within the boundaries for normal values is 100% for the chemical and energy sectors, which means that companies in these sectors do not, on average, use either an optimistic or a pessimistic tone in their disclosures. For the utilities sector the results are inconclusive because we find almost the same probability on either side of the lower boundary of the range of normal values. In any case, we find no evidence that the means lie above the upper boundary of this interval in any of the three sectors. We therefore reject Hypothesis 1.

Table 2. Results from testing H1 (optimism)

Sector	UOV	IOV	HOV	OOV
Chemical	0.00%	100.00%	100.00%	0.00%
Energy	0.00%	100.00%	100.00%	0.00%
utilities	46.58%	53.42%	100.00%	0.00%

UOV: probability that the mean is Under the lowest boundary of the interval of Ordinary Values.
IOV: probability that the mean is Inside the interval of Ordinary Values
HOV: probability that the mean is under the Highest boundary of the interval of Ordinary Values.
OOV: probability that the mean is Over the highest boundary of the interval of Ordinary Values.
OV: Interval for ordinary values: [48.21, 55.58]

Table 3 summarises the results for certainty. In this case, the results are inconclusive, on average, for the chemical and electric utility sectors, so we reject Hypothesis 2 for these two sectors. Energy companies, however, use a level of certainty in their environmental disclosures that, on average, is below the boundaries for normal values. For the energy sector, therefore, we accept Hypothesis 2.

Table 3. Results from testing H2 (certainty)

Sector	UOV	IOV	HOV	OOV
Chemical	78.91%	21.09%	100.00%	0.00%
Energy	98.15%	1.85%	100.00%	0.00%
utilities	56.24%	43.75%	99.99%	0.01%

UOV: probability that the mean is Under the lowest boundary of the interval of Ordinary Values.
IOV: probability that the mean is Inside the interval of Ordinary Values
HOV: probability that the mean is under the Highest boundary of the interval of Ordinary Values.
OOV: probability that the mean is Over the highest boundary of the interval of Ordinary Values.
OV: Interval for ordinary values: [48.43, 52.71]

5. DISCUSSION OF THE RESULTS.

In this study we measured the use of an optimistic tone and the language of certainty in the narrative environmental information contained in sustainability reports in the chemical, energy and electric utility sectors. To do that, we used a sample of sustainability reports for 2018 issued by the 46 listed companies in the chosen sectors that prepared their reports in the GRI (Global Reporting Initiative) format.

Our work is thus related to the literature on environmental disclosures in non-financial reports, but this is the first study to use non-parametric statistical analysis (bootstrapping) to evaluate tone and language (optimism and certainty) in narrative environmental disclosures in the sustainability reports of companies in highly environmentally sensitive sectors in the European Union. Our findings are therefore not directly comparable with those of previous studies.

The two studies closest to our topic are those by Cho et al. (2010) and Hassan, A. (2019). Cho et al. (2010) relate tone and language in environmental disclosures in the annual reports of US companies in environmentally sensitive industries to the companies' environmental performance. Our results are not comparable because our focus is on the

levels of optimism and certainty in the disclosures, not on the relationship between optimism and certainty and a third variable. There are similarities with Hassan, A. (2019), in that this author studies optimism and certainty in sustainability assurance statements, while we study optimism and certainty in sustainability reports.

In our study, the results of the text analysis and statistical inference indicate that companies maintain a neutral tone (in optimism) (neither optimistic nor pessimistic) in their disclosures, that is to say, within the limits set by DICTION (48.21-55.28). The optimism of the environmental information therefore cannot be said to have been manipulated. In this respect our study coincides with Hassan, A. (2019), who finds no evidence of excessive optimism in the assurance reports.

As regards certainty, however, our results show a use of complex, abstruse language in energy sector reports. This points to the use of impression management strategies in this sector, whereas the results for the chemical and utilities sectors are inconclusive. In this respect our study contradicts Hassan, A. (2019), who finds high levels of certainty in assurance statements. The reason for this is probably the different nature of the documents studied: sustainability assurance statements (Hassan) and sustainability reports (our study), the former written by auditors, the latter by managers.

Another relevant difference between Hassan, A. (2019) and our study is the statistical methods used. Whereas Hassan, A. (2019) uses parametric methods to measure optimism and certainty, we use non-parametric methods. This means that, unlike Hassan (2019), we can generalise our conclusions from the sample to the population (sector) level, without having to know or make any assumptions about the statistical distribution of the measures analysed.

6. CONCLUDING REMARKS

We tested whether the tone used in environmental reports reveals an impression management strategy. To do this we assessed two features: optimism and certainty. The methodology we used allows us to extend our conclusions beyond the sample to the entire sector.

As regards optimism, our results do not suggest any impression management strategy. For uncertainty, however, our results point to the use of complex language that is difficult for users to understand, which indicates the use of impression management strategies by energy sector companies.

These findings suggest that even when sustainability reports are prepared in accordance with mandatory rules, the tone of the reports can manipulate readers' perceptions, so as draw attention away from actual environmental performance.

Our study contributes to the existing literature because it not only analyses tone and language in environmental disclosures but also uses a novel methodology to extend the conclusions obtained from the sample to the sector as a whole. This is probably the main contribution of our article.

The article may also provide stakeholders with a guide to the impression management strategies used by writers of mandatory sustainability reports, who still have the power to influence their readers' perceptions despite complying with regulations. It thus suggests that investors (especially inexperienced investors) and stakeholders, when making their investment decisions or establishing industrial and commercial relationships, should be wary of the environmental information disclosed by companies.

The regulations on mandatory non-financial disclosure open new avenues for research. Examples include: the creation of indices of quality and tone for disclosures in mandatory sustainability reports; the role of corporate governance in setting tone and communication strategies in such reports; and the determinants of tone and language in mandatory non-financial disclosures.

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